

January 12

Jim Oberg advises:

0. The days dwindle down to a precious few.... About 72 hours left in the life of the stranded Russian Mars probe and its 11 tons of unused toxic fuel.

If the UARS 'death watch' is any example [and it probably is] we could face hours of uncertainty, false reports, blind alleys, and wild claims, to be filtered out. Just my kind of space story.

1. Atmospheric entry is now predicted to occur early on Sunday, EST. See paragraph 8.

2. Resources:

Reentry ground tracks....

<http://reentrynews.aero.org/2011065a.html> and

<http://www.satflare.com/track.php?q=phobos&reenter#MAP>

Thierry Legault's outstanding telescope video of probe in orbit:

<http://legault.perso.sfr.fr/phobos-grunt.html>

Earlier advisories on this mission appended at end, after a lengthy discussion of probably design flaws leading to the mission calamity.

3. Wednesday I spent half an hour chatting with an old friend, Xxxx xxxxxxx, His comments are for background, not for attribution.

4. Most interesting was the discussion of 'odds' for the random fall back to Earth. Although for this particular orbit about 75% of the orbital ground track is over water, this does NOT mean that the odds are 3 to 1 that the probe will 'splash' harmlessly.

5. The factor overlooked before now is that the entry actually creates a CLOUD of debris, a parade of fragments that fall to Earth along a path that is hundreds of miles long. And ONE fragment may have a one chance in four of hitting land, but intuitively, if there is a long TRAIL of fragments, some of the others might be closer to land.

6. The actual figures suggest that the odds of ALL the fragments from an entry of a satellite of this size, all safely hitting open ocean, are quite a bit less than 75%. Preliminary calculations indicate the odds are still better than even, 50-50, but not a whole lot better.

7. Bottom line -- a more sophisticated but true-to-life computation shows that the chances of at least SOME of the fragments from the satellite hitting land are almost a toss-up. I'll get better, and quotable, figures soon.

8. WHEN? xxx [confirmed by others, including the Russian Space Agency earlier today] expects the time of entry to be on Sunday, although it could

be a few hours earlier than expected if the probe begins to come apart under growing aerodynamic stresses.

9. What he considers most likely is that the two solar power panels, which are now acting as an arrow's feathers and keeping the small end of the craft 'trailing' in its orbit, could collapse or tear off.

10. The craft would then tumble end over end, facing its broad side to the air flow and increasing its drag. As of now, in the stabilized flow with the solar panels in place as 'vaness', it faces its narrow end 'into the wind'. Without this stabilization, it will fall out of orbit hours sooner than predicted.

11. It's also possible that new stresses, including heating, could lead to one or more of the tanks rupturing early, and perhaps even exploding.

12. Nobody knows what configuration the craft's fuel valves were left in by the failed autopilot commanding. And the tanks were not designed for months of space orbiting, going through hundreds of heat/cool day/night cycles as it circled the Earth. Under the growing stresses of the final hours, dramatic and violent processes could be triggered.

13. What is NOT expected is any Russian attempt to hit the probe with an anti-satellite missile, to disintegrate it safely while still in space.

14. The US pulled off that bullet-hitting-bullet marksmanship with the USA-173 derelict spy satellite several years ago. The Russians have similar missiles, land-based, but I doubt they would dare make a shot and be seen to miss.

15. The probe has two dozen tanks in various stages and sub-probes, and they contain a lot of toxic hydrazine [fuel] and nitrogen tetroxide [oxidizer]. But aluminum tanks will probably 'demise' [xxxxx's team uses that word as a verb] as the tanks actually burn while being physically crushed by entry G-forces in the 15 to 20 or even higher range.

16. xxxx confirmed my suspicions that not ALL the tanks are flimsy, flammable aluminum. Some segments of the craft's stage meant to return to Earth from Mars seem to have titanium tanks, much stronger and resistant to destruction. This is CONTRARY to official Russian pronouncements.

17. However, xxxx advised me that these are relatively small tanks and he expects them to spew out their contents during the descent, after they have been torn loose from the main vehicle. They could indeed reach the surface intact, but his analysis says they will be empty by that time. He does NOT expect any unusually high hazard from this, and I defer to his insight.