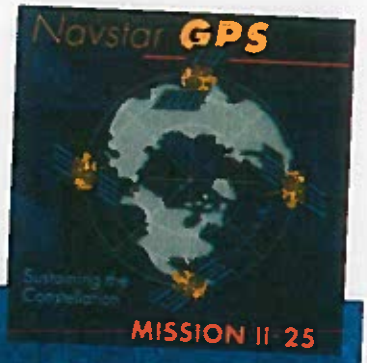
KOYAANISQATSI AT PAD SEVENTEEN



by Marr "Moose" Lavigne #238

Photos by USAF and the author

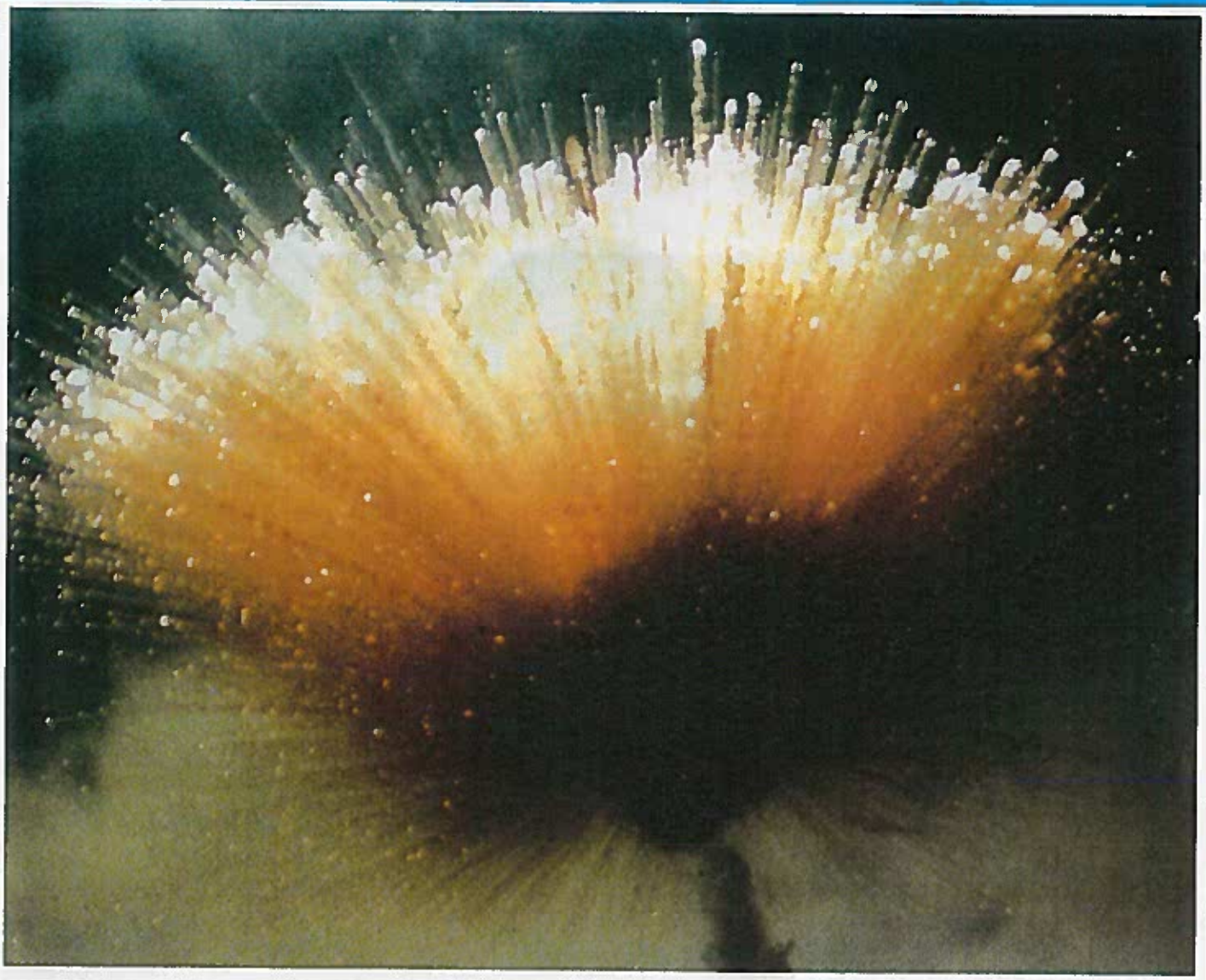
In many technical occupations, a strong sense of teamwork develops when working with a small group of professionals day in and day out. We become familiar with each other's personalities, moves, strengths and weaknesses. We depend on each other to get the job done. We feel unified when the organization is running like a precision machine. A proper balance is struck, if you will. This is how it is for the Delta space launch vehicle team, and the following story is my attempt to convey an unforgettable historic event from the morning of 17 January 1997.

Prologue

On a typical launch day, the 1950's blockhouse is where all the resident team's skills unite for one common goal: to prepare and launch the rocket. For the Delta, the final four minutes of the terminal count are the most critical. Prior to that time, the vehicle's first stage is receiving propellants, the engines are slewed, the electrical systems are powered up, the telemetry and control systems are exercised, all activities that have been done previously in the days leading up to launch. The team has seen it before and knows what to expect. The atmosphere in the control room, crowded with consoles and the lead test conductor up front resembling an orchestral arrangement, is sharply focused. The back room, where telemetry strip charts and support consoles reside, is a bit less tense thanks to the freedom to walk around and the absence of upper management.

When the T-4 minute mark is called, it is a "huddle up" signal for all. Almost like robots, we snap to our stations and take position. All chatter ceases. We watch intensely as the vehicle is transferred to internal power and the silver zinc batteries bear the load. Nitrogen and helium spheres are topped off

Another normal liftoff. Little did anyone know that the #2 solid rocket motor was about to cato. ***(USAF)***



At T+14 seconds, the self-destruct system splits all nine solid motors, creating a nice starburst display. Notice the nose cone poking thru on top, indicating that the range safety folks have yet to issue command destruct. ***(USAF)***

and rechecked. Ordnance systems are armed. The LOX tank is brought to 100% and one can imagine the sound of the big vent valve slamming shut at T-120 seconds. After the second stage hydraulic pump is energized at T-90 seconds a string of familiar litanies is heard on the comm net: Hydraulics go, electronics go, range is go, lox topping is go, status is greenboard, igniters armed. Three, engine start, two, one, liftoff.

As if on a winning football team, we embrace the feeling of being team players and share the successes. We also experience the emotional trauma when our common plan deviates out of balance.

T-0

My assigned position on Delta 241's launch day was special instrumentation telemetry monitor in the back room of the blockhouse. Not the most glamorous position, but I was the most obvious choice since I had written and directed all of the specialized functional testing. As with most terminal counts, things moved along uneventfully. Gathered in the back room also known as the data station, we chatted with each other, shared jokes, hollered across the room, and otherwise prepared for the events to come. As the terminal count proceeded down through the normal holds I developed the feeling that this would be another normal launch. My thoughts drifted to the next one on deck.

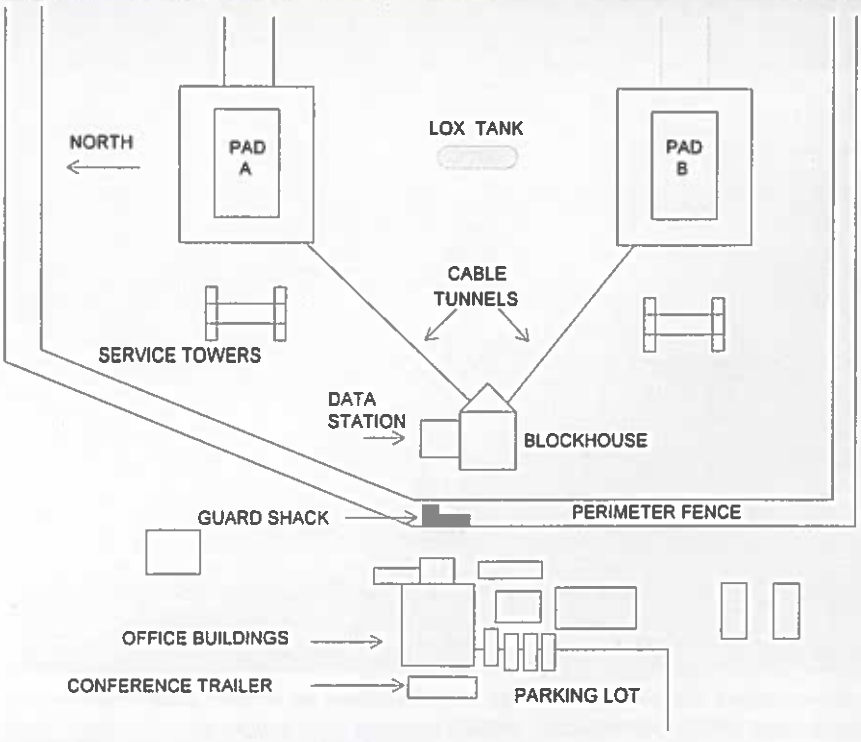
Just prior to the four-minute mark, I was discussing with a propulsion engineer about which video channel to watch on the overhead monitors for liftoff. We both agreed that the close pad view would be good for ignition, but to switch to the remote range camera site as soon as the pad camera view was obscured with smoke. With that in mind, I took my normal telemetry monitor stance before the stripchart recorders, pen in hand. The countdown clock off to my left ticked away the final seconds as displayed by their three-inch red digits. At T-0 the first stage console operator (the guy who issues the engine start command) announced the liftoff indication and we were treated with the normal liftoff roar from 800 feet plus concrete and earthen walls away. I annotated T-0 on my charts using the standard red felt tip pen, then quickly looked up at the video monitors. The pad camera was already white with smoke, so as planned we switched to the remote range camera feed. The vehicle was ascending nicely.

T +12.8 Seconds

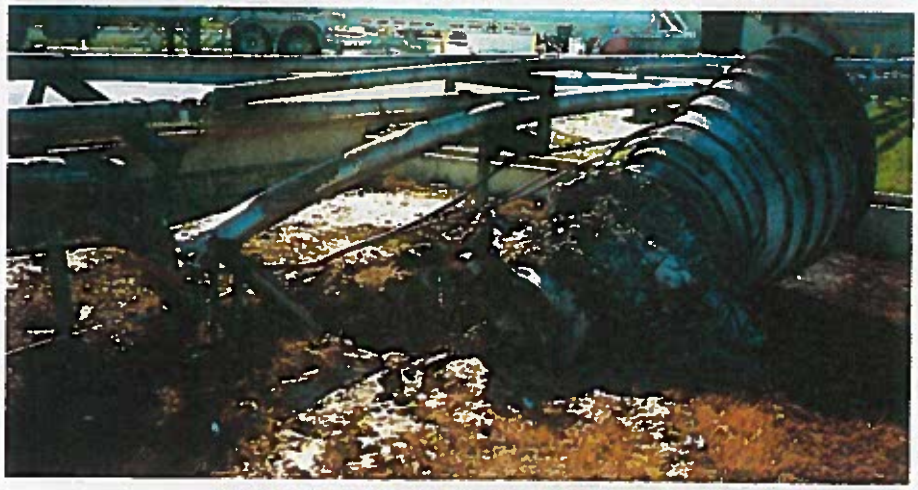
I returned my attention to the data streaming out of the chart recorders. The accelerometers and pressure sensors had the usual low level vibrations. Looks nominal, I thought. One more glance at the

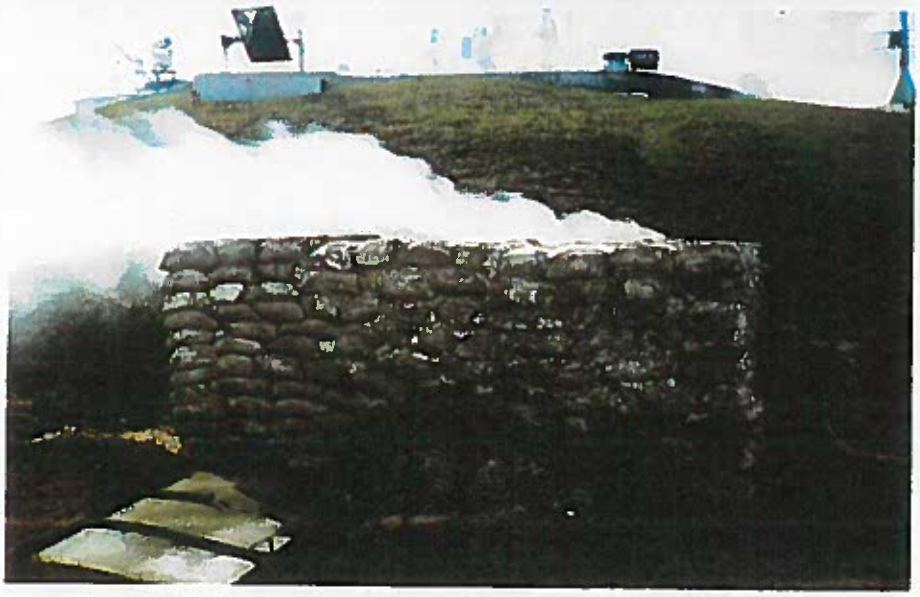
monitor. What the hell is that? I caught the sight of a blast of flaming solid propellant engulfing the first stage, associated with a burst of static on my headset. Nahh, that can't be - what does the data say?, my mind reeled. I glanced down and noticed a transient bump on all eight channels, but they all settled down to their normal levels. I looked back up at the monitors for more input, but it was too late. One by one, in what seemed like slow motion, the monitors went blank. Blink, blink, blink down the line until all six were black. My headset was void of the familiar post launch commentary. Muffled booms filtered thru the thick walls. It was eerie. I thought over and over as my jaw hung open, "this isn't supposed to happen."

What was *really* going on? Did we truly lose the vehicle? Along with many others in the blockhouse, I was in a state of denial and mild shock. I stared at the faces of my fellow engineers for clues. They all looked bewildered, like deer staring back at headlights. What do we do now? My experience took over momentarily and I stared at the charts once again.



One of the solid motor nozzles (above) sitting next to the pad, being examined by part of the investigation team. The first stage main engine (below) was found near pad B. ***(USAF)***





The video camera atop the roof remains unscathed as smoke pours out of the cable entryway of the blockhouse. ***(USAF)***

Now there was a definite sign of the loss of telemetry - all channels were random noise. Yep, that's my affirmation. Better write that on the charts: "Loss of vehicle." Further affirmation came when a large piece of what was once a fully operational rocket slammed into the blockhouse, shaking the walls and ceiling like a fully loaded freight train. Shortly afterwards, there were a few lesser intense shocks from falling pieces. Gravity won this contest.

Through all of this activity, I do not recall feeling any sense of personal danger. Perhaps it was knowing I was in a reinforced blockhouse. I would have different feelings later.

We were directed by word of mouth (as if we needed to be told) to distribute the emergency air supplies, or ELSA paks. These are small personal air tanks connected to a plastic bag that fits over one's head. The tank has only a seven minute supply to be used whenever one must move through contaminated air to safety. Seven minutes. The storage box was running low, so I declared that I would share one if needed. Nobody seemed amused. Most people opened their plastic bag and tried it on. Thinking about the seven minute limit, I decided to use mine only if things went from bad to worse, so I left it slung over my shoulder.

Nowhere to Go

As smoke slowly seeped into the room I had the sinking feeling that we would be stuck for a while, so I looked over the stripchart data again in an attempt to pass the time. The clues were puzzling. The first stage data ended at 12.8 seconds, but the special channels that were installed in the payload fairing lasted until 21.7 seconds. Looks like the problem started at the bottom and worked up, I thought. Seeking more clues, I walked over to where a couple of our senior engineers were sitting. One was staring at the floor with a solemn look, the other was shaking his head with a blank stare and muttering, "it must have been a solid motor, it went too fast."

As the reality of the failure was slowly taking hold, I thought it would be interesting to see how the others in the front control room were adapting. When I walked in I was struck by the sight of people standing up at their consoles, a most uncommon sight. I walked up to the prop console and asked the engineer how things were. He told me the first thing he did was to remove his headset and dive under the console. A natural yet futile reaction, I thought. He then uttered very negative opinions of solid motors. The others were milling about, as if waiting for something to happen. It didn't take long. Suddenly an air vent began belching smoke and someone yelled for a fire extinguisher.

After the fire scare turned out to be merely smoke, I wandered back to the data station.

One of the guys seemed extremely nervous. He was holding his jacket over his nose in attempts to ward off any toxins from the smoke. I was growing concerned that he would lose it and try to break down the reinforced vault-like door.

As the smoke slowly thickened, he moved to the floor to sit with a huddle of other guys along with the Doc, our eldest team member. I felt sorry for Doc. He shouldn't have to go thru this.

Glancing up at the monitors, I noticed that somebody was scanning the outside area with the rooftop camera. Amazingly, the camera was still operational. The camera was scanning the pad area 180° back and forth repeatedly. Unfortunately for us trapped rats, the camera could not point towards the door of the blockhouse. All we could watch was smoke from distant grass fires and a fire at the cable tunnel where it enters the blockhouse.

Koyaanisqatsi

Slightly more than an hour after the incident, we were given the go-ahead to evacuate to the northern perimeter emergency evacuation assembly point. Wow, I thought, I gotta see this. We are going out by the pad! My thoughts went to the air tank. I checked the valve and kept it ready in case it would be required for walking near a cutting torch flame pointing in my direction, spewing toxic black smoke. Better let the other guys go first - I was in no hurry.

Just outside the door we were met with the chilled air of that cold January day, a welcome contrast to the acrid smoke that filled the blockhouse. We proceeded through the short protective tunnel entryway made from railroad timbers, sandbags, and dirt to meet - koyaanisqatsi. The first evidence of something amiss was the absence of people. After a normal launch, we always see the same beehive of activity upon emerging from the blockhouse: the gang hanging out in the smoking area, the security guards leaning against their trucks, the guys returning the government cars to their parking spots, the pad damage assessment team preparing to do their thing. But this time it was a scene from a holocaust movie - numerous smoke pillars, no people (other than our single file line wandering off to the pad), damaged buildings and muffled explosions.

I consciously increased the gain of my awareness to take in all the sights. It is odd how the mind behaves at a time of danger. I guess most people were only concerned with getting away from there, but I was more interested in taking notes. As I walked slowly along, I could not miss the multitude of circular, ash-white burn marks sprinkled all over the asphalt from the burning solid propellant rain. The burn marks ranged in size from a few inches to many feet. Many unburned pieces from the three air-started solid motors were scattered everywhere. Then there was that thick black smoke behind the office buildings. My truck, I thought. That big smoke column looks like it's coming from the parking lot. Thoughts of hindsight rippled through

The crater (above) depicts the cause of all the scattered asphalt and shows how some cars were left intact while others were burned beyond recognition. Someone has the thankless job of assessing the damage to public and private property. ***(USAF)***

The blockhouse outer wall/roof interface where the "frieght train" debris struck, exposing the rebar. ***(USAF)***

my mind, "Why didn't I park it at the remote lot and ride the bus in?" Too late for that plan.

Walking around the corner of the blockhouse and turning eastward, I expected to see large scale destruction of the towers or pads or something. Instead, things looked mostly normal. There was another smoke column rising from the woods beyond the pad area near the ocean, but the pad and service tower appeared fine. Hmmm. Of course, I thought. The vehicle exploded 1500 feet above, radially spreading debris outward, not straight down. I've seen this effect before many times at the high power model rocket launches.

Now we were passing a twisted lamp post and another large burn mark in the asphalt just to the north side of the blockhouse. Time to start turning left, out to the pad and the northern evacuation point. I would soon be able to look back over my shoulder and peer around the office buildings to see where that billowing smoke column was coming from. Meanwhile, I heard more distant explosions. After walking another 100 feet, I could finally see the source of the smoke. It was the conference trailer being consumed by flame. Hoping for the best, I considered my truck must be okay and continued taking in the scenery. There was a fire raging at the cable entryway to the blockhouse. So that's the source of the smoke we were inhaling, all that burning cable insulation and creosote from the timbers. There was evidence of many grass fires, and unburned solid propellant shards were everywhere. You couldn't avoid walking on them. Then we happened upon a nasty crater and a fellow human, a fireman. He warned us about the unburned propellant, then directed us to the bus which was parked a hundred yards further.

Prior to boarding the standard blue government bus, I scanned the pad area once again for anything interesting. I saw no burning pieces, no rocket engines, no twisted metal. Strange. A repetitive, slow drum beat was in my head, like something out of *Apocalypse Now* or the *Terminator*: boom... boom, boom.

We drove out through complex 18, a once operational Thor facility now used for storage. Many small fires were still active on the scorched property. We continued along to intersect Lighthouse Road, which connects complex 17 to the main causeway. Craning our necks, we looked back towards the pad, only to see columns of smoke. We drove on towards the roadblock where we met with the fallback crew. Some words were exchanged between our military officials, and I heard others talking about burning cars in the parking lot. Some guys on the bus started lamenting about their wallets and keys left in their cars.

We were ordered to proceed to the infirmary for a once-over check. We descended on that poor infirmary en mass and waited as the overworked staff processed us. In the small waiting room we passed the time by calling our wives and surfed the channels on the lobby's TV for some CNN coverage of the accident. When I finally got through to my wife the news footage was just starting. The room filled with words of amazement as we watched the starburst display of the rocket that we launched two hours ago. My wife wondered what happened because I stopped talking. I was frozen with awe thinking, "We lived through *that*?"

Following the infirmary, we were bussed back to the Air Force headquarters building for the standard military debrief. My spirits were raised when our second shift personnel greeted us and showed us the way to the briefing room. I saw many relieved faces and people hugging as we plodded into the room. My spirits were raised even more when I saw the burgers and other food that was obtained for us (no barbecue sauce, however).

After the short meeting, given by the same Air Force general who delivered the first press statement after the mishap, we were allowed to go home. Like a fresh amputee feeling that his limb was still attached, I thought about getting in my truck and driving home. Oops.

It wasn't difficult to find a ride. The folks from second shift were making sure we could get home. What a team. On the way home, we joked about making a mass car purchasing trip and getting great deals. It helped keep the uneasiness at bay. When I finally got home, the house was empty. This would normally not be a problem, but my keys were in the truck. A great way to end the day.

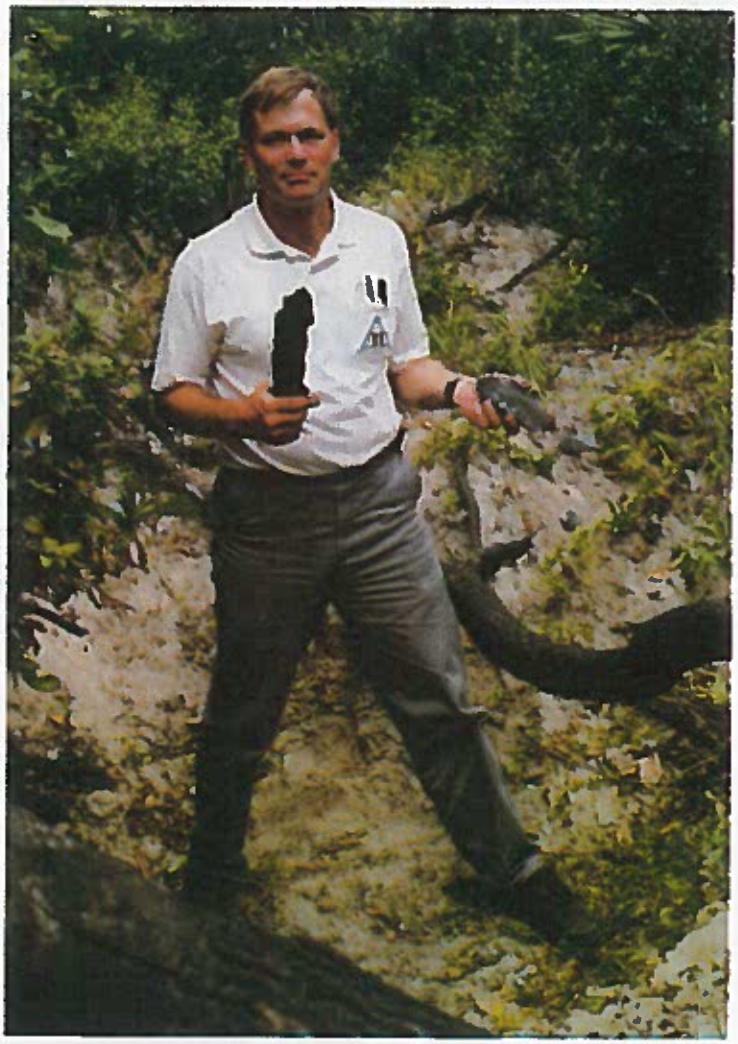
Aftermath

It was over a week later that we were

allowed, with minor hassles, to visit our cars in the parking lot. A week's worth of anguish from hearing disaster stories and simply not knowing whether my vehicle existed gnawed at my mind. The people who were without a car were allowed to rent one at company expense in the interim. In my case, I had my spare VW beetle. Those things run forever.

Only six persons at a time were allowed to visit the parking lot by way of a government van. When I arrived, my initial impression was that of a bombed out town in the outlands of some third world country. Damage was obvious. I walked around, checking out the cars that were still recognizable, studying each like a Mensa math problem. Aluminum wheels turned into frozen puddles. Engines had melted parts. Batteries were splayed open. Tires were reduced to steel wires. It must have been some hot fire, I thought. The explosive shock wave had struck the place from above, blowing out windows and knocking rear view mirrors off their windshield mounts. Large pieces of asphalt lie scattered about from where a solid motor forward mount impacted, leaving a sizable crater. One piece sat squarely on the roof of someone's car. Only a few vehicles were undamaged.

When I finally determined which was mine, I slowly approached it in dismal awe. I had never lost anything of this value. It was sad in a way, like at the funeral of a friend whom you thought you could save. The vehicle was totally consumed by fire. Nothing flammable remained, not even the paint; just ash colored metal and body parts that were showing signs of rust. After a walk around, I reached into the glassless driver's window and rummaged around the floor for the keys. They were difficult to find at first due to the partly melted broken glass and black, sticky residue from the carpet, but there they lay right where I had left them a week before. I was amazed to also see my cereal bowl on the passenger side floor, still intact amidst the broken glass. How did that ever survive? I then shared one last moment with it, gave my burned out hulk its last rights, and returned to the transport van.



The author stands in the crater next to the parking lot. The crater is approximately 25 feet in diameter and four feet deep. Note the trees which are still black after more than a year. Know anyone who would like some slightly used rocket parts? *(Lavigne)*

Epilogue

The incident has faded with time as the work force moves on to other assignments and upcoming launches. I could not let it fade that easily. I wanted to know how others remembered it. I asked one experienced individual known for his immediate answers. I was impressed to hear him admit he would've been a basket case had someone in the blockhouse been hurt. He regrets not being in the blockhouse for launch. A *real* rocketman, I thought. Many other people thought we were dead.

I visited the pad office buildings two months after the incident. For over thirty years this was the central hub of all field site engineering, planning and operations. This was where it all happened: the big meetings, the latest news, the hiring, the launch readiness reviews, the post flight briefings. Now they are empty shells. Walking through this area was like walking through a massive post exodus scene. Nothing left but unwanted papers, heaping trash, empty coke cans and essentially junk strewn across the floors accompanied by the smell of rotting food. It was a depressing sight even though I am not considered one of the "old heads" who held their offices here for so long a time.

Before departing the office, I nearly stepped on a large envelope displaying the company logo on it. Upon examination, it contained a 25-year service award for our hydraulics engineer, the same person who announces "Hydraulics Go" at T-35 seconds.

Walking down the empty hallway towards the door, I noticed the absence of the 240-plus framed launch pictures, the "wall of fame" of the Delta program. Every launch was represented and the date shown. Where are they now?

A trip around the blockhouse revealed a nasty, scorched gouge and crater at the roof line of the three-foot thick concrete where the "freight train" debris hit, exposing the rebar. It was then that I realized how close we had come. Another four feet over and it would have crashed through the thinner data station roof, suffocating all those inside. Koyaanisqatsi, indeed.

Historical Perspectives

Statistically, it had to happen. The last failure was caused by an electrical problem in May of 1986. Many of the guys have stated that our next loss would be from a propulsion problem. How right they were. The loss of Delta 241 with the Navstar (GPS) spacecraft was caused by a solid motor cato. This January '97 launch was the last one to be controlled from the complex 17 blockhouse. The first took place in January of 1957. I am fortunate and proud to have been part of that final crew.

On a final note, I would like to thank Gary Fillible for motivating me to write these words. Without his encouragement from 3,000 miles away, this story probably would not have been written. Thank you, Gary.

ko-yaa-nis-qatsi (from the Hopi language) n. 1. crazy life. 2. life in turmoil. 3. life out of balance. 4. life disintegrating. 5. a state of life that calls for another way of living.