Virtual Design Review 3

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**Design and Manufacturing Status, Short-Term Work Pending**

Outline of the CDR report has been completed and technical content will be filled in leading up to the sub-scale test flight in parallel with manufacturing. Selected alternatives for the full-scale vehicle and payload must be identified and discussed, and material from the Preliminary Design Review (PDR) report can be recycled for this purpose. The bulk of new material for the CDR report is the safety section, which now requires an operation manual for the sub- and full-scale vehicles. The operations manual is to cover the handling and preparation of all systems to make the vehicle flight-ready, as well as countdown and recovery procedures. The operations manual is in process as of this report.

The team was advised during the PDR slideshow presentation that the payload design was lacking in specificity (concept phase rather than itemized part-sheet), and this must be remedied for the CDR report. The final payload design is currently being modeled, with most components selected. The RF antenna to receive the command sequence from NASA is yet to be selected. Preliminary code for all potential NASA executables is in process.

The sub-scale demonstration flight and Critical Design Review (CDR) submission deadline is January 9, 2023. Beginning November 21, 2022, the team began receiving materials for the sub-scale vehicle and the vehicle remains in the assembly phase as of this report. Expected completion date is no later than (NLT) December 9, 2022. The team expects travel to the test facility for a flight on Sunday, December 11, 2022. The final addition to the CDR report will be the demonstration flight data and discussion of results. Full-scale components are identified and ready to be ordered pending a successful sub-scale flight. Ordering will occur after the CDR deadline with assembly immediately following.

**Future Work**

STEM engagement is a requirement of the competition. STEM engagement planning is to begin NET January 1, 2023; and is expected to occur NET/NLT January 15/31, 2023. Following a first STEM engagement activity, subsequent activities may be planned and scheduled through February and March until the 250-student engagement requirement is reached and/or exceeded.

Full-scale vehicle assembly is slated to begin the week of January 23, 2022, as a two-week period for ordering and shipping time is to be expected. The full-scale demonstration flight and Flight Readiness Review (FRR) deadline is March 6, 2023; therefore, the team has identified February 4, 2023, as the no earlier than (NET) date for the flight test. Expected test date is February 12, 2023, and NLT February 19, 2023, for full-scale attempt #1.

The outline for FRR has been created with the handbook requirements, and technical information will be added NLT January 31, 2023. Payload components are to be ordered with full-scale and assembly is to begin NET/NLT February 1/15, 2023. Payload demonstration flight deadline is April 3, 2023. Payload demo flight expected NET February 7, 2023, with a firm NLT of February 15, 2023, as the payload demonstration flight must follow any full-scale demonstration re-flight in the event of an unsuccessful first launch.

Following a successful payload demo, the next action item is launch week at NASA MSFC, Huntsville, Alabama from April 12-16, 2023. Coordination with the ME Department regarding transportation and lodging has been active through November 2022. The final competition item is the Post-Launch Assessment and Review (PLAR) report. The PLAR summarizes the launch week performance and program performance across the entire competition. PLAR and is due May 1, 2023. PLAR writing begins immediately following return from launch week.

**Problem Areas**

The area of greatest concern at present is the sub-scale flight test. In the event of a catastrophic failure, there is no time margin to reorder parts and fully rebuild the vehicle. Meeting the sub-scale flight deadline would be impossible and we would be removed from the competition. Another point of worry is the final payload design. The payload design has been consistently lagging the vehicle by upwards of a month. The deficit must be alleviated prior to CDR per the NASA review board’s request, although failure to do so would not result in a mission critical failure, and we would be allowed to proceed in competition, albeit without feedback on the payload. The final and least pressing issue is that of STEM engagement. The team must plan and prepare logistically for STEM engagement activities over the holiday break and be prepared to execute at the earliest possible opportunity when requests are sent out to and accepted by local middle and high schools and/or youth organizations.