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The Tragic Challenger ExplosionThe Tragic Challenger Explosion Space Travel. It is a sense of national pridefor many Americans. If you ask anyone who was alive at the time, they couldprobably tell you exactly where they were when they heard that Neil Armstrongwas the first person to walk on the Moon. But all of the success in our spaceprograms is overshadowed by tragedy. On January 28, 1986, one of the worstdisasters in our space program's history occurred. Many people were watching atthe moment because it was the highly televised space mission where, for thefirst time, a civilian was a member of the crew that was to be shot into space.

This civilian was the winner of the " Teacher in Space" contest, ChristaMcAuliffe. The disaster: the explosion of the Space Shuttle Challenger. (Compton's 1) Many people thought that disaster couldn't strike because acivilian was on board.

But as the whole nation found out, nobody is immortal. By examining this further, we will look at the lives of the seven who died inthis dumbfounding calamity, take a look at exactly what went wrong during thisfateful mission, and the outcome from this sorrowful occurrence. First, whoexactly were those astronauts that died on the Challenger? Sharon ChristaCorrigan McAuliffe, born in 1948, was the famous winner of the teacher-in-spaceprogram, was a high school teacher at Concord, N. H., a wife, and a mother oftwo children. She touched the lives of all those she knew and taught. As aschool official in Concord said after her death, " To us, she seemed average.

But she turned out to be remarkable. She handled success so beautifully.” Shealso wanted everyone to learn more, including herself. Demonstrating heraspirations after entering the space program, she is quoted saying, “ What are wedoing here? We’re reaching for the stars.” Also, after reflecting on herposition, she said in August 1995, “ I touch the future, I teach (Gray 32).

“ Francis R. (Dick) Scobee, born in 1948, was a tremendous enthusiast for aviationand the space program. At 18 years old, he enlisted in the Air Force.

Whileworking as a mechanic in the service, he put himself through night school, eventually earning a degree in aerospace engineering that helped him become anofficer and a pilot. He loved flying. Scobee once observed, : You know, it’s areal crime to be paid for a job that I have so much fun doing.” On one of hisspace missions, he carried a banner made for him by students at Auburn High, hisold high school. It read “ TROJANS FLY HIGH WITH SCOBEE.

” School officialsannounced after the tragic explosion that the banner would be put on display toremind others at Auburn High that other seemingly ordinary students can too flyhigh. (Gray 33) Judith Resnik, born 1949, had a Ph. D. in electrical engineering. She was very ambitious and loved everything. She once said, “ I want to doeverything there is to be done.

” Being chosen for the space program gave herthe opportunity to meet a few self-described personal goals: “ To learn a lotabout quite a number of different technologies; to be able to use them somehow, to do something that required a concerted team effort and, finally, a greatindividual effort

(Gray 33).” She had said once, when asked, about the dangersof the space program, “ I think something is only dangerous if you are notprepared for it or if you don’t have control over it or if you can’t thinkthrough how to get yourself out of a problem.” For Resnik, danger was simplyanother unknown to be mastered. Ronald McNair, born in 1950, was the secondblack man in space. He was truly remarkable growing up in his segregated SouthCarolina school. He was remembered by those he knew as “ one who was alwayslooking to the clouds.” Jesse Jackson, one of his collage classmate’s at N. C.

Agricultural and Technical State University said McNair saw participation in thespace program as “ the highest way he could contribute to the system that gavehim so much.” McNair did think much of the space program. He once said, “ Thetrue courage of space flight comes from enduring . .

. persevering and believingin oneself (page 34).” Michael Smith, born in 1945, always had his head in theclouds.

At the age of 16, he soloed in a single-engine Aeronca. After the U. S. put its first astronaut into space in 1961, Smith decided that was where hewanted to be. His older brother said, “ In high school he paid a lot ofattention to academics because he knew that was the best way to get in.” Healso thought much of the space program. He once said, “ Everybody looks atflying the shuttle as something dangerous.

But it’s not. It’s a good program, and something the country should be proud of (Gray 34).” Ellison Onizuka, bornin 1946, became an instant hero to both

the Hawaiians and the Japanese Americansbecause he was the first member of either group to fly in space.

He was one whowas always fascinated by the vastness of outer space and spend a lot of timestudying it. When he was young, he spent much of his time examining theuniverse through a telescope at Honolulu's Bishop Museum. He also said beforethe Challenger launch, " I'll be looking at Halley's comet. They tell me I'llhave on of the best views around (Gray 35)." His family always looked favorablyupon his achievement. After the tragedy, his mother remembered that " Ellisonalways had it in his mind to become an astronaut, but was too embarrassed totell anyone. When he was growing up, there were no Asian astronauts, no blackastronauts, just white ones (Gray 35).

" Ellison will be forever remembered asbeing the first Japanese American in space. Finally, the last member of theseven person crew, Gregory Jarvis, born in 1944. Gregory was very dedicated tothe space program. Despite being bumped off two previous flights, he finallygot his chance. Unfortunately, his only flight was that of the Challenger. Itis very saddening to see seven bright lives vanish in a ball of fire, but it issaid that the explosion was so rapid that the crew did not realize their comingfate. (Gray 35) Perhaps we can all take comfort in the fact that their lastvision was that of the stars. Now, many people haven't heard exactly what wentwrong to cause such an explosion.

(Dumoulin, 1-2) The Challenger finallylaunched after five days of delays. On January 28, 1986, the morning of thelaunch, there was ice at Kennedy Space

Center. After an inspection crew gavethe go-ahead, the launch was underway. Just after liftoff at .

678 seconds intothe flight, photographic data show a strong puff of gray smoke was spurting fromthe vicinity of the aft field joint on the right solid rocket booster. Computergraphic analysis of film from pad cameras indicated the initial smoke came fromthe 270 to 310-degree sector of the circumference of the aft field joint of theright solid rocket booster. This area of the solid booster faces the ExternalTank. The vaporized material streaming from the joint indicated there was notcomplete sealing action within the joint. Eight more distinctive puffs ofincreasingly blacker smoke were recorded between . 836 and 2. 500 seconds. Thesmoke appeared to puff upwards from the joint.

While each smoke puff was beingleft behind by the upward flight of the Shuttle, the next fresh puff could beseen near the level of the joint. The multiple smoke puffs in this sequenceoccurred at about four times per second, approximating the frequency of thestructural load dynamics and resultant joint flexing. As the Shuttle increasedits upward velocity, it flew past the emerging and expanding smoke puffs. Thelast smoke was seen above the field joint at 2. 733 seconds. The black color anddense composition of the smoke puffs suggest that the grease, joint insulationand rubber O-rings in the joint seal were being burned and eroded by the hotpropellant gases. At approximately 37 seconds, Challenger encountered the firstof several high-altitude wind shear conditions, which lasted until about 64seconds.

The wind shear created forces on the vehicle with relatively largefluctuations. These were immediately sensed and countered by the guidance, navigation and control system. The steering system (thrust vector control) ofthe solid rocket booster responded to all commands and wind shear effects. Thewind shear caused the steering system to be more active than on any previousflight. Both the Shuttle main engines and the solid rockets operated at reducedthrust approaching and passing through the area of maximum dynamic pressure of720 pounds per square foot. Main engines had been throttled up to 104 percentthrust and the solid rocket boosters were increasing their thrust when the firstflickering flame appeared on the right solid rocket booster in the area of theaft field joint. This first very small flame was detected on image enhanced filmat 58. 788 seconds into the flight.

It appeared to originate at about 305degrees around the booster circumference at or near the aft field joint. Onefilm frame later from the same camera, the flame was visible without imageenhancement. It grew into a continuous, well-defined plume at 59. 262 seconds. Atabout the same time (60 seconds), telemetry showed a pressure differentialbetween the chamber pressures in the right and left boosters. The right boosterchamber pressure was lower, confirming the growing leak in the area of the fieldjoint.

As the flame plume increased in size, it was deflected rearward by theaerodynamic slipstream and circumferentially by the protruding structure of theupper ring attaching the booster to the External Tank. These deflectionsdirected the flame plume onto the surface of the External Tank.

This sequence offlame spreading is confirmed by analysis of the recovered wreckage.

The growingflame also impinged on the strut attaching the solid rocket booster to theExternal Tank. The first visual indication that swirling flame from the rightsolid rocket booster breached the External Tank was at 64. 660 seconds when therewas an abrupt change in the shape and color of the plume. This indicated thatit was mixing with leaking hydrogen from the External Tank. Telemetered changesin the hydrogen tank pressurization confirmed the leak. Within 45 millisecondsof the breach of the External Tank, a bright sustained glow developed on theblack-tiled underside of the Challenger between it and the External Tank. Beginning at about 72 seconds, a series of events occurred extremely rapidlythat terminated the flight. Telemetered data indicate a wide variety of flightsystem actions that support the visual evidence of the photos as the Shuttlestruggled futility against the forces that were destroying it.

At about 72. 20seconds the lower strut linking the solid rocket booster and the External Tankwas severed or pulled away from the weakened hydrogen tank permitting the rightsolid rocket booster to rotate around the upper attachment strut. This rotationis indicated by divergent yaw and pitch rates between the left and right solidrocket boosters.

At 73. 124 seconds,. a circumferential white vapor pattern wasobserved blooming from the side of the External Tank bottom dome. This was thebeginning of the structural failure of hydrogen tank that culminated in theentire aft dome dropping away. This released massive amounts of liquid

hydrogenfrom the tank and created a sudden forward thrust of about 2. 8 million pounds, pushing the hydrogen tank upward into the intertank structure. At about the sametime, the rotating right solid rocketbooster impacted the intertank structureand the lower part of the liquid oxygen tank. These structures failed at 73.

137seconds as evidenced by the white vapors appearing in the intertank region. Within milliseconds there was massive, almost explosive, burning of the hydrogenstreaming from the failed tank bottom and liquid oxygen breach in the area ofthe intertank. At this point in its trajectory, while traveling at a Mach numberof 1.

92 at an altitude of 46, 000 feet, the Challenger was totally enveloped inthe explosive burn. The Challenger’s reaction control system ruptured and ahypergolic burn of its propellants occurred as it exited the oxygen-hydrogenflames. The reddish brown colors of the hypergolic fuel burn are visible on theedge of the main fireball.

The Orbiter, under severe aerodynamic loads, brokeinto several large sections which emerged from the fireball. Separate sectionsthat can be identified on film include the main engine/tail section with theengines still burning, one wing of the Orbiter, and the forward fuselagetrailing a mass of umbilical lines pulled loose from the payload bay. TheExplosion 73 seconds after liftoff claimed crew and vehicle. Cause of explosionwas determined to be an O-ring failure in right solid rocket booster. Coldweather was a contributing factor. Finally, what was the outcome of thisterrible disaster?

(Compton’s, page 1) The shuttle program was suspended untilthe exact cause could be found.

It wasn’t until September 1988 when the nextshuttle launch happened. After many hours of investigating and finding out whatexactly caused the disaster, many changes were made to the structural designs ofthe space shuttle. Also, they don’t allow launches when the temperature is thatlow. Also, the explosion delayed the now famous Hubble Telescope program(Church 38). We have seen the tremendous photographs the Telescope has sent toEarth, it’s a shame they couldn’t have been received sooner.

From a mediastandpoint, this disaster really changed the way television was used to reportmajor disasters. It may seem fairly common when Special Reports interruptnormal programming, but in 1986, it was pretty unusual. In fact, ABCswitchboards alone fielded more than 1, 200 complaints from people who wanted towatch soap operas rather than an all-day report about the Challenger and thelate breaking news related to it (Zoglin 42). Television definitely had atremendous impact on reporting this story. ABC Anchorman Peter Jennings said,” We all shared in this experience in an instantaneous way because of television. I can’t recall any time or crisis in history when television has had such animpact. (Zoglin 42)” The disaster even affected President Reagan’s State of theUnion address. When asked about the State of the Union speech, Reagan replied,” There could be no speech without mentioning this, but you can’t stop governingthe nation because of a tragedy of this kind (Magnuson 29).

” In conclusion, itis such a sad tragedy that this negligence led to such a disaster. If we learnfrom our mistakes, then hopefully, this sort of disaster won’t happen again. Works Cited “ Space Shuttle Missions: Challenger.” Compton’s Encyclopedia ofAmerican History on CD-ROM. Compton’s New Media, Inc., 1994.

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