

NASA likely legally required to sterilize first Mars samples to contact Earth's biosphere at least to 2039 with modern laws to protect humans and ecosystems as ESF study requires novel technology far better than modern biosafety labs BSL-4 - proposal to study remotely with miniature life detection instruments, in a safe high orbit above GEO – and return sterilized subsamples to Earth immediately

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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