The Making of a Safety Engineer

Writings of Terry Naughton

"AMERICA'S STRATEGIC BACKSTOP
FIFTY YEARS STRONG"
by Warren F. Neary, Capt, USAFR
Limited Edition

Terry Naughton's Story of His Early Career and How He Became a Safety Engineer

editor's note:

I stumbled upon these writings while researching historical launch vehicle failures and at first was somewhat disinterested in Terry's "There I was…" descriptions of flying his cyber aircraft in a pre-world-wide-web game. I'd already heard plenty during my Air Force service; especially during Squadron Officer's School when several hundred Captains learning to be Majors were thrown together for two months. The pilots enjoyed telling tales.

My interest piqued however, as Terry transitioned to his account of how he ended up being a Safety Engineer. His unusual path toward this career is best described as, and many Safety Engineers would echo, "I never set out to become one, but ended up there one day."

To those who work in the Safety Engineering field or to those seeking to enter this often unrewarding and conversely always gratifying career I present Terry's words. I've done some editing for misspellings and format and added photographs (which are not Terry's).

Curt Botts
Chief of Launch Safety
45th Space Wing Safety Office
2009

A tribute to Terry Naughton (a.k.a. Scavenger)

Terry Naughton passed away July 2nd 1994, he was in the mid-fifties. I never had the chance of meeting him personally, I only knew him from his many and often funny messages on the GEnie electronic bulletin board and from some "radio messages" on a game called Air Warrior[1]. We were both AW pilots, like hundreds of other flight-sim fans, we were enjoying re-creating what it was like to be a World War II pilot, we fought for a Country, we were part of a Squadron, we were flying electronic replicas of WW II planes in a cyber sky. All in the comfort of our homes but it was the closest we could get to live.... our common dream.

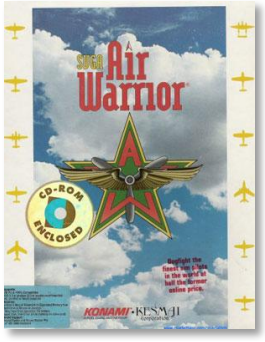
Terry Naughton was known in the AW community as "Scavenger" of the Turkey Ham squadron. He wasn't the best 'pilot' in terms of flying skills but he was the most universally liked person online. The announcement of his death brought sadness to all who had the chance to know him; many of us felt we had lost a close friend.

His messages on the bulletin board were often funny, sometimes moving, and always friendly. It came as a fresh breeze after all the ego-bashing, flame-throwing, chest-pounding messages that pretty much were the norm, at least in the famous Crash & Burn Cafe :)

It's been nearly two years now that he left us, but the posts are still in the memories of those who knew him... They always are a pleasure to re-read and they still bring us emotions. I decided to put some of them on my Web pages to make them even more present to people who already have them on disks and to make them available to new flight-sim enthusiasts who didn't had the privilege of being there.

Thank you again Scav!

Christian Labelle



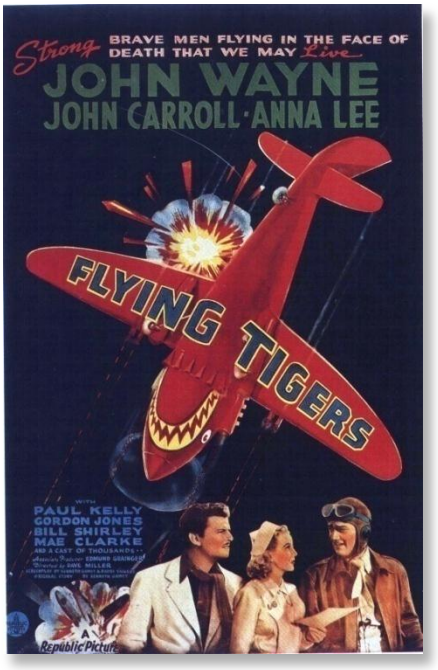
[1] **Air Warrior** was an early multiplayer on-line air-combat simulator. A player is able to fly a simulated World War II aircraft, fighting with and against other players, each flying his own simulated aircraft. It was introduced in 1986 by Kelton Flinn and his company Kesmai. At this time the internet was not generally available outside the worlds of government and academia. Kesmai therefore used the online service GEnie for the game's networked communication.

PREFACE

Message 154 Tue Jun 14, 1994

T.NAUGHTON [Scavenger] at 01:58 EDT

Being five years old in 1943 meant being a WWII child. Having a brother go off to be a bomber pilot fixed my childhood fantasies forever. While other people's children may have dreamed of Cowboys and Indians my fantasy world was filled with fighter planes and bombers, my cowboys were aces, my Indians - the Japanese and Germans.



One night when I was about five or six (1943 or 44) we all walked up to the High Point Theater a few blocks from our house. John Wayne was starring in a movie called Flying Tigers. I was deeply impressed with the glory of anyone who put on a helmet and goggles and took off into the wild blue yonder. The scene that just stuck in my mind forever was John Wayne sitting in a Flying Tiger P-40 Warhawk fighter as he put on his leather flight helmet and started his engine. His canopy was open and when he was ready to take off he looked to John Carroll (who played his wingman) in the next plane and gave him a thumbs-up. His wingman returned the thumbs up vigorously and John and his squadron rolled out onto the grass field and took off side by side over the heads of the happy coolies working in the rice fields of China. John and his friends were on their way to save China from the Japanese.

That moment of thumbs-up seemed to me, as a boy, to symbolize those few men, smart and heroic enough to have earned the right to fly the finest of machines, the fighter plane. For the rest of my childhood the heroes of the world were John Wayne and my brother and anyone else with wings on a leather jacket. That became the only thing that I ever wanted to do. I couldn't wait to graduate from high school and join the elite cadets who were one day going to have wings on their chest.

Mom and Dad, who had already worried through one son flying airplanes, were not at all supportive of having another son in the Air Corps. By the time that battle was fought to its conclusion the Air Force was no longer accepting applications for cadet training and the window of opportunity closed. The Atlas Missile program and then the Mercury Space Program came along and I had enough satisfaction from being part of that to gradually see my dream of a flying career slip away first to the back burner and then off the stove completely. Soon I had a wife and then children. The dream of flying became some lessons in a Mooney AirCoupe at Spirit of St. Louis Airfield right across from Kratz field where Bill got his start in '43. Lessons were expensive for a guy with two kids and flying an AirCoupe with the canopy back was not fulfilling the fantasy. Years went by, many years. John Wayne and the Flying Tigers became just an unfulfilled childhood dream remembered vaguely at air shows and flying movies with the kids.

Then in 1981 I read about a new kind of flying. New technology had made what started as a motorized hang glider into a real flying machine. The aircraft looked much like the Curtis Pusher of 1910-1920 era. Light but extremely strong fabrics and aluminum tubing had created an aircraft that weighed less than 300 pounds powered by an engine that could create a rate of climb of 1500 feet per minute. Full controls had been developed giving three-axis flight; rudder, aileron, elevator. The pilot sat in the open, like the early Curtis.

I decided to go for it. While I was taking my lessons I met a man who flew dive bombers in WWII and had spent most of his life as a test pilot for Douglas Aircraft and as a commercial pilot. He told me one day, "Don't regret the adventure you think you missed. Flying stopped being flying a long time ago. Flying became the act of managing an aircraft," which to him was not flying. He said, "Have you ever noticed those tiny windows in modern aircraft?" That's because flying has become something done inside the aircraft with instruments and communications. The modern pilot is not looking out his windows experiencing the joy of flying." He said that what I was learning to do now was more flying than many get in a lifetime. Sitting on a seat, under a wing, with full controls acting and reacting to the elements is the essence of flight.

He had a beautiful new ultralight with a ballistic rocket parachute which could be deployed in an emergency to bring pilot and plane down safely. So I practiced and learned and finally soloed. The next day I was back out at the field to build up my solo time. My friend was also at the field getting used to his new plane. He came over as I was pre-flighting my aircraft and suggested that we take a little flight together.

Our aircraft were parked side by side on the field. We both climbed aboard. Merl started his engine as did I. We both pulled on our helmets and goggles. A quick control

check - stick back and forth, right and left, full rudder right and left, engine advance and then back to idle. Merl pulled his goggles down and into place and then looked over to me. He reached out with a gloved hand and then extended his right hand thumb indicating his readiness to taxi. I extended my hand and returned a thumbs-up to indicate that my dream was, after 50 years, about to become reality. We brought up the throttles and taxied side by side out onto the grass field. As one we advanced our throttles and side by side we moved down the field rapidly picking up speed. Our planes became light and with a slight bounce of wheels we were airborne. We cleared the edge of the field rising toward the setting sun. I looked down to the fields richly bathed in the early evening light. For just a fleeting moment I was sure I could see the coolies waving from the rice fields as we climbed wing to wing for one last battle with the Empire of the Sun.

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ATLAS ICBM and ATLAS-MERCURY

Cheyenne, Wyoming ▪ Altus, Oklahoma ▪ Cape Canaveral, Florida

1958 - 1963

My Adventure In Spaceflight

by Terry Naughton 1993

I've seen things you people wouldn't believe.
Attack ships on fire off the shoulder of Orion.
I watched sea beams glitter in the dark near the Tanhouser Gate.
All those moments...will be lost...in time
Like tears...in rain.

Roy Batty (Rutger Hauer) in Blade Runner

In the summer of 1958 my Dad, an attorney, was very ill with a heart condition. He was so hypertensive that any discussion led to an argument, and any argument endangered his life. Most of the arguments revolved around my life style. I was an angry lad 22 years old. I was back home in St. Louis, Missouri after six months of Marine Corps Reserve training at Marine Corps Recruit Depot San Diego and Camp Pendleton, California. I tended to stay out late most nights and do plenty of drinking, carousing, and fighting. My life was filled with wine, women, and song. The fact was, I did very little singing.

The origin of my anger and those arguments began in 1943, when I was six. That was the year my brother, William (Bill) Sarsfield Naughton, joined the United States Army Air Corps. Bill graduated from the Air Cadet program and flew bombers during WWII. Dad was an attorney and could afford to leave his work when he so desired. We visited Bill at all of his base assignments. I spent much of 1943-1945 traveling to Army Air Corps bases, watching bombers fly.

When the Korean conflict came he was called back to active duty. I still have the photographs he sent me of P-51 and F-86 fighters parked on the runways of Korea. While other children played Cowboys and Indians I played aviator.

P-51 Mustang (USAF Photo)

F-86 at K-13 (Suwon Air Base)

My Dad thought my adoration of Bill was very cute. He obtained a small officer's uniform and a pair of my brother's wings. Wherever we went I received a lot of attention, including salutes from "other men" in uniform. I never had any doubt that I would, someday, wear my brother's wings on a real Air Force uniform.

In 1955 I was ready to follow my brother's footsteps. I would enlist in the Air Force Pilot Training Program right after high school graduation. Dad wouldn't hear of it, and he had to sign the papers if I were to enter before the age of twenty-one. Mom and Dad felt they had spent enough time worrying over a son flying for the Air Force. They would not go along with their youngest son following the same path. They insisted that I attend college, preferably in the field of law. Dad offered a compromise. If I would attend college for two years, he would then sign my enlistment papers, if that was what I still wanted.

Dad's "compromise" seemed a betrayal. I had been talking about this choice for twelve years, with no opposition from my family. Now that it was time to go, they had pulled the rug from under me. I devised an angry compromise of my own. I knew Mom and Dad would be very upset if I were thrown out or flunked out of college. They might sign anything just to get me out of their sight for a while. It was immature and disrespectful but it was effective. When Washington University of St. Louis, sent my family a notice stating I was no longer welcome, Dad signed my cadet papers the same week.

I took my tests at Scott AFB, Illinois. My scores for pilot training were excellent. The Air Force ordered me to Waco, Texas in sixty days. I spent those two months on an extended "goodbye party" with all of my friends. It was a very exciting time. Even the model airplanes, that filled my room, took on a new significance. The Air Force was now flying some very fast equipment and soon I would be too. The frustration and anger I felt, during the three semesters it had taken to get out of college, were forgotten.

Three days before I was to leave for cadet school my Air Force recruiting officer called. The Air Force had just canceled the cadet program. They replaced it with a flight officer's program that only accepted college graduates. With great disappointment, I joined the Marine Reserve. If I wasn't to be a fighter pilot I would, at least, be one of the proud and the few. I was trained as an infantryman.

My girlfriend, a law student, was being restrained from my company by her father. For some reason he thought that I wasn't going to amount to anything. He was a very wealthy Kansas pharmacist, who came pretty close to possessing his very own small town.

He was an extremely self-righteous fellow. Yet, he thought nothing of sending his darling daughter bottles of 100 Dexedrine capsules at a time to “help her study.” The word *speed* wasn't in vogue yet. If we both took a couple of those 10 mg capsules, we could sit at the bar matching everyone drink for drink and then watch them getting drunk, while we seemed to stay sober and alert. We both thought that was great fun. Later experience taught me that she was not a sexually oriented person at that time of her life. She did, however, firmly believe that I should never go home from our dates with, THAT LITTLE PROBLEM, as she liked to call it.

So, in the summer of 1958 I was very good looking, upper middle class *bon vivant*. I was playing out my *Rebel without a Cause* imitation of life in St. Louis, Missouri. I had more women than I knew what to do with, not yet realizing that even one woman was really, more than I knew what to do with.

My favorite activity was to dress up in my best Ivy League threads. They were a white button down shirt and a crew neck sweater, with sharply pressed khakis, and penny loafers. I would then pick up my date and hit a circuit of our favorite clubs, drinking the night away. Inevitably I would find an opponent. Someone who would make the wrong remark or could be provoked to suit my mood. Then I could release my anger and put my Marine Corps conditioning to use. I would come smashing down taking him out with a few punches and retire with my girl. Life was unchallenging, the events of the world were of no matter; the center of the universe was me. Things finally came to a head toward the end of that summer. My Mother became quite frightened that the arguments with my Dad would cause him to have another heart attack. My girl's father was using every means to recover his daughter from my clutches, even cutting off her supply of Dexedrine. I also had a court appearance coming up.

The manager of our *American Graffiti* style, drive-in hamburger joint had unwisely stuck his head into my car. He began to lecture me on proper “hanging out at the drive-in” behavior. His face was but a few inches from mine. My right hand, resting on the seat had traveled in an arc upwards to the side of his jaw, driving his head up into the roof of my car. Friends outside, watching the episode, said that he suddenly stiffened, his hands and legs splayed out in a Charley Chaplin imitation. Then his head slid out of my car and followed his body down to the ground. I drove away leaving him peacefully sleeping on the parking lot of his domain.

The problem was that Officer Hagar of the Brentwood Police Department was making his rounds just then. Flashing red lights followed me to the next stop sign and I was busted!

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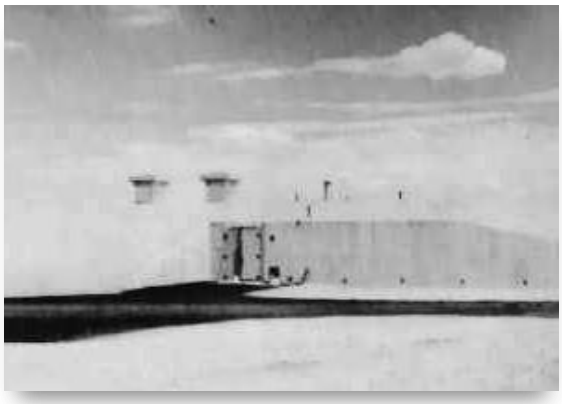
In 1958, I knew Eisenhower was the President. I had never heard of the Military-Industrial Complex, The Missile Gap, or the Atlas Inter-Continental Ballistic Missile (ICBM).

I was driving to Cheyenne, Wyoming in my 1955 VW. The 1955 model had no gas gauge. When it ran out of gas I had to reach down on the floor and turn a little selector lever. Then I could drive on reserve for another 40 miles or so. By the time I reached the five thousand foot altitude of Denver and turned north to Cheyenne that little four cylinder engine was struggling and by the time we reached the seven thousand feet altitude of Cheyenne it was barely running.

My Sister Louise had a home just off the highway and I arrived late in the afternoon. My brother-in-law, a civil engineer, was the Assistant Project Manager for Fuller Construction. He explained he had a project going and I could work out the summer as a laborer for the electrician's union. The Fuller Construction Company received the primary construction contract to build the first ICBM launching sites in the USA.

My job had very little to do with the Atlas ICBM. When I arrived at the site, I found some very basic concrete buildings. Other than the lack of windows they looked little different from any industrial site. Concrete was being poured and the buildings lacked any fixtures at all. My job was to haul the electrical cables from the warehouse



area out to the electricians. The material handler's designation was a good name for day-laborer. When the electricians were on a job that was too short to support an apprentice program they used material handlers as gophers.

I spent my days getting used to working at seven thousand feet altitude. We loaded trucks filled with conduit and cable then drove them a half mile or so to a launch pad or launch control center. Then we unloaded the truck and went back for another load. Days merged into weeks, weeks into the last part of summer. The buildings were

near completion and the union was phasing out their material handlers. It would soon be time to saddle up and move on. Most of the men had been laid off. I was finishing the cleanup work. Nothing that I had done that summer was different from any other construction job. The buildings, to me were launch buildings in name only. There was nothing about the project to get excited about. Atlas was something far away from me in space and time. This was just another construction site, and I was just one of many laborers.

On the next to last day of my employment I looked up when I heard the sounds of a hard pulling diesel engine. I saw the smoke pouring out of the exhausts and gradually a very heavily loaded semi-trailer emerged from the draw next to the site. As it came fully into view I could see why it was working so hard to come up the draw. The tractor was pulling a 70 ft. trailer with an immense load, covered completely by a great grey shroud.

I jumped into my pickup and arrived at the front gate just as the first Atlas ICBM arrived. Even covered in grey the missile looked powerful, enormous and like something out of a Jules Verne story. Then, in my naivety I was not thinking "big Bomb," I was thinking "space rocket."

From the age of twelve I read all the more popular science fiction writers. Robert Heinlein, Isaac Asimov, Hal Clement and others took me on many adventures. Two things, other than wine, women, and very little song, filled my fantasy life; Aviation and Science Fiction. Science fiction and aviation (Aero-Space) had just pulled up to the front gate.

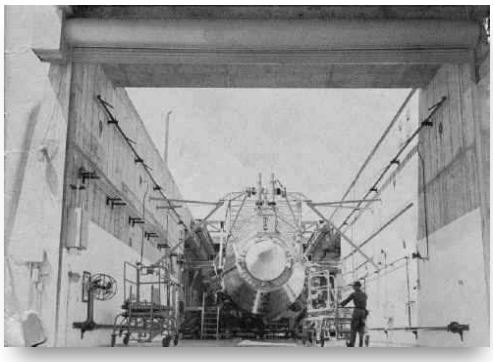
I knew immediately that I wasn't going home. The thought of leaving without seeing the Atlas unveiled, installed and operational was ridiculous. I knew my future was sitting in front of me. But, I had to find a new job. I learned that the company in charge of this phase was the Convair/Astronautics Division of General Dynamics. They were interviewing and hiring the next day, in downtown Cheyenne. The fellow that supplied this information had recently been hired to be a Safety Inspector. He had been

about the site for several days, wearing his white safety hat and looking around. I had no qualifications for a safety job but that's what they were hiring and I was there the next afternoon, right after work. My interview was with the Safety Engineer. The fact that I had no experience was painfully clear. Our discussion reached the subject of my academic credentials. I talked around the fact that I had recently been thrown out of college. I rambled on about college mentioning more about fraternity life than about classes and grades. Suddenly my interviewer's face became more animated. He leaned over and said, “You and I were in the same fraternity. We were at different colleges and about 20 years apart but the same fraternity.” Once that unimportant fact was established I had the job. I drove home as the Safety Inspector for Site 6.

Wearing my newly acquired white, safety hat, I reported the next morning for my employee orientation. The filling out of forms included an FBI and Security Classification questionnaire. I would need a “classified” security level to work on this phase of the project. I doubted that the incident of the Steak and Shake Manager’s jaw would hold up my clearance. A classified government badge made me feel pretty patriotic and important. I answered every question completely and truthfully.

I then attended an Atlas familiarization course. We studied many aspects of how the Atlas worked; its propulsion system, guidance systems, and support systems. For the first time in my life I was academically fascinated. I took many notes and studied in depth. Each site would have a central building above ground referred to as the Launch Control Center (LCC). The LCC was surrounded by six “coffin” launch buildings. The launch buildings, or pads, were long, low, rectangular, concrete buildings, open at the top. The roll back steel roof would be installed later. When completed they would house the Atlas D series ICBM which was built in San Diego, by Convair.

The Atlas would rest horizontally within the building. When tested or launched the roof would be rolled back and a gantry, supporting the Atlas, would slowly rise to a vertical position. This would put Atlas into a ready to launch vertical position. When the construction and installation phase was complete the launch buildings would be landscaped. That is, dirt would be pushed against the outer walls until most of the building appeared to be under ground.



The pads were a labyrinth of equipment. Tank farms held the RP-1 Fuel (rocket propellant #1), a highly refined kerosene. Liquid Oxygen (-293 degrees Fahrenheit) would provide the oxidizer for the fuel, Liquid Nitrogen (-320 degrees F) and Nitrogen gas was used to maintain the internal pressure of the Atlas and as purge pressure for lines and systems.

The Atlas was like a giant, inflated football. Nitrogen pressure kept it inflated. The stainless steel skin was less than the thickness of a dime. The internal baffling separated the various components. They were not strong enough to support the shape of the missile.

When the Atlas classes were completed I went into the field to work with a "more experienced" Safety Inspector. He had been on the job for three weeks before I arrived. The semi-blind led the blind, but we got on well. Soon I was feeling more comfortable. I realized that as little as I knew, those hired even a week after me, knew less. Most of the day was filled with basic safety and reports. A portable, high pressure container left unsecured, could fall over, knock off a valve and cause injury. A man without a safety hat might catch a wrench on his head from those working above. We looked for basic violations of common sense safety rules.

Then one day, on another pad, a man went into the permanent nitrogen storage tank area and never came out. Two men going in after him were also overcome. A substantial nitrogen leak had occurred. Nitrogen, being heavier than air, had displaced the air at ground level[2]. The men had walked into a nitrogen rich atmosphere and were asphyxiated. They breathed nitrogen until they passed out. Nitrogen was a very silent killer.

It became apparent that I must learn more and learn fast, if I was to be an effective safety man. Technical knowledge might, one day, prevent a death. We must also have more safety training for every employee, contractor and sub-contractor. We also learned we required better protective and emergency equipment.

My site had an ambulance parked 24 hours a day, right next to the Launch Control building. The vehicle was a WWII type four wheel drive with the Red Crosses painted on the sides, top and back. Every few days I climbed aboard and started the engine to make sure it would run when required.

One afternoon an electrician was downed by a severe heart attack. This was a man I knew and had worked with during the construction phase. I ran for the ambulance, got it started and backed it up to the launch pad. We loaded this man into the ambulance and began our race for Cheyenne 26 miles away. I was pleased with our speed of response. We had him on the way to the hospital in less than fifteen minutes.

It soon became clear that this truck could not run more than forty three miles per hour with the pedal on the floor. The red light was on, the siren was on yet we were forced into a leisurely drive into Cheyenne. Soon the day shift ended at the site. The men, driving home from work, were catching up and passing me. They were blowing their horns and shaking their fists. I was torn between stopping the ambulance and switching this man to one of their cars or keep on going. We were, at last, reaching the outskirts of Cheyenne so I kept on rolling. We finally reached the hospital where he died a few minutes later.

[2] **Editor's note**: Actually, nitrogen gas is "lighter" than air. The density of air at standard temperature and pressure is 1.292 kg/m^3. The density of nitrogen is 1.251 kg/m^3. The normal atmosphere is composed approximately of 20.9% oxygen and 78.1% nitrogen, and 1% argon with small amounts of various other gases. Reduction of oxygen in a confined space may be the result of either consumption or displacement. The total displacement of oxygen by nitrogen will cause immediate collapse and death.

The I.B.E.W. (International Brotherhood of Electrical Workers) refused to enter any work site until modern ambulances were provided. How many times I had started the engine of that old ambulance, just to make sure it would work, when a need arose, but never thought to take it out for a test drive. Some of the electricians, men I had worked shoulder to shoulder with all summer, seemed to hold me responsible. I became determined to learn more, be more observant, and check things out more thoroughly.

Shortly afterwards, on another site, a man was nearly cut in half. A stainless steel high pressure flex hose broke loose. The hose, under thousands of pounds pressure, flailed wildly, cutting down anything or anyone in its path. Again the seriousness of what we were to do here was driven home. I spent many late night hours studying to learn more about every aspect of this profession. Poor performance in this college could get someone killed.

The obvious question is why were we, superficially trained people, assigned to watch out for the safety of men in a hazardous environment? The answer is simple. We were all they had.

One day the Atlas was being designed and built in a plant. The technicians were supervised and protected by a thoroughly trained factory staff. Months later Convair/Astronautics had a contract to take the Atlas Rocket out of the plant and distribute it throughout the United States. The qualified people were used up instantly. Promoted to their "Murphy's level of incompetence." Then the "know nothings" were hired by the car load to go out into the field and make a job safe with a minimum of training. My job should have been manned by someone with years of experience. But there weren't even weeks of experience around. This job had never been done before.

For the first time I was virtually living my work. We got a new Safety Engineer. W.D. Morgan had spent over twenty years in the Navy and retired as a Chief. He knew a lot about motivating young men. He became a second father. It took him a very short time to realize that the written body of safety knowledge on off-site missile operations was virtually non-existent. He decided to write the book. I decided to help him.

We gathered every publication he thought would give some direction. The Corps of Engineers had spent many decades in every form of construction. Their rules along with Morgan's Navy regulations and everything else we could find were extracted, bent, shaped, reformed to meet our needs. General information on explosive hazards, flammability, and high pressure hazards, were examined and debated. Many nights we were still working when the sun came up. We worked hard and fast to fashion new documents covering the hazards the off-site people were confronting.

On those days, when the sun came up, I just put on my safety hat and drove out to the pad. A full day there was often followed by another night with Morgan, writing, reading, and discussing. We had a job to do and not much time to do it. It was hard work and also the most fun I'd ever had. All this for the $1.25 per hour Safety Inspector's wages that were half of my pay as a laborer.

I was doing a walking inspection of the pads when the military showed up. USAF really wasn't on the sites that much during the installation phase. But when they came they always acted as if we were all working for them. I, on the other hand, was working for Convair safety and didn't give a hoot what Air Force thought if they encroached on my safety regulations. So, when this group of six officers strolled leisurely up to one of the missiles, I was quick to note the big guy in the middle had a cigar clenched in his teeth. That was all I needed to see. I made a beeline for these people yelling, "Get that cigar off this pad!" as I approached.

Two of the officers walked quickly toward me. I was intercepted about twenty feet from that cigar. One of the officers tried to stare me down as the other asked, "Do you know who that is?" My reply was that "He was a man smoking a damn cigar and that was all I needed to know." "This man," said the officer, "is General Curtis Lemay, Chief of Strategic Air Command and the cigar is not lit."

Once we had the fire hazard straightened out I was impressed. Lemay was another of my childhood heroes of the WWII Air Corps. Colonel Curtis E. Lemay flew the lead B-17 of the 96th Bombardment Group on the raid to Regensburg, Germany in 1943. Regensburg and Schweinfurt were two of the most costly and dangerous raids flown against Germany in WWII.

The officers enjoyed the fact that I was impressed by their boss. I was permitted to approach and welcome him to the site. He shook my hand briefly and said "good job" through the cigar while he looked past me at the Atlas.

While I was working on the Cheyenne project the Wyoming Air National Guard offered me the opportunity to go to flight school in Waco, Texas. I would receive the training to earn my wings and a commission in the Air Force Reserve. I would return to Cheyenne to fly the F-86D jet, all weather interceptor. That was the hardest decision of my twenty two years. I spent an emotional and thought filled month. I finally decided give up the dream of becoming a fighter pilot, and stick with the Atlas.

One day while on a site inspection I happened by some technicians who were performing electrical tests. I noticed that the installed pad equipment had switches marked "simulators." One in particular was marked "Overhead Missile Door Open." It nagged at me the rest of the day. Finally I went back and asked the techs, "What are the simulator switches for?" The reply was that it was a time saver for system checks. Bypassing part of the system cut hours from a procedure.

I thought that over until the next day. Finally I asked, "If you can simulate the missile door open, what keeps you from raising the missile into the closed door." That struck them as humorous. "Design engineering makes that impossible. There are electrical safeguards," they replied. They however, did not know what those safeguards were.

I started looking for those electrical safeguards. It was a question in need of an answer. What I found was, that the people who had the education and the system knowledge, were positive it could not happen. But they were vague about why not. The higher I went, the more authority replaced substance in the answers. The replies started to become more strained. One conclusion was that, a locally hired, hourly safety inspector did not know enough to be asking those kinds of questions. My inquiry was a waste of engineering time, said one home office chief engineer. The ex-navy chief, my boss, Don Morgan, saw that I was getting into hot water. He permitted it. He stood behind me when I wrote Impact Reports. Impact reports were filed with both home office and the Air Force. Management had to take them very seriously. My boss was taking a lot of flack.

We finally found ourselves in the Chief of Operations Office. That was as high as you could go at an off-site base. Mr. Jeremiah ruled that while I had an interesting issue, the impact reports I wrote had too high a priority for a theory. It was diverting people from the job of getting the Atlas installed and sold off to the Air Force. I got a polite but firm instruction to "button it."

Shortly after, in Kansas in 1959 a "D" series Atlas was raised into the closed overhead doors of the launch building. The simulator switches were found to be the hardware part of the error. The cost was over six million dollars. There was no loss of life or personal injury as the test was being run from the LCC. The Atlas, the gantry and some support systems were destroyed.

Shortly thereafter our Chief of Operations was called back to Convair/Astronautics headquarters at Kearny Mesa, California. He took me with him. We deplaned at a stopover in Phoenix. While Mr. Jeremiah and I were having a drink the plane taxied off without us. We had missed our flight. Mr. Jeremiah walked up to the ticket counter and pulled some identification from his wallet. He spoke with the attendant for just a moment. Within a few moments the aircraft turned around and taxied back to the departure area. The ramp was down and we boarded. I was amazed. I didn't think anyone short of the President could do that. We had first class attention for the rest of the trip.

The next day Jack Garrison, Astro's Chief Safety Engineer took me for a short walk through the plant. I was introduced to the plant safety and medical staff as his Cheyenne Safety Inspector. I wasn't aware that I was being evaluated. The next day I met the Chief of Aviation and Aerospace Medicine for Convair. I was introduced to him as one of Garrison's Safety Engineers. I returned to Cheyenne to pack. My career at Cheyenne was over.

I received a promotion and a new assignment I would head south to Altus, Oklahoma. I was now the youngest Safety Engineer in the Aerospace program. As pleased as I was to hold that distinction it would cause some major problems in the future.

Altus along with sites at Roswell, New Mexico, Plattsburgh, New York, Salinas, Kansas and elsewhere would receive the new Atlas "F" series silo installations. Now we were going to dig a 152 ft. hole in the ground and put the equivalent of an eight-story superstructure within. My old job had been upgraded in order to attract a higher skill level. I would hire thirty two Safety Technicians for a twelve site operation. My greatest hope was that I would find some of those people with more experience than I had. I wanted employees more knowledgeable then their boss. Maybe in that way I could avoid the consequences of Murphy's Law.

In the early fall of 1960 I drove south from Cheyenne, Wyoming for the state of Oklahoma. Cheyenne had given me a sense of purpose and direction, a small bit of maturity, and a great feeling of good luck and personal fortune. There was nothing I would rather be working on than the Atlas project.

The new car I was driving to Altus, Oklahoma was a British TR-3 Roadster. I purchased it when I returned to St. Louis, for Christmas. If providence had determined that I should still be doing stupid things, that car was the evidence.

I am 6'1" and then weighed about two hundred and ten pounds. The TR-3 was a very small, two seat sports car. I could reach over the side and touch the ground. The first comment I heard after purchasing it was a girl turning to her friend as I drove up. She didn't say, “nice car”, she didn't say, “wow”, she said, "tight fit."

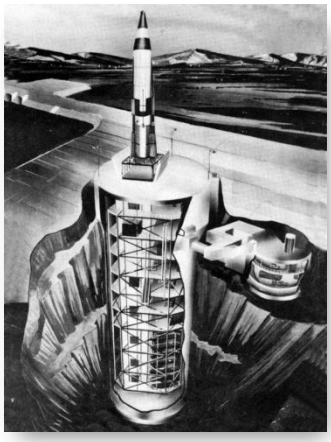
In the Cheyenne winter it was miserable. The heater blew hot air on my right kneecap and that was all the heat I had. The snow came in between the vinyl top and the windshield and made a little mound running along the top of my dashboard that never melted. The engine would never start after a freezing night on a missile site. Someone always had to push start me.

The car was very light so the slightest press of the accelerator would cause the rear wheels to spin on snow or ice. The minute I drove it out of the show room I owed more than it was worth so I was stuck with it until many payments were made. I drove that miserable little car in heavy winters for three years.

When I reached Altus AFB the first Convair/Astronautics people were starting to arrive. I met my boss, Nolan Manly, a newly promoted Chief of Industrial Relations from the Convair/Fort Worth plant. The project was still in the basic construction phase and the authority and responsibility was with the Corps of Engineers. We were considered not too welcome guests at the sites.

I had no experience with chains of command, dealing with the military, trade unions, or with bosses. My "boss" at Cheyenne, Don Morgan, was a leader, not a boss, although at the time I did not know the difference. My Father was a man of great personal integrity but he ruled as a boss, by decree, not by the charisma of leadership. He owned his own business and reported to no one. He was the only role model I had for an authority figure. That was the only way I knew how to approach my new job as a Safety Engineer. I was argumentative, inflexible and the Holy Grail was the safety program. But I was not running my own business like my Father. I was instantly in big trouble.

Under the rules of engagement between Corps of Engineers, USAF, and civilian contractors were agreements called JOD and BOD. JOD was Joint Occupancy Date and BOD was the Beneficial Occupancy Date. The years have blurred my memory as to which was which but one meant we were guests of the Corps on a site with no authority. We were just looking over their shoulder while they worked. The other gave us the contractual authority as construction phased out and the installation of Atlas hardware began.



We were in the former not the latter when I made my first visit to a site. I was the "guest" of the Corps Safety Engineer. We drove from site to site and he briefed me on the work in progress. Down underground in the launch control centers the painters were at work. The air was rich with the smell of paint thinner. The air was also rich with the smell of other solvents as the fitters were wiping down stainless steel with Trichlorethylene from fifty five gallon drums. They were also smoking while they worked. We had Convair people down in those LCCs with them.

My newly acquired office was in a converted barracks on base. I rushed back to write my first safety report. It was in the form of a letter to the Corps. I outlined the hazards, specified the regulations, and pointed out the risks to Convair personnel. I listed the remedy, and mentioned that Convair personnel could not continue to be present with these hazards uncorrected. I copied my boss, USAF, my Chief Safety Engineer at the plant, and of course, my Mother and Father.

Within two days my letter hit the fan. The Corps responded with a letter to the Chief of Operations Convair/Astronautics indicating we had no authority onsite and banning me from further visits. They indicated they could also ban all Astronautics personnel until the official turnover date. Astro must agree to operate within the joint occupancy limits of authority.

This was a big deal. Everyone was very upset. The Chief of Operations called my Chief of Industrial Relations who called me and there was a meeting. I was suspended from any trips to the sites. Jack Garrison was called in from San Diego to

deal with me and pull Convair out of the hot water with the Corps. I didn't have a friend in the world on this matter. My people seemed as outraged by my letter as the Corps.

Jack Garrison arrived by plane the next day. I knew he was there but he did not call for me or come to see me. He was in meetings with my managers. A joint session was scheduled with Astro, USAF, and Corps on Monday. I was not invited to that meeting either.

Before the meeting occurred and while Jack Garrison was speaking with my supervisors two sites had fires in the LCC.

One was considerably damaged and one very lightly damaged. The fires were the result of solvent saturated debris in contact with a source of combustion. The only logical source of combustion was matches or unextinguished cigarettes. The Corps apologized. The meeting on Monday was a victory meeting for Convair. I was not invited but, I was off the hook.

Now Garrison came to see me, he was all smiles and enthusiasm. Putting a twenty two year old Safety Engineer at Altus had suddenly become a feather in his cap. I learned later that he had definitely come to fire me. Corps rescinded the no visit rule, I would be a welcome "guest." Jack was at ease, relaxed and wanted to see the sites.

As we drove out to the Snyder, Oklahoma site we talked shop. My first hired Safety Technician Bob Powers sat behind us. I was explaining to Jack some of the problems I had found on the sites. I explained how I wished I had come down to Altus sooner; I could have prevented some of the more ridiculous unsafe activities. He was all ears and in a good mood.

I explained one the biggest complaints from our people and one of the most stupid things I had seen onsite. That was our men, staggering around, 100 plus feet in the air, on steel superstructure, wearing safety belts, with heavy logging chains, instead of light steel cable attached. The heavy steel link logging chains swung forward with each step and then swung backward slamming into the men's legs, knocking them off balance. I went on to say if it wasn't so dangerous it would be funny.

Bob Powers agreed with me later that Jack was all ears for my report. He said that as I spoke first the back of Jack's neck and then those ears became beet red. Of course my eyes were on the road so I had no idea what was happening next to me. Suddenly and completely to my surprise Jack exploded. Man was he hot. He told me that those logging chains were approved, purchased and shipped by him. His staff spent a lot of time on that provision; that through the use of logging chains there would be no chance of a fraying or breakage occurring by the sliding of thin cable over the sharp edge of the steel superstructure. My opinion about those chains did not change. But I remembered my Chief of Operations remark in Cheyenne. It was another time to “button it.”

Once again the importance of what we were to do and the short time available to learn was impressed upon me. I went in to work one day to hear of a major disaster at

our Roswell, New Mexico site. There were immense cranes at work on the lip of all the silos. They swung loads of materials out over the edge of the silo and then down to the workmen over one hundred feet below. The crane at Roswell had tipped over into the silo while lowering material. The operator, crane and load plunged one hundred and fifty two feet to the bottom, killing him and a number of workmen.

Life went on at Altus. The construction phase was completed and the installation phase began. Convair/Astro took over. I hired my secretary Sally Presley. Her husband had once been on the coaching staff for the Oilers professional football team. One by one Safety Inspectors from other D series sites like Cheyenne started showing up to be Safety Technicians at Altus. My new hiring was greatly reduced by the availability of these good people from other bases. I hired a former Fire Chief with over twenty years of emergency procedures under his belt. Our staff quickly grew to its full complement.

Each site team was issued a car from the car pool. We were in business. The teams inspected the sites. We also conducted new employee orientation and a rescue team class. Each site foreman was asked to appoint a number of men for site rescue and emergency evacuations. The Safety Department trained them in use of the MSA safety appliances, Scott Air Breathing apparatus, and rehearsed the methods of accessing the silo during a fire or other emergency to rescue those who might be unable to egress on their own.

The training time for these procedures was a hot topic for many site foremen. After all, they were held responsible for getting this job completed on contract date. The Atlas installations were high priority rush jobs. So safety training time was often considered lost time. Only later did I find that at some bases training was given lip service, but the procedures were never fully rehearsed. At Altus they were fully implemented.

My second trial by fire occurred shortly after we took over the sites. I ordered dozens of Mine Safety Lamps for all sites. These would be put at various levels in the hole. If the oxygen content became dangerously low they would go out notifying everyone to get out of the silo. Nitrogen tank leaks could occur in the silo just as they occurred at Cheyenne.

The new brass lamps arrived at the Safety Office. We took the task of filling them with kerosene and sending them out to the sites. One man from each shift was appointed to keep them refilled. I felt very good about having those in the silos.

By the first evening my Safety Techs started calling in from every site. The lamps were out and the union stewards had ordered all personnel out of the silo until they were relit. “Why aren't they being refilled?” I demanded. “No one can get the fuel tank open to put the kerosene in,” came the reply. “That's nuts, how in the hell can that be so hard!”

I went back to the office and grabbed a lamp. It was shipped with the fuel canister off the lamp so I took one and put it together just as we had when I fueled them that morning. Then I tried to separate it again. The base turned as if it were unscrewing but would not release. I examined that lamp every way I could think of but it would not come apart again. There was no way to fill it if it couldn't be separated. I had four hundred men out of the silos waiting for an answer and management was hotter than hell. I could not get the tank off.

Finally, in desperation, I called Don Morgan in Cheyenne. I explained what was going on. He was laughing so hard it took a while to get an answer. “Did you get some little metal bars about four inches long with your shipment?” I replied that I had but they didn't fit anything so I put them in a bag in the Safety equipment room. That cracked him up some more. “Go get one,” he instructed, and I walked down the hall and came back with the bag of bars. “OK,” he said, “put a lamp together. Now take the metal bar and put it across those two little steel buttons that protrude from the side of the canister.” That made no sense to me at all, but I did what I was told. I heard a click and I could unscrew the canister. What the hell?

“Those bars are magnets,” Don explained. “They pull the locking pins back so the fuel can is removable. That makes it tamper-proof.” Don was still laughing when we hung up. I spent the rest of the night driving to each of twelve sites delivering them their little metal bars. That was one night I really wished I'd had some years in the business before I was made a department head.

I went back to St. Louis at every opportunity. Dad and I had two more Christmases together. He was in very poor health. I always sent Mom and Dad copies of my unclassified reports, directives, and regulations. It kept him informed of the projects progress. That was also my way of letting him know his youngest son was doing all right.

One day, on impulse, I sat down and wrote him a long letter about my respect for him. I gave him credit for having raised three successful children and setting the values that provided for that success. I just wanted him to know how important he was to all of us. Mom told me later that he read just a few lines and then excused himself to go read the rest in private. She came to him in a few minutes, just to see that he was alright. He had the letter in his hand and there were tears streaming down his face. I am so glad I wrote that letter. He died from a heart attack while I was visiting him over the fourth of July 1961.

Astronautics concluded its first year at Altus, Oklahoma without a major accident or incident. The Safety section was very gratified when our operation at Altus was

awarded the Atlas award for 1961. This was awarded to the off-site facility with the lowest frequency/severity accident rate.

I had become tied to my desk. The amount of paper-review was enormous. Daily reports came in from each Safety Technician. Medical sent us reports on any injury regardless of severity. We received copies of the weekly and monthly reports from every other off-site facility. Material came from the home office daily.

Work had become my only activity. A day of work was finished with movement by us all to the base Officer's Club. Altus was a very small town and the Officer's Club became our regular hangout. We drank and talked shop.

One afternoon my secretary made a suggestion. Her husband was forming a semi-professional football league in Oklahoma. He would coach the Altus team. It would travel around the state but only have an overnight on weekends. Sally recalled my mentioning how much I loved playing football. She thought it would just be a great idea if I joined the team.

I was very tempted. At twenty two I was sure I would never play again. Now here, unexpectedly, was another chance to play the game. I reported for practice. It took a while to get in shape but I was having a lot more fun than hanging out at the Officer's Club. There were two things I had not taken into consideration.

One was the level of competition. Oklahoma had some of the best "has-beens" in the country. Oklahoma had supplied the Sooners, A&M, Rice University, and colleges all over the USA with some of its finest players.

Two, I had not taken my boss's reaction in to consideration. Nolan was beside himself. It made him very unhappy having his "Safety Man" playing tackle football before the entire Atlas organization and community of Altus, Oklahoma. He thought it set a bad example for safety.

I played that season as a tackle for the Oklahoma Yellow Jackets. They were quite a bunch of "part time" football players. These people were bigger, stronger, and tougher than anything I had seen before, on a football field. I saw many of them remove their false teeth before each game. Our fullback played for the Chicago Bears in his prime. The other tackle was "All American" from Rice University. The quarterback played for the Sooners. The competition was equally qualified. We won our share of games. There were days when I went to work looking like one of the accidents I was trying to prevent. But I was having a very good time.

The Annual Safety Engineers conference was scheduled and I was selected to be a keynote speaker. Altus was one of the first of the F-series silo bases and Jack Garrison felt my input would be helpful to the newer sites. I prepared my speech on "co-occupancy with the Corp of Engineers." After my experience with Corp I felt that would amuse my fellow Safety Engineers. They were also experiencing their share of problems with the Corp.

I climbed on a plane, and flew to Santa Maria, California to spend one day with my sister Louise before flying down to San Diego. My young nephew Nick had a new skateboard. I had never been on a skateboard. It looked interesting.

The next day I flew down to San Diego and presented my safety speech. I turned the pages slowly with my left arm. My right arm was in a cast to the shoulder. My boss enjoyed the cast more than the speech. He said explaining me, as a Safety Engineer, to others was becoming quite an exercise in futility.

A USAF Safety Officer, Major Downs, was assigned as liaison between Astronautics and Air Force. Most of his enquiries were directed to me. Major Downs and I got along great. His only shock came after working with me for almost a year; he asked me how old I was. When I responded that I was 23 he looked shocked. He had assumed he was working with some experienced hand in his thirties. That was a nice compliment about my work and a lousy crack about my looks.

The paper flow out of my office was equally formidable. I collated every possible hazard from other bases along with engineering studies and NASA bulletins into a weekly bulletin to the Site Chiefs. We found that the safety documents for off-site operations were coming from so many sources a Site Chief could become very frustrated trying to acquire the information and follow the guidelines.

We spent many office hours collating every source document into one manual. Then we reduced the size down to a pocket book, and titled it “The Safety Advisor.” We had it distributed throughout the base. The Safety Advisor contained the sections for SOPS (standard operating procedures), TOPS (temporary operating procedures), BOPS (base ops), SRs (safety regulations), and so forth. For the first time a site supervisor preparing to perform any procedure could pull out his manual and see everything there was on that item. It was very well received. We sent a few to home office expecting that they would like to reproduce it for the other sites but heard nothing back.

I found myself losing all personal touch with the sites. Everything I knew about the silo progress was coming in from my Safety Techs. They had become experts in the field and I truly trusted their observations. When they asked me to come down on their behalf in an on-site safety dispute, they got what they asked for and a bit more.

Safety was frequently a disputed issue. The Astronautics mission was to install this system quickly and effectively and get it turned over to USAF. National Defense and all that. I kept promising myself to put the papers aside and spend a week in the field. It never seemed to happen. The bottom line was things seemed to be going well. We were moving into the second and final year at Altus with no major events.

I assigned one of my Safety Technicians, Pat Robinson, to learn the use of emergency rescue equipment for on-site use. He spent days with our Mine Safety Appliance and Scott Air sales reps. He was an extremely bright and quick young man only four years older than me. He also proved to be an excellent instructor and that is a

rare talent. We put on a one day class in how to use the emergency equipment to get out of a silo. We offered it to every new hire including all the subcontractor personnel. Then I asked Pat to make a circuit of all the silos and teach a five man crew how to rescue people in a silo emergency.

We wrote a plan whereby the Stand-talker (stationed at the exit tunnel from the silo) would keep a record of every man entering and leaving the silo and what level he was working on. We stationed all these new, expensive rescue devices in a big locker just inside the tunnel, behind the blast doors. I bought horns for every site, to be mounted next to the Stand-talker. He could activate the horn to evacuate the silo. God, at twenty three, how I loved to devise these plans and spend money on gadgets.

Some site-managers were reluctant. Once more Safety was diverting man-hours from production. I heard frequently, "Hell, man, we aren't going to be staying here for twenty years." But I was having a good time and we were going to do it right at Altus. My performance reviews had been excellent, I had my boss on my side, and I had just been reclassified from Safety Engineer to Safety Supervisor. I was now a RED BADGE.

Safety Engineers had been candy stripes meaning they wore a red and white striped badge and were staff advisors not supervisors. An all red badge meant supervisor. Therefore officially, until then, the Safety Technicians officially worked for my boss, not me. In reality my boss seldom even saw them.

My best friend and counterpart, Bill Whitmer, was Security Supervisor or Security Officer. Bill was a Red Badge. How I envied his supervisor status. He enjoyed reminding me of that little difference in our position frequently.

The chief of Industrial Relations pinned on my red badge and took me to all the department heads. He enjoyed reintroducing me as his new Safety Supervisor. At twenty three did I ever enjoy that day. A small ego was not one of my problems.

While that was going on I was having my third big battle with Operations Management. Pat Robinson had learned of a defective high pressure hydraulic valve installed at every site. Site Management was aware but felt it was a low priority threat. Pat felt it was extremely hazardous. Remembering Don Morgan's backing for me in Cheyenne, I threw in my full support for Pat. He obtained all the documents, went around asking all the questions, and came to the conclusion that we should shut down the system. Since this valve affected hydraulics throughout the silo, that shut down the silo.

That was our recommendation and insistence. Management was horrified. We were talking about a great number of lost man-hours. I was called into meeting by the Chief of Operations.

Every operations and engineering supervisor was present. Safety said shut it down. They said no. I got hot. At twenty three I had no concept of compromise what-so-ever. They offered to build a containment cover that would go over the valve and

prevent flying metal or hydraulic spray. I said fine, when they were in place then the silo could go back in operation.

McPheeters, the Chief of Operations, said that contractual obligations would not permit us to just stop work. I said, fine, just don't use the hydraulic system. Of course that effectively shut down the silo so engineering and site-ops got hot. It was getting out of control. My boss took me outside. He told me I had said everything I was going to say in this meeting. I was sent off to my office like a misbehaving child would be sent to his room.

I stewed. I called Jack Garrison the Chief Safety Engineer at home office and ranted. He said I had done everything I could do. The final decision to operate the site rested with operations. I said I could red tag the valves. That was the one threat safety always held over management. Technically we were an advisory group. We were staff. We were not in the direct chain of authority. The last trick, of a frustrated safety man, was to use the threat of a red tag. In theory no one could remove a red tag or operate red tagged equipment. On the other hand Safety was advisory, not part of operations. So it had always remained just a threat.

I was ready to play our last card. Garrison and my Chief of Industrial Relations were ready to fire me. I was told, no I was warned, not to do it. I calmed down, they calmed down but I felt I had backed off and let my Safety Techs down. Later I learned everyone was hoping I would calm down and back off a bit. They were afraid for me that I was going too far. But I was only twenty four. I had very little idea of what too far might be.

We continued going around to every site and training those emergency rescue crews on how to get men out of the silo. Late one afternoon, about two weeks after the brouhaha, I was sitting with Bill Whitmer, the Security Officer. We were having coffee. A call came in from the site security office. There was a major fire at site six Russell. Men were trapped in the silo. We jumped into Bill’s security vehicle and put it to the floor getting out there in a hurry. By the time we arrived it was almost over. The ambulance was picking up men who had been overcome by smoke inhalation. The silo was a burned out hulk. Just about everything in that hole was wreckage.

What happened was this. That hydraulic valve, still unshielded and uncovered, blew. The metal fragments flew out like a hand grenade grazing one man. A fragment hit the explosion proof light above the valve exposing the electrical filaments. The force of the pressure of hydraulic fluid against the broken remnants of valve caused some of the fluid to become a mist. The mist reached the broken lamp and ignited.

The flash fire of the mist quickly raised the temperature of the spewing hydraulic liquid to its ignition point and the now flaming liquid cascaded down into the bowels of the silo, igniting everything in its path. There were about forty men working in the lower levels. The Stand-talker switched on the evacuation horn. This alerted the emergency rescue team who ran into the LCC tunnel and started putting on Scott Air Packs. They gathered other supplies, lights, rope, extinguishers and moved to the mouth of the silo.

The men in the lower levels were surrounded by fire and smoke. They grabbed Lif-O-Gen bottles hanging from the guard railings. Lif-O-Gens were seven minute compressed oxygen bottles designed for ambulance and sick bed use. All you had to do was stick the little spout in your mouth and press the stem. They also had a little plastic mask and hose if you had the time. They were not made for rescue use but there was nothing else I could find in 1961 to offer a little protection for the large numbers of men we had in silos. So I ordered these in the hundreds as a better than nothing option.

The men tried to come up. They found the elevator would not function. They had seven minutes oxygen supply to climb the spiral ladder up to the LCC tunnel. They made it to the tunnel level only to find access to the tunnel blocked by fire. Just as things were looking hopeless ropes started dropping down from the top of the silo. The emergency rescue crew, moving fast to the overhead missile doors, started pulling people up by the ropes.

Two of the younger stronger guys went down into the silo and hooked up the men overcome by smoke. The smoke was beginning to pour from the silo top. The rescue team used their Scott Air Packs to stay at the top and pull men out. They finally fell back from the silo rim, job complete just as the combustibles in the silo caused flames to extend out above the silo doors.

The final count was no deaths, twenty seven men hospitalized with smoke inhalation. They were all released within a few days. The Russell site was over 50% destroyed. Operations was in a state of shock. My guys were in a state of elation. Phone calls of congratulation were coming in from all of our sister sites, and home office. The sites that had dragged their feet on providing men for the rescue crews were now demanding more rescue equipment, more Evac-bottles, and more training.

We scheduled a brief ceremony to honor the rescue crew with many pictures for the company and town newspaper. Needless to say all sites were temporarily shut down until the replacement valves arrived. Pat Robinson was the man of the hour in our office. In spite of my protestations that this was Pat's accomplishment, I got a great deal of credit from my bosses. I did not protest too much. It was very heady stuff. We had their attention for the rest of the Altus project.

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If this was a story about personal friendships, I would devote a chapter to my relationship with the Security Officer, Bill Whitmer. Bill arrived at Altus a couple of months after I did. That was because the previous Security Officer had been relieved of duty and shipped out. He became overly involved with the USAF social life at the Officer's club and permitted Security to take second place. They brought Bill in as his replacement. Bill was about twenty six when he arrived in Altus. He was married and gave all appearances of being very settled and mature. He had a big job. He was responsible for all security matters at the sites. He would hire and supervise a guard force of over one hundred and fifty personnel.

While Bill was far more mature than I, we shared a common bond. For our age and previous experience we were both in way over our head. We also shared the fact that we were doing a damn good job of it. Often the look on Bill's face when I came up with one of my grand ideas reminded me that, other than my responsibilities in Safety, I was, in fact, a typical twenty three year old kid. But at twenty six Bill still had enough kid left in him to also appreciate this was one fine adventure. We became the best of friends and Bill's advice often kept me out of trouble.

The biggest thing missing from working on Atlas was that none of us would ever see it launched. It was a very good thing that we wouldn't as it was, after all, installed as an ICBM pointed at the Soviet Union. But still, it would have been very exciting to see one of those rockets blast off into space. Major Downs came into my office one morning and asked me if I could take the time to join him on a little trip.

A little trip to Vandenberg AFB in California to sit in the blockhouse for an actual Atlas firing. I don't remember hearing a more exciting offer in my life. Virtually none of us working on off-site bases would ever participate in a launch. I ran to Nolan for permission to go. I really thought he wasn't going to permit it. Then I got a sly smile and a remark that it would be good for our relationship with USAF, so he supposed I could make the trip.

The trip was right then. I got an hour to run home and pack a bag, get back to the base and board a USAF C-47. We climbed out of Altus, AFB and headed west. There were four officers and myself. I was in heaven; flying in a military transport going to a live shot. We landed at Vandenberg and the very next day checked in to the launch complex. We were accessed into the LCC and given a briefing.

I was invited to sit with the Range Safety Officer at a console. We were seeing the Atlas via the closed circuit monitors. The countdown began and ran down to T-0 without a hitch. The LCC started to vibrate and a deep rumble came through the concrete walls into the room. The monitor showed the flames shooting down and back out of the flame bucket. Atlas started to lift very slowly out of the gantry. The sustainer and two boosters were causing all the vibration. The verniers at each side moved back and forth maintaining the Atlas in the correct attitude.

I sat there transfixed. Everything I had spent two years working on and reading about was happening out there, on that pad. Atlas moved slowly up into the atmosphere. I heard someone say mark 2 which meant the boosters had correctly shut down and the single sustainer engine was now carrying Atlas into space. The camera caught Atlas becoming a small condensation trail as it moved up and out of the atmosphere. Everyone was elated as Atlas had come through some very hard times with several costly and embarrassing failures. Every successful launch was a very big win.

I came home feeling that if it all ended tomorrow I had now seen everything I dreamed about, back there in Cheyenne, when the first Atlas arrived. I came home to start phasing out at Altus, Oklahoma. We won the Atlas Award again for 1962.

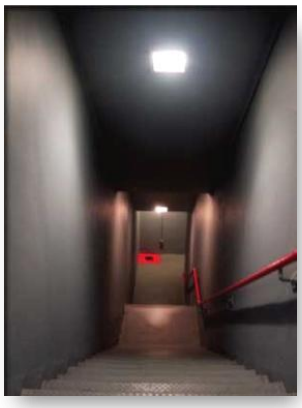
The final phase of the program was to demonstrate to USAF a capability to fully tank the missile. We would transfer fuel (RP-1) and Liquid Oxygen from the storage tanks on the silo to the onboard tanks of Atlas. This would occur as the missile was raised from within the silo to a position above ground sitting on the missile elevator ready to launch. The procedure was called a DPL for double propellant tanking.

The LCC was sealed and the pad cleared. My Safety crew and I were "safely" located about 2,500 ft. from the launcher at the Fall Back Area (FBA). This established a reasonable safety area from which fire fighting and medical emergency operations could be launched in the event of a serious incident. I was, as usual, watching with a hand tightly wrapped around a cup of coffee.

The Atlas began its ascent out of the silo. Its nose showed the white frost evident as the missile skin reached sub-zero temperatures. This was caused by the LOX (liquid oxygen) being pumped into the internal tanks. The missile had risen about a third of the way out of the silo when it stopped. That was definitely not part of the DPL procedure. We waited.

The fall back area was in contact with the Test Conductor through a land line. A look in that direction evidenced that a lot of discussion was taking place between the Base Manager and the Test Conductor located underground at the silo. The site manager beckoned to me so I put my coffee on top of the car and walked over. He handed me the mike. The test conductor was on the other end and wanted me to drive in to the site entrance and come down to the launch control center which was about 70 ft. below ground. He said to move fast and he would brief me when I arrived at the LCC.

No one had ever gone into the 2,500 ft. area before, once a DPL was in progress, at Altus. I was very aware of that as I made a very lonely drive through the



guard gate and down the road leading to the Launch Control Center entrance. I reluctantly left the security of the car. I parked it right in front of the door (for a quick getaway) and went down the long tunnel stairs to launch control.

The Test Conductor briefed me that his instruments indicated a loss of pressure in a liquid oxygen line from the storage vessels to the Atlas. So he felt sure LOX was pooling on some level of the silo.

Liquid Oxygen alone is a quick freeze to anything that it touches. With any hydrocarbon (oil, grease, RP-1 fuel or lubricants), it makes a bluish colored gel that is highly explosive and extremely pressure sensitive. It can be set off by a foot pressure of 5 to 7 pounds and has five times the explosive force of a similar amount of TNT.

They wanted me to take the site foreman on a complete tour of the silo. The half erected Atlas would be hanging over head boiling off liquid oxygen into gas as it sat there warming up. We were to explore the silo for any sign of the LOX gel. Were the Atlas to move or any machinery activate, sufficient energy could be produced to explode a gel and destroy the missile, systems, and in fact the entire silo. We would have emergency lighting only as they were afraid of any possibility of an electrical spark. So the Foreman and I were escorted to the blast doors.

The blast doors were located in the tunnel between the LCC and the silo. They weighed about 10,000 pounds and were designed to contain and divert the blast from an explosion inside the silo, keeping it from reaching the men in the LCC. We then stepped to the silo side of those doors and the LCC personnel buttoned up by closing those doors behind us. To this day I can still clearly remember the sound of those doors closing. We had about 70 ft. to go through the tunnel and then we were directly under the aft end of the Atlas sitting on its elevator. The Atlas seemed even larger from this perspective. On the whole, I would have rather been in Philadelphia.

We climbed down the silo ladder one deck at a time reaching the bottom in less than ten minutes. The bottom of the silo held much of the machinery to move the elevator. In the light of our flashlights and the low grade illumination of the emergency lights, we started working our way up one level at a time looking for a LOx gel.

We were also hoping the stressed system would not let go as the fluids now sitting stagnant and building pressure in the missile system were meant to be moving at

all times into or out of the missile. We both jumped when a safety relief valve popped off on one of the liquid oxygen tanks venting excess pressure.

We spent a tense hour in that silo looking for anything that might explode the missile if it were moved back into the silo. We had both seen the films of the Cape Canaveral Atlas launches that blew on the pad so it was not a joyful hour.

We found nothing unusual and were able to go back to those big blast doors at a walking pace instead of at the speed of sound. When they opened and I was back in I felt I had paid my dues for all the times I meant to visit the site but was too busy. I also paid my dues that day for being in safety, where our job was to "just watch".

The blast doors were slowly swung open and we were able to rejoin the living on the safe side. The missile was very slowly lowered back into the silo and detanked. Another DPL was scheduled and we finally got Snyder sold off to the Air Force with no further hair-raising incidents.

Soon I would be laying off my men. We had no more off-site contracts and I would soon follow them to lay off. It was about over. I really thought it was about over. I was very wrong.

In the fall of 1962 Altus was completed. I gave the Safety Technicians a bon-voyage. Each got a good letter of recommendation. I called home office about Pat Robinson hoping they find something for him to do there. I had killed my chances of being transferred.

Jack Garrison called me several months earlier, while Altus was still unfinished. He offered to transfer me in to home office on his staff. When I visited home office safety I thought it was boring. Leaving Altus before the finish, walking around the plant looking for cigarettes in the wastebaskets, was not a future to me. When he told me I would have to "temporarily" give up my ninety dollars a month off-site bonus I was sure I wanted no part of home office. I thanked him but rejected his offer.

My Chief of Industrial Relations was aghast. Nolan could not believe I had just thrown my career away by turning down the Chief Engineer. It also bothered him that I had not even mentioned the offer until after I turned it down. I was 24. What did I know about all that? I was on a roll. I was having too much fun to see even sixty days ahead. Nolan assured me I had thrown my future away. In emphasis he suggested that I get my résumé printed and out to other contractors. I put out around three hundred résumés to every aerospace contractor.

I was packing the last boxes for shipment to Kearny Mesa when I received a call from Jack Garrison's assistant, Bill Bordon. Bill wanted to know if I still had those Safety Advisor Manuals. I told him they were packed for shipping but yes they were here. He asked me to unpack that box and put thirty of them in the hands of the next supervisor heading to Kearny Mesa by air. They were in Safety's hands the next day. Later I learned that USAF had confronted Convair about the accident at the Russell Site. They alleged that the silo sites had no integrated, documented plan for silo emergencies and

that, in part, accounted for the fire and damages. We, at Altus, were the only site that did have the integrated plan and it was documented in the Safety Advisor. Jack and the San Diego boys went into the meeting with the Safety Advisor. They distributed the copies before the meeting began and took the wind out of USAF's sails.

Then I got another call. Would I pack up and drive to Lincoln, Nebraska right away. Sure I would, what was up? USAF had given Convair a new project called "Clean Sweep". It was a follow-up contract to take the system upgrades to each site and install improvements and correct deficiencies. The rumor mill had it that the Air Force Techs had screwed up the systems. Our guys said that if the LCC panel required a green light to go on these Air Force Techs went down into the silo and made sure a green light came on. Even if the way to get the light on was to bypass the system it monitored. Our Engineers remarked that if Atlas had to be operationally launched it would be a great surprise if one out of four actually fired. Omaha, Nebraska was SAC headquarters and we were getting into a pushing match with the Soviet Union over Cuba. Those missiles had better be working.

I drove to Lincoln in early October of 1962. Our crews were moving around all the SAC Atlas sites making repairs and adjustments. They found a lot wrong. We were working twelve to fourteen hour days. We were not reading newspapers about the build-up. Most of us were rolling in and out of bed and to and from the sites. The most dramatic event I recall was watching the DefCon numbers going down. We knew what DefCons represented. They started at 5. This was a relaxed state of readiness. They terminated at 1. This was everything ready to launch with the launch officer’s finger actually poised over the button.

The United States had never been to DefCon 2. We went to Defcon 2 while I was in an Omaha area silo. I wasn't sure if it was good to be in a silo and kiss the world goodbye or be in the world and kiss a girl goodbye. I decided on the latter.

One of my very best friends and co-workers from Cheyenne was also assigned to Clean Sweep. Alex (Flip) Manzano and his wife Anita were in Lincoln when I arrived. Every minute we were out of the silo Flip and I buddied around. One night we were strolling around a Lincoln, Nebraska Mall. I chanced to look through the window of a full service camera shop. Behind the counter, waiting on a customer, was a beautiful Swedish blonde.

Swedes were new to me and they were very numerous in Nebraska. I thought Swedish women were just great. Flip prodded me into going into the camera shop. With him looking through the window I approached this beautiful girl. I asked her if she had some sort of camera and she replied that they didn't carry that brand. I said I should probably go to Penny's. She smiled and leaned forward. She said, "We don't say Penny’s in here." I thought that was a cute answer and suggested she show me around to those other stores the next night. I explained that I was new in town and really did not know my way around.

She looked at me for a moment and then said she had other plans for tomorrow night. Just as I was thinking of my next move she said “but I could show you around tonight.” Within fourteen days of our meeting we eloped to Sioux Falls, South Dakota which had no three day waiting period. We were married on December 11, 1962. Eventually we had two beautiful children, Traci Ann and Shaun Andrew. We remained together until 1971.

The day after I proposed, the Chief of Industrial Relations at home office called. What are you doing in Lincoln? I said I was getting over shaky knees. Well, would you want to go to Cape Canaveral and handle our safety program there? I was too surprised to take it seriously for a moment. He really meant go to the Cape and run Astro Safety for the last Mercury shot.

Gordon Cooper was scheduled to launch in May 1963. It was now December 9th, 1962. I said I would be there and then asked him if there wasn't a better transfer package for married couples. He paused and then said “you will keep that lousy ninety dollars you’re so worried about.” No, I replied, “It’s not about the ninety bucks it’s about me getting married in two days.” He broke up. “You sure will go to extremes Naughton, but yes you get one thousand transfer instead of three hundred.” “Okay,” I said, “put me in for a married transfer and I will be at the Cape right after New Year.” He said "you will be at the Cape by twenty December."

I had to leave Darlene behind, in Lincoln and go directly to the Cape.

I checked in with Industrial Relations on the 19th of December 1962. Just driving on to the Cape was exciting. As soon as I had my ID I was on my way to Pad 14. This was where Mercury would be launched. The sign on the front gate read

My new supervisor took me around to meet the department heads. T.J. O'Malley was running the Cape office for Atlas. B.G. McNabb, Operations Director was traditionally the last man to shake the Astronauts hand as they stepped from the trailer to the launch pad elevator. Cal Fowler was Test Conductor.

I found an apartment just a block from the beach. The balcony looked out over the ocean. Darlene arrived from Lincoln and we started the marriage adventure. On the nights when a Cape launch was scheduled we just opened our door, walked out on the balcony, looked to the left and watched the arc of flame rising from the pad. It was right out of a Robert Heinlein novel with the slight improvement of being real. I could hardly wait to really get into harness and begin my new job.

Darlene and I went out on a few furniture gathering jaunts buying some rattan like all Cape dwellers. Darlene brought home a tiny Persian kitten that jumped up and sunk its tiny teeth into my dinner steak and then into my thumb when I tried to recover my dinner. My beautiful and long time buddy Stud died with a kidney infection. Stud came into my life in Cheyenne and had been through the entire adventure with me. He was a handsome sable and white Collie. His life could be the subject for another story, but now he was gone.

I turned over my English TR-3 to Darlene who thoroughly enjoyed running around Cocoa Beach getting a great tan with the top down. She was a Swede who never burned, only tanned. With her white gold hair and a dark tan Florida was treating her very well.

We bought a sailboat. I wanted something small and easy to sail. I saw a little twelve foot boat with a single sail that looked just right for a beginner. I spent hours reading all the books on sailing and then went over to the Banana River (intercostal waterway) to give it a try.

I set everything up and in a mild wind launched from the dock. Things happened very fast. The wind filled the sail, the sail swung the boat and in an instant I was floundering around in the water. A dozen tries later I had never made it much past the end of the dock. I was drawing a small crowed. I left my little boat chained to the trailer and came back the next day. The wind had blown the boat off the trailer and the mast was shattered.

Chagrined, I brought my little day-sailer back to the apartment. The apartment owner looked over my boat and heard my sad story. He really thought it was funny that I bought a racing cat-boat to learn on. It seems I hadn't noticed that the single sail was on a mast almost twice as high as the boat was long. He fiber-glassed the break and I spent all of my free time learning to sail.

Each day I would run out to Pad 14 to see what I could see and make my reports. I was working out of a cubby hole that I shared with the Security Officer and his secretary. I spent most of my time at 14 which was where the action was.

Soon I began to sense that I was rubbing my boss, the security officer, and his secretary the wrong way. The Chief of Industrial Relations was trying to rein me in. The security officer, a gentleman in his sixties and soon to retire, was trying to get me to quit loading "his" secretary up with reports to type. His secretary was supposed to be "our secretary" but was pleased to have him stick up for her. My work was left undone.

It came down to this. Mercury had been on line for a while. Cooper's launch in May would be the last Atlas-Mercury launch. After that the manned space flight operation would go over to Martin Marietta with the Titan as launch vehicle. Astronautics would be left with a few science packages to launch with Atlas.

Additionally while Atlas was the launch vehicle, NASA and Pan Am had the site responsibility. They had their own safety people so, according to my boss, Pad 14 was not the focus of attention for Astro/Safety. The assembly and administration areas were my responsibility. This meant my job was to make daily and weekly rounds checking the waste cans for cigarettes, the grinding wheels for proper clearance.

This was the end of the road and they were winding down operations. I came in charged up from running a twelve site project. I had also had a well developed ego from supervising, developing procedures, and briefing top players. In Altus I had my own secretary and rather unlimited resources. So, simply put, these people found me knowledgeable, but abrasive, over eager, and self important. I was also there because home office thought I was the best Safety Engineer in the field. I was now twenty four.

My boss had one other, hidden agenda. The Chief of Industrial Relations in San Diego made him lay off his Safety Engineer and take me. The man they were forced to lay off was Ken McCabe. He was also in his twenties, had done a fine job. He was part of the original team and was really liked by everyone. He was also my supervisor's personal friend. I had contact with him regularly as he had obtained a Safety Inspector's job with Pan Am.

I found myself in hot water at every turn. My reports were left untyped for days. Getting anything done required an argument followed by another meeting with the Chief of Industrial Relations. Each meeting with him gave others more confidence in their refusal to give me support. Their refusals led to more meetings with my boss. The meetings with my boss turned into reprimands in my personnel folder.

Within four months I was on probation. My San Diego bosses, Jack Garrison and Kip Williams were calling me to get my side of the story. I did not give it to them. I kept saying everything was fine and there were no major problems. I was applying a lesson learned at Altus. It was the right lesson at the wrong time.

Back in 1960 Jack Garrison had come down to Altus. I had a list of complaints about my boss. He listened and then gave me a serious lecture on loyalty. He said that Nolan had given me an excellent review and was responsible for the support I had received during the flap with Corp of Engineers.

I decided then, that I would never criticize a supervisor, behind his back, or to higher authority, again. So San Diego got basic reports and no complaints from me. They, of course, knew the situation from my supervisor’s point of view, so not speaking up added to his credibility.

I was miserable at the Cape. But there were more important matters. On Complex 14 our people were preparing an Atlas for launch. It was the highest risk area

for Astronautics' personnel. I would inspect all Astro areas. But I was going spend a lot of time on 14, regardless of who my boss thought, had the responsibility. In Cheyenne and Altus I paid very little attention to being a "good employee." I paid a lot of attention to being a good safety man.

Gordon Cooper was getting ready to go. I went up to the white room daily. There, I would often stand next to Alan Shepard who was Cooper's back up. I would listen to the chatter and chime in a bit. I was accepted out on 14. If I was there, I was part of the team.

Alan Sheperd had a new Cadillac and Gordo had a Corvette. They all got their cars from G.M. Dealer, Jim Rathman. Rathman was the professional driver, who had once won an Indianapolis 500. Alan and Gordon liked to race each other from the pad to Henri Landiworth's Holiday Inn. That was the motel most frequented by the Mercury Astronauts. Cocoa Beach Police looked the other way. It was fun to watch and know I wasn't the only kid on the pad.

They made regular trips away from the Cape in their assigned service jet fighters. When they flew back from those trips they announced their return by coming over the Cape inverted at about three hundred feet altitude. We all went outside our office buildings to wave them a big welcome back.

Of course, Mercury wasn't the only test site at the Cape. Right next to us was the Gemini stand. Martin Marietta was testing Titan for that program. They had a launch going one afternoon. The missile climbed up about one thousand feet and blew up. A great purple red cloud started to sink back toward the ground. We on 14 were ordered to button up the launch building and stay inside. The blockhouse went on internal air and we sat it out for over an hour, waiting for that cloud to dissipate. The titan was fueled with dimethylhydrazine, a nasty and highly toxic chemical.

One night I was returning to Cocoa Beach from Cocoa on the causeway headed east. To my left and several miles away was the Cape. I saw a trail of flame signifying a launch. Within a few moments the entire area was lit up like a thousand high powered floodlights had been turned on. It was very eerie. A minuteman had exploded on launch. Gigantic pieces of missile and solid propellant were strewn about the pad. The solid propellant burned like a million sparklers going off at once, casting a brilliant artificial light about the Cape.

The day was quickly approaching for the Cooper launch. I was spending my time at Complex 14 looking for problems. I noted in a report that the elevator used to move the Astronaut from ground level to the capsule had only one cable and did not appear to have any safety mechanism or backup if that cable failed. It was a legitimate concern.

I turned this report in at once and soon got a call from my Chief of Industrial Relations. When I arrived at his office he had the report on his desk. I received a fifteen minute chewing about being overly interested in 14 and sticking my nose into

areas that were not my responsibility. The launch was in a few days. He banned me from the site.

I have a photograph taken by my wife. It is 8:04 AM May 15th, 1963. I am standing, dressed in a white shirt and tie, on the beach, a mile away from the Cape. I am pointing up, to the last Mercury-Atlas, MA-9, Faith 7 as it rises from Complex 14 with Gordon Cooper aboard. I have a big smile on my face. My smile is for the camera. This page of my story could be titled, "I Was Almost There!"

Later I received a pocket size copy of the Test Conductor's manual for that flight. It is dated May 17, 1963 and reads, "Thanks for your assistance on Faith 7," signed Cal Fowler, Test Conductor. Cal had no idea how much that meant to me. I was far more accepted on Complex 14 than among my peers and supervisor in the Industrial Relations office.

The important thing is that MA-9, Faith 7 was successful. MA-9 flew 22.5 orbits over a 34:19:49 period. There was a complete loss of power in the automated re-entry system, and loss of all altitude readings, which forced Cooper to make the first completely manual re-entry. He landed within four miles of the recovery ship, Kearsarge.

Shortly thereafter my Chief of Industrial Relations called me in to his office. Ken McKabe was there. He asked me to spend some time with Ken, briefing him on the various state of affairs in Safety. He explained that he had received approval to increase the size of the safety department and that Ken and I would be working together.

I spent a week working with Ken. Ken was an interesting and likeable man. At the end of a week I received another call to see my boss. He quickly reviewed my past six month's performance. He fired me and then escorted me around to turn in my badge, pick up my final check, and get off the Cape. Ken McKabe was my replacement.

While I was working on the Cape I went to a joint Air Force, NASA, Pan American safety meeting. There I met a Colonel Steel who was the top Safety man for USAF at Patrick AFB. He had responsibility for USAF Cape operations. He offered me a job with his Safety team. It was a GS-12 government job.

I called him the next day and accepted his offer. He said he was glad to have me and directed me to the GS applications office. I filled out the various government forms. Colonel Steel was out of the country for a meeting. After waiting a week I called to ask when to report. I was referred back to the employment office.

They told me that I did not qualify for a GS-12 job. I was five months short in total education and time on the job. I had four and a half years in the program. Five were required. I said the Colonel had already hired me. Employment explained that the Col. couldn't hire anyone for a GS job. That was the employment office responsibility. Calls to Colonel Steel, in Mexico, went unreturned.

Darlene and I packed up and moved back to my home town of St. Louis, Missouri. The great adventure was over. So was the money. I was considered over paid, too young, and over qualified for most industrial safety jobs. I finally got a job as an investigator for General Motors. I kept my résumé in with all the aerospace contractors. I never received an offer.

Jimmy Doolittle's biography is titled "I could never be so lucky again." That sums up my recollections of the spaceflight program.

Historical portrayals of the voyage of Columbus to the New World usually focus on Columbus, the major players, and his project. There were many others who worked on the Columbus Program. Most shared in only part of the adventure. Some may have died, some were laid off. A few may have upset Columbus and were fired.

But they were there. They were the carpenters, laborers, sail makers, clean-up men, and maybe... there was a kid, from a good family. A kid who was wasting his life, getting into trouble, drinking too much and had no direction in his life. A kid who found his dream, when he had the opportunity to play a small part on the Columbus project. I would understand and, identify with, that kid.

During a "brief shining moment" in history, when Kennedy was President, and mankind took its first steps toward the stars...

I was there.

Terry Naughton – 2nd on the left