

Failure is an option for North Korea satellite ... then what?

Flight plan offers ample opportunities for blow-ups, both technical and political
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PYONGYANG, North Korea — Officially, we now are only hours from North Korea's launch of its Kwangmyongsong-3 satellite. The first of four reserved daily launch windows has already passed, with three to go until Monday.

Celebrations are already planned that involve a successful mission. The radio beacon is to transmit hymns in honor of the country's ruling dynasty. Foreign displeasure of the demonstration of rocket prowess will be ignored.

All that is planned — if the launch works. But what if it doesn't? What if the Earth-observing satellite goes the way its two predecessors apparently did — into the ocean, as scorched shrapnel, following a launch failure?

This is worth serious consideration, since the things I've seen and assessed during our amazing insider tour of the North Korean space program have made me a lot more worried about the likelihood of this launch succeeding.

Kinds of failures

A lot will depend on just how and when the failure occurs.

In the first moments of flight, as the rocket lifts off the pad at the new Sohae launch base, it could explode, as early rockets in many other countries did.

But this may not be as easily detectable as it seems, especially if the video transmission from the launch site has been tape-delayed in prudent anticipation of exactly such a possibility. In that case, "no news" is all the news there will be, until a later announcement that the launch has been "indefinitely postponed."

Local residents north of the base — and we saw lots of villages there — would notice the explosion, but might not even connect it with a rocket. And rumors would be unlikely to spread very fast in such a tightly controlled society. After a minute or so of flight, the rocket will be high in the skies over the western half of the country, including the capital, Pyongyang. Any "energetic event" (NASA's favorite euphemism for a bad-ass explosion) could streak the sky with a burst of flame — but no sound.

Lots of people would see it, and some foreign visitors might even get a picture. But these photographs and videos would be recognized for what they showed only if the launch was announced within a minute of liftoff.

These possibilities underscore the importance of the North Koreans announcing the launch time in advance, and broadcasting the launch video with minimum delay — or all their vaunted "transparency" involved with the unprecedented press tour evaporates.

Out of sight, out of luck

Another opportunity for failure would come after a well-publicized liftoff, after the vehicle vanishes over the southern horizon. The critical third-stage burn, which apparently involves a fairly sophisticated sideways jog to slip into the proper final orbit, may be too far away for in-country tracking sites to receive signals. So instead they have to wait.

The wait could be excruciating, because the satellite's orbit does not pass within radio range of North Korea for 11 hours. This is a real situation — I've checked the orbital flight path myself — and it's caused by the steep polar orbit of the vehicle.

During all this time, officials say, the satellite will be transmitting patriotic hymns on a 470MHz beacon. Foreign radio listeners will try to pick it up, and if the satellite reaches orbit, it's almost certain that some — perhaps very, very many — will do so before the first official North Korean reception.

If nobody hears the satellite's beacon in those hours, something clearly will have gone wrong.

Observers also need to be cautious about inevitable rumors and "false positives" — possible confirmatory signals picked up briefly or weakly, that actually originated with other unrelated transmitters. This happens often enough to mislead observers to eager to find and trumpet a "first signal," so we need to be cautious.

Failure is an option

Failures in space often occur because, basically, "space is hard." And it's especially hard on beginners. Failure rates in almost every national program start out high, and then diminish.

But people can also make spaceflight harder than it has to be through careless and imprudent attitudes. These can interfere with the crucial process of error detection, diagnosis and correction, that must occur effectively many times a day in the run-up to a space shot

If people are pressured into cutting corners and taking shortcuts to meet an unrealistic schedule, critical choices may be overlooked, crucial repairs may be omitted. Lamentable examples from the past are too numerous and well-known to merit mentioning.

And the schedule pressure on this North Korean mission, tied to the most important holiday in their country's history, must be immense. It's a formula for fatal errors, all too familiar to space experts.

The North Korean situation is made worse by the "launch fever" attitude exemplified by mission managers in front of visiting Western journalists. With quasi-religious fervor and dedication to an ideology they treat as near-divine, their ability to tolerate dissent or doubts from working troops must be very, very low. When in doubt, it seems, they quote favorite passages from their leaders' writings, and charge ahead.

This is more than worrisome: It seems to be a recipe for disaster. Every worker must have the courage to speak up and recommend remedial measures. Whether they can overcome this culture in a technological field that is notoriously intolerant of make-believe is the most serious issue I found on my visit.

Mythical reasons

If the mission does fail, there are a wide variety of excuses available to all observers to "explain it away." And since rocket scientists know that the first step towards one's next disaster is to forget about — or deny — the previous disaster, the North Korean insistence against all evidence that their first two satellites were actually successful, is not auspicious.

The first and most traditional reaction from Pyongyang to a satellite failure would be simply to pretend it succeeded. That worked for them in 1998 and 2009, but this time there is too much scrutiny from visitors and worldwide radio amateurs to make such a pretense attractive.

The next choice, however, is worse: Blame foreign enemies. If the failure occurred early in flight, the South Koreans can be implicated. If it occurs farther away, out of radio contact, U.S. malevolence is an obvious scapegoat.

This is an instinct that we even saw in some supposedly sensible Russian space experts when their recent Mars probe tripped on its face just out of the starting gate. U.S. radar interference was widely suggested as the cause, a gimmick that North Korea could be expected to copy for its own needs.

Alternately, Pyongyang could blame internal enemies intent on sabotage, an old Stalin-era trick. It could help fuel a major purge of less-than-perfectly-loyal officials during the ongoing regime transition. Hundreds could be fired, and many shot — a convenient excuse for a housecleaning.

Russia came up with a less malicious blame-shifting gambit recently when they officially explained the crash of the Mars-bound Phobos-Grunt probe on what today passes for an "act of God" — space radiation. Supposedly, two computer chips were zapped by cosmic forces beyond the control of mere earthlings. If the North Koreans are feeling unusually benign, they could opt for this excuse, and reduce the need for much bloodletting.

Western conspiracy theory

No catalog of conspiracy theories would be complete without a version that might spring up in the West — that the failure was all part of a preordained plan to hide a top-secret weapons test. Like all good conspiracy theories, it originates from a web of actual facts, but then lets the imagination guide the conclusions.

Here's one version: the "satellite" was never on board, but had been surreptitiously replaced by the one major missile weapon component not yet verified, a heat-shielded re-entry capsule. Until this technology is acquired, the ability to throw a warhead thousands of miles is useless, because the descending warhead would burn up as soon as it hits the atmosphere.

So to close this gap, put a test warhead under the nose cone. Launch it as a "satellite." Let the warhead drop back into the atmosphere along with the spent second stage, where it can radio simple test results to a small ship or submarine. Physical recovery wouldn't be necessary to confirm that the design worked.

All these excuses have the virtue of being simple and easy to understand. Their only drawback, aside from the aggravation of already-too-high tensions in the area, is that they would be wrong — and worse than useless in preparing for a new launch attempt.

All the more reason, then to hope for a successful orbit of this little satellite — and to fear the consequences of its failure, even if that fate seems more than likely.