

Testimony of Alex Roland

before the

Subcommittee on Science, Technology, and Space of the Senate Committee on Commerce, Science, and Transportation

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Senators, thank you for the opportunity to share with you my views on human spaceflight.

The Columbia accident confirmed what the Challenger accident made clear. Systemic flaws in the space shuttle render it unsustainable as a safe, reliable, and economical launch vehicle. The Rogers Commission issued two critical injunctions to NASA. Do not rely on the space shuttle as the mainstay of your launch capability. Begin at once to develop a next-generation launch vehicle. Sixteen years later NASA is massively dependent on the shuttle; no replacement is in sight. I have appended to my written remarks an article explaining how and why the shuttle program became systemically flawed. Briefly stated, NASA made two mistakes in shuttle development in the late 1960s and early 1970s. First, it traded development costs for operational costs. Second, it convinced itself that a recoverable launch vehicle would be inherently more economical than an expendable. NASA promised savings of 90%, even 95%, in launch costs. In practice, it costs more to put a pound of payload in orbit aboard the shuttle than it did aboard the Saturn launch vehicle that preceded it. These mistakes produced a program that cannot work. NASA could conceivably operate the shuttle safely and reliably, but it dares not admit what it would cost. The evidence for this was abundant before the Challenger accident. Instead of listening to the data, NASA consistently allowed its judgment to be clouded by its hopes and predictions for human activities in space. The agency cares about astronaut safety, but it is trapped by its own claims about shuttle costs. And, unlike expendable launch vehicles, the shuttle grows more dangerous and more expensive to fly with each passing year. In what it euphemistically called "success-oriented management," i.e., hoping for the best, NASA assumed in 1970 that each orbiter would fly fifty times. But in those heady days, NASA was expecting sixty shuttle flights a year by 1985, meaning that a fleet of five shuttles would be completely replaced every five years. No one imagined that a shuttle would be in service after twenty years. Unfortunately, nothing practical can be done now to save the shuttle. A crew escape system would help reduce the risk to human life, but it cannot eliminate it. It is not clear that crew escape could have saved the astronauts aboard either Columbia or Challenger. Nor will an infusion of new money suffice. The United States spends more on space than the rest of the world combined. NASA has ample funding to support a robust space program. It has simply wasted too much of that money flying astronauts on unnecessary missions aboard a ruinously expensive spacecraft. We should drastically curtail human spaceflight until we have a safe, reliable, and economical launch vehicle. In the meantime, anything we want to do in space, except having humans there as an end in itself, we can do more effectively and efficiently with automated spacecraft controlled from earth. Whenever we put people in a spacecraft we change the primary goal to reconnaissance or communication, science or exploration to bringing the astronauts back alive. Most of the weight and hence the cost of manned missions comes from safety and life support systems. The astronauts contribute little. Even had the astronauts aboard Columbia known of the damage to their spacecraft, they could not have saved themselves. NASA should begin at once to carry out the recommendations of the Rogers Commission. It should limit shuttle flights to a bare minimum. It should convert the space station into a space platform, to be visited but

not inhabited. And it should use the savings from these actions to fund development of a new launch vehicle. I have enormous confidence in NASA's ability to achieve a vital and productive space program, including both human and automated missions. But to achieve that goal, it must do the right thing. That means phasing out the shuttle. It is a death trap and a budgetary sink hole. NASA must develop a stable of launch vehicles that will open up the promise of space. I believe that we should send people into space only when they have something to do there commensurate with the risk and cost of sending them. Given the liabilities of the shuttle, I do not know of any mission that now meets that criterion.

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supplemental material: Alex Roland, "The Shuttle: Triumph or Turkey?" Discover (November 1985): 29-49.