

Current title: NASA and ESA are likely to be legally required to sterilize Mars samples to protect the environment through to 2039, or until proven safe – technology doesn't yet exist to comply with ESF study's requirement to contain viable starved ultramicrobacteria, and legal process followed by build and training of technicians takes at least 17 years - proposal to study samples remotely in a safe high orbit above GEO with miniature life detection instruments – and immediately return sterilized subsamples to Earth

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Short abstract (central points, 2,000 characters)

- **Astrobiologists say Mars may have surface microhabitats for life.** Early Mars had habitable seas, and early microbes could evolve to adapt to current extreme conditions.
- **The chance of returning extant life could be significant** in microhabitats or as viable spores in dust storms
- **Current technology can't meet the ESF study's requirement** to contain 100% of particles at 0.05 microns
- **The legal process likely starts in 2022** when NASA submit their draft Environment Impact Statement.
- **Minimum 17 years to complete facility** as NASA needs legal clarity to start the build - legal process takes at least six years, build at least 9 years and it's 2 years to train technicians because of many lapses in protocols for the Apollo mission
- **NASA is likely legally required to sterilize the first Mars samples to contact Earth's biosphere through to 2039+** based on the shortest possible timescale until the facility might be ready to receive samples.
- **NASA needs to be ready for a possible legal decision to apply the prohibitory version of the precautionary principle** based on large scale effects such as from mirror life, and "Sagan's criterion" that "we cannot take even a small risk with a billion lives" - a quote from "Cosmic Connection"
- **Recommendation to return unsterilized samples to a safe orbit above GEO,** examine with remote controlled life detection instruments and return sterilized sub-

samples to Earth immediately

- **Several recommendations to increase chances of returning viable Martian life** including a dust sample and sample of the brines found by Curiosity, by adding capabilities to the ESF fetch rover
- **New swansong Gaia feedback hypothesis that life on Mars may remove just enough CO₂ to keep Mars barely habitable** for billions of years through fluctuations in CO₂ emissions from volcanoes – this would increase the chance of finding present day life on Mars