EXHIBIT B

ORBITAL DEBRIS ASSESSMENT REPORT FOR COWBOY SPACE CORP Reason-1 SATELLITE

This report is presented in compliance with NASA-STD-8719.14C, APPENDIX A.

Document data is not restricted.

This document contains no proprietary, ITAR, or export-controlled information.

Debris Assessment Software (DAS) version used in analysis: v3.2.6

Revision Record				
Revision	Date	Affected Pages	Changes	Author(s)
0.0	July 1, 2025	All–Initial	Initial	Andrew Yarmola; Victor Qiu; Cheyne Scoby; Pete Bobseine
0.1	December 9, 2025	All	Altitude update and relevant impacts	Andrew Yarmola; Paxton Scott; Cheyne Scoby
0.2	February 26, 2026	19, 24-57	DAS updates reflecting correct payload materials; Discussion of casualty risks	Andrew Yarmola; Victor Qui
0.3	April 17th, 2026		Altitude update	Andrew Yarmola; Paxton Scott
0.4	May 19th, 2026		Name change	Paxton Scott, Diego Arias, Andrew Yarmola

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ODAR Self-Assessment Evaluation

A self-assessment is provided below in accordance with the assessment format provided in Appendix A.2 of NASA-STD-8719.14C.

ODAR Requirement	Status
4.3-1.a	Compliant
4.3-1.b	Compliant
4.3-2	N/A
4.4-1	Compliant
4.4-2	Compliant
4.4-3	N/A
4.4-4	N/A
4.5-1	Compliant
4.5-2	N/A
4.6-1(a)-c	Compliant
4.6-2	N/A
4.6-3	N/A
4.6-4	Compliant
4.7-1	Compliant

4.8-1	N/A

47 C.F.R. § 5.64 Self-Assessment Evaluation

Section	Compliant	Rationale	Evidence	Description
5.64 a	Compliant	Cowboy Space Corp constructs Reason-1 at its own risk.	Section 1	Satellite construction
5.64 b1	Compliant	There is no planned release of debris.	Section 3, Req. 4.3-1	Planned release of debris during normal operations
5.64 b2	N/A	Satellite houses no post-mission disposal equipment.	Section 5, Req. 4.5-2	Probability of collision with small debris
5.64 b3	Compliant	Cowboy Space Corp has assessed and limited the probability of accidental explosions or release of liquids.	Section 4	Probability of accidental explosions or release of liquids
5.64 b4iA	Compliant	Probability is less than 0.001.	Section 5, Req. 4.5-1	Probability of collision with large debris
5.64 b4iB	Compliant	Cowboy Space Corp will coordinate with other spacecraft to avoid collisions.	Section 5	Coordination with other spacecraft or systems
5.64 b4iC	Compliant	Cowboy Space Corp will coordinate with agencies when above the orbit of the ISS and other inhabitable spacecraft.	Section 5	Transit through the orbit of inhabitable spacecraft

5.64 b4iD	N/A	Cowboy Space Corp will not maintain orbital parameters.	Section 2	Orbital parameter maintenance
5.64 b4iE	Compliant	Cowboy Space Corp will take all possible steps to mitigate collision risk upon receipt of a conjunction warning.	Section 5	Conjunction warnings
5.64 b4ii	N/A			GSO only
5.64 b5i	Compliant	Cowboy Space Corp will passively track Reason-1.	Section 2	Space station identification and tracking
5.64 b5ii	Compliant	Cowboy Space Corp will register the satellite.	Section 2	Registration with the 18th Space Control Squadron or successor entity
5.64 b5iii	Compliant	Cowboy Space Corp will share information.	Section 2	Sharing information with the 18th Space Control Squadron
5.64 b6	N/A	Cowboy Space Corp will not conduct proximity operations.	Section 6, Req. 4.8	Proximity operations
5.64 b7i	N/A			GSO only
5.64 b7ii	Compliant	Cowboy Space Corp's Reason-1 will demise via atmospheric re-entry.	Section 6	Deorbit rationale
5.64 b7iii	N/A			N/A
5.64 b7ivA	Compliant	The probability of successful demise is greater than 0.9.	Section 7	Probability of successful deorbit

5.64 b7ivB1	Compliant	Cowboy Space Corp's Reason-1 will deorbit through uncontrolled atmospheric reentry.	Section 7	Controlled or uncontrolled reentry
5.64 b7ivB2	Compliant	The human casualty risk is <1:10,000.	Section 7	Casualty risk

Assessment Report Format

This ODAR follows the format recommended in NASA-STD-8719.14C, Appendix A.1, sections 1 through 8 for the Cowboy Space Corp Reason-1 satellite. Sections 9 through 14 apply to the launch vehicle ODAR and are not covered here.

1. Program Management and Mission Overview

Cowboy Space Corp is a U.S. company based in San Carlos, California.

Foreign Government or Space Agency Participation

- None

Mission Overview

Cowboy Space Corp's Reason-1 is expected to launch in October 2026 into a circular sun-synchronous, low-Earth orbit (LEO). It is expected to be launched in an inclined (97.4 deg) orbit at 510 km and it will operate for <5 years and deorbit for another 5 years for a total mission duration of <10 years. We also provide analysis for the worst case insertion orbit of 530 km as per SpaceX contract, however, missions are usually within 5 km of their target orbit. Reason-1 will be equipped with reaction wheels, a Global Positioning System (GPS) receiver; star trackers; sun sensors; magnetorquers; inertial measurement unit (IMU); telescope; laser system; and cameras.

Launch

Cowboy Space Corp's Reason-1 is planned to launch on a SpaceX Falcon 9 rocket on the Transporter-18 mission. Cowboy Space Corp has begun constructing Reason-1 and understands that such construction is at its own risk[1].

Mission Duration

The anticipated operational lifetime of Cowboy Space Corp's Reason-1 is less than 10 years in LEO.

[1] 47 C.F.R. § 5.64(a).

Deployment Profile

Cowboy Space Corp's Reason-1 is expected to deploy from the launch vehicle with the following orbital parameters based on SpaceX launch history.

Table 1. Orbital Parameters

	Apogee	**Perigee**	**Inclination**
Max Insertion Orbit	530 km	530 km	97.4° ± 0.1°
Min Insertion Orbit	490 km	490 km	97.4° ± 0.1°

2. Spacecraft Description

Physical description of the spacecraft

The Reason-1 satellite is based on Apex's Aries supplemented with commercial-off-the-shelf and proprietary items from Cowboy Space Corp. Basic enclosing dimensions are 250 x 99 x 114 cm (solar arrays deployed). The satellite is composed of the Aries spacecraft bus, deployable solar panels, and a payload. The solar panels generate 250 W Orbit Average Power (OAP) of electrical DC power, which is stored in a 60 Ahr commercial off the-shelf (COTS) Li-Ion unpressurized battery assembly. A secondary 1170 Wh payload battery of the same type is present to provide payload power. The solar array is deployed using a hold down mechanism. The bus is 3-axis stabilized, employing star trackers and sun sensors for attitude knowledge and reaction wheels and magnetorquers for attitude control. Detailed illustrations of the Reason-1 spacecraft are provided in the figures below.

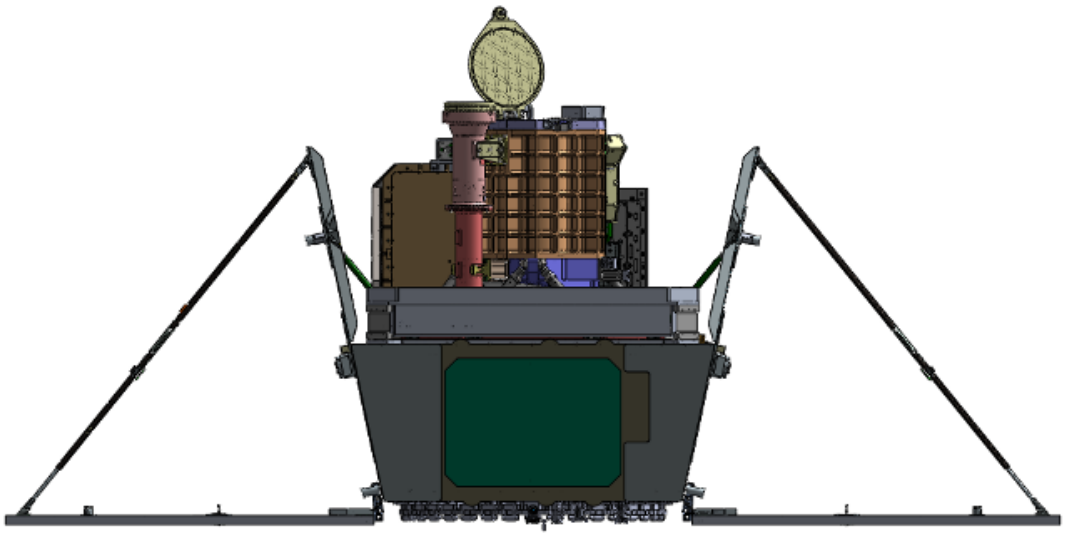

Figure 1. Reason-1 Space Vehicle External View | XY Plane (deployed)

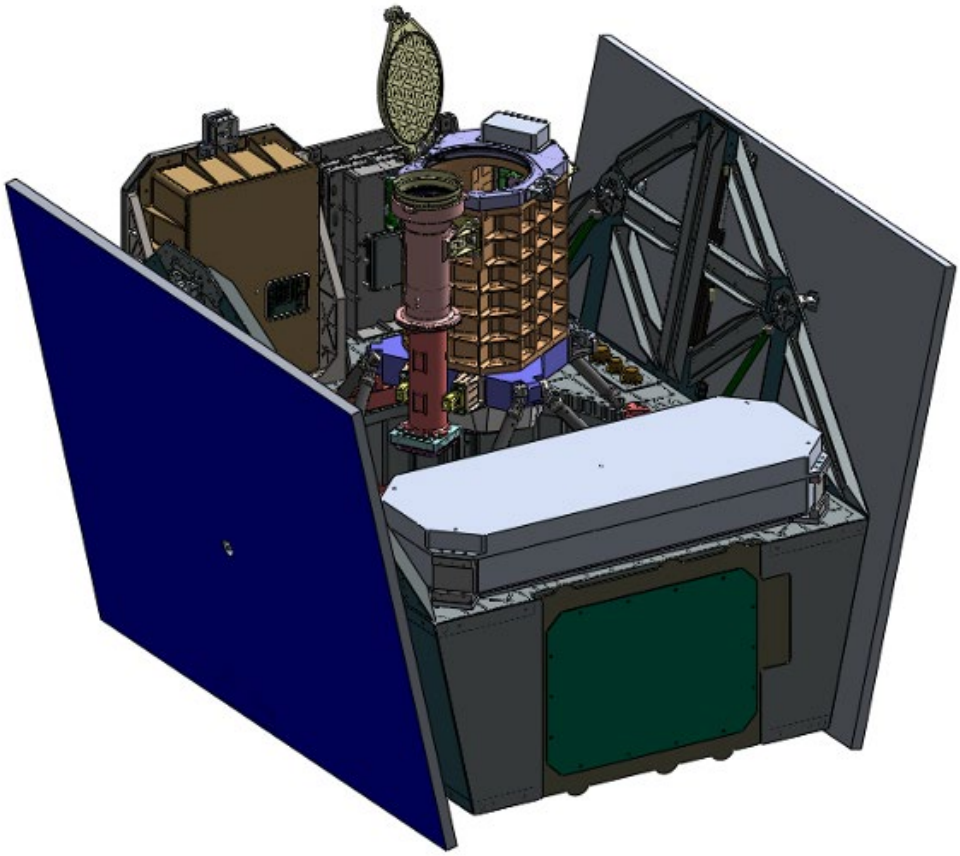

Figure 2. Reason-1 Space Vehicle External View | Isometric View (stowed)

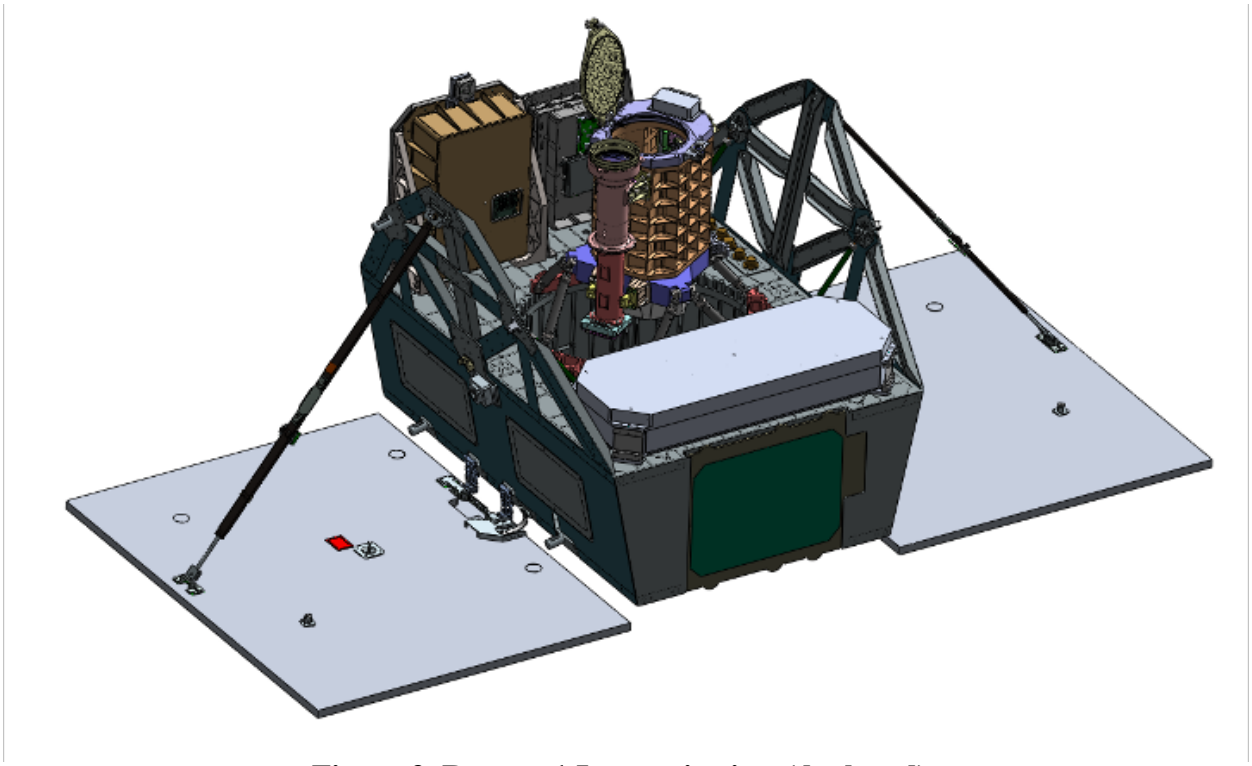

Figure 3. Reason-1 Isometric view (deployed)

Spacecraft Mass

- Mass: 230 kg

Description of propulsion system

None.

Fluids Planned to be On-board

None.

Attitude Control System

The guidance, navigation, and control (GNC) subsystem has a sensor suite consisting of star trackers, IMU (containing gyros and accelerometers), GPS receiver, three-axis magnetometer, and sun sensors. The actuator suite consists of chemical thrusters, reaction wheels, and magnetorquers. The GNC subsystem has several operational modes that enable the spacecraft to perform its mission:

- A *detumbling mode* is used to reduce angular rates below a threshold after launch vehicle separation or after a hardware failure in the GNC subsystem. The magnetometer is used to sense the orientation of the Earth's magnetic field and the magnetorquers are used to generate torques opposing the rotation of the spacecraft.
- A *pointing mode* is used to orient the spacecraft in either the velocity, anti-velocity, nadir, ground tracking, or inertially fixed directions. This mode is used for ground communication and payload activities.
- A *safe mode* is used to maximize solar power generation while also allowing communications with the ground network. Safe mode is entered either by ground command or autonomously by the flight software when it detects a low battery state of charge. During this mode, the spacecraft will maintain its solar panels pointing toward the sun and will also track selected ground stations when they come within line of sight.

During normal operations, the reaction wheels provide redundant 3-axis attitude control while the magnetorquers are used to maintain wheel speeds below their maximum limits. The nominal spacecraft orientation has the solar panels in the zenith direction (+R for radial) and the launch vehicle separation ring in the velocity direction (+T for tangential).

Description of any range safety or other pyrotechnic devices

None.

Space vehicle separation will be accomplished using a debris-free low-shock release system as designed by approved integrators for our launch. Integrators will install the RocketLab Advanced Lightband separation system onto Reason-1. The Advanced Lightband is a 24” debris free deployment mechanism.

Solar array deployment will also be achieved using Space Lock Lora6 hold-down mechanisms, which do not release any debris. Solar arrays will be deployed via a spring-based system folded out.

Optical cover deployment will be achieved by a D-Cubed uD3RL Micro Hold Down Release Mechanism (HDRM) which will not release any debris. The cover will deploy via a spring-based

system and remain attached to the vehicle through a mechanical hinge.

Description of the electrical generation and storage system

Standard COTS Li-Ion battery cells are charged before payload integration and provide 1760Wh of electrical energy during the eclipse portion of the satellite's orbit. A series of triple junction solar cells generate an average on-orbit power of approximately 250 W. The charge/discharge cycle is managed by the electronic power system, which is monitored by the flight computer.

A secondary payload battery providing 1170 Wh will be charged before integration and re-charged in orbit from the flight battery. The battery will be electronically disconnected from the payload and bus until a successful separation.

Identification of any other sources of stored energy not noted above

Reaction wheels store kinetic energy but can be disconnected from power at the end of the operational lifetime.

Identification of any radioactive material on board

None

Address the trackability of the spacecraft. Spacecraft operating in low-Earth orbit will be presumed trackable if each individual spacecraft is 10 cm or larger in its smallest dimension, excluding deployable components

The spacecraft is in LEO and has a smallest dimension measuring at least 38 cm without solar panels deployed. This dimension is greater than 10 cm and, therefore, trackable.

The statement shall also disclose the following:

How the operator plans to identify the spacecraft following deployment and whether spacecraft tracking will be active or passive

Spacecraft tracking will be passive.[2] Prior to deployment, an initial ephemeris is produced by the

launch service that will be used to schedule a contact time window with the ground station. The accuracy of the ephemeris will depend on the launch vehicle's performance, delays, and deployment times. A more accurate ephemeris will be made available shortly after deployment. After deployment when the satellite establishes contact with the nearest available contracted ground station, satellite tracking will be employed to enhance and maintain satellite ephemeris data. The collected data will be used to identify the spacecraft from two-line element sets once they become available by the 18th Space Control Squadron. At this time, Cowboy Space Corp will not enlist any commercial space situational awareness data but is actively seeking to do so for future missions.

Whether, prior to deployment, the spacecraft will be registered with the 18th Space Control Squadron or successor entity

Prior to deployment, the spacecraft will be registered with the 18th Space Control Squadron via their Satellite Registration Form and Space Situational Awareness (SSA) Sharing Agreement.

The extent to which the spacecraft operator plans to share information regarding initial deployment, ephemeris, and/or planned maneuvers with the 18th Space Control Squadron or successor entity, other entities that engage in space situational awareness or space traffic management functions, and/or other operators

Cowboy Space Corp intends to provide the 18th Space Control Squadron information regarding initial deployment, owner/operator (O/O) ephemeris, and planned maneuvers. This sharing is intended to provide better SSA and improve the accuracy of conjunction analysis (CA). The higher accuracy O/O ephemeris will improve the quality of the CA and reduce the frequency of Conjunction Data Messages. Cowboy Space Corp intends to share ephemeris with other operators on an as-needed basis.

Planned Proximity Operations

None.

3. Spacecraft Debris Released During Normal Operations

Assessment of Spacecraft Compliance with Requirements 4.3-1 and 4.3-2

Requirement 4.3-1: Mission Related Debris Passing Through LEO

- All deployments use either a Space Lock Lora6 or D-Cubed uD3RL Micro hold-down mechanisms that do not generate any debris. Additionally, there is no probable scenario for unintentional debris generation.
- **Compliance statement:** No release of debris will occur during the lifetime of Reason-1.

Requirement 4.3-2: Mission Related Debris Passing Near GEO

- **Compliance statement:** This requirement is not applicable to this mission profile.

4. Spacecraft Intentional Breakups and Potential for Explosions

Potential causes of spacecraft breakup during deployment and mission operations

None.

Summary of failure modes and effects analyses of all credible failure modes which may lead to an accidental explosion

Battery Power System: The battery safety systems are discussed in the assessment of spacecraft compliance with ODAR requirement 4.4-1, which describes the combined faults required for the mutually exclusive failures that lead to battery venting. The batteries are COTS batteries equipped with safety vent features that release excessive pressure build-up, precluding explosions. There are two batteries on this spacecraft.

Plan for any designed spacecraft breakup

There are no planned breakups.

List of components which shall be passivated at EOM including method of passivation and amount which cannot be passivated

- **Reaction Wheels** – will be spun down and the spacecraft will be controlled via torque rods to maximize drag.
- **Batteries** – will be deenergized to a minimum charge state and then commanded to

disconnect charging input and discharge output to the bus to transition to full passivation with no ability to boot satellite after passing the orbits of the ISS and other inhabitable spacecraft.

Assessment of Spacecraft Compliance with Requirements 4.4-1 through 4.4-4 Requirement

Requirement 4.4-1: Limiting the risk to other space systems from accidental explosions during deployment and mission operations while in orbit about Earth or the Moon

- *For each spacecraft and launch vehicle orbital stage employed for a mission, the program or project shall demonstrate, via failure mode and effects analyses or equivalent analyses, that the integrated probability of explosion for all credible failure modes of each spacecraft and launch vehicle is less than 0.001 (excluding small particle impacts) (Requirement 56449).*
- **Compliance statement:** Compliant**.** See list below.

Battery explosion:

- **Effect:** All failure modes below might result in battery explosion with the possibility of orbital debris generation. However, in the unlikely event that a battery cell does explosively rupture, the small size, mass, and potential energy of these small batteries, coupled with the multiple enclosures surrounding the batteries, any debris from the battery rupture will be contained within the spacecraft due to the lack of penetration energy.
- **Probability:** Extremely Low. It is estimated to be less than 0.01% given that multiple independent (not common mode) faults must occur for each failure mode to cause the ultimate effect (explosion). The Reason-1 spacecraft uses Samsung INR18650-MJ1 battery cells which have extensive flight heritage. Each battery cell has over-voltage and over-current protection. Battery testing includes Lot Sampling Testing, Acceptance Testing, and Final Checkout after Assembling the satellite.
- **Failure Mode 1:** Internal cell short circuit
    - **Mitigation:** Qualification and acceptance shock, vibration, thermal cycling, and vacuum tests followed by maximum system rate-limited charge and discharge will

prove that no internal short circuit sensitivity exists.

- **Combined faults required for realized failure:** Environmental testing **AND** functional charge/discharge tests must both be ineffective in discovery of the failure mode.

- **Failure Mode 2:** Internal thermal rise due to high load discharge rate
  - **Mitigation:** Battery cells were UL/UN tested in lab for high load discharge rates by short circuiting the terminal to determine the feasibility of an out-of-control thermal rise in the cell.
  - **Combined faults required for realized failure:** Spacecraft thermal design must be incorrect **AND** external over-current detection and disconnect function must fail to enable this failure mode.
- **Failure Mode 3:** Excessive discharge rate or short-circuit due to external device failure or terminal contact with conductors not at battery voltage levels (due to abrasion or inadequate proximity separation)
  - **Mitigation:** This failure mode is negated by:
    - Qualification tested short circuit protection on each external circuit;
    - Design of battery packs and insulators such that no contact with nearby board traces is possible without being caused by some other mechanical failure; and
    - Obviation of such other mechanical failures by proto-qualification and acceptance environmental tests (shock, vibration, thermal cycling, and thermal-vacuum tests).
  - **Combined faults required for realized failure:** An external load must fail/short circuit **AND** external over-current detection **AND** disconnect function must all occur to enable this failure mode.
- **Failure Mode 4:** Inoperable vents
  - **Mitigation:** Battery venting is not inhibited by the battery holder design or the spacecraft design. The battery can vent gases to the external environment.
  - **Combined faults required for realized failure:** The cell manufacturer and the satellite integrator must fail to install proper venting.
- **Failure Mode 5:** Crushing

- **Mitigation:** Failure mode prevented by design. No moving parts appear near the battery assembly. Battery cells are UL/UN tested for crush and impact.
- **Combined faults required for realized failure:** A catastrophic failure must occur in an external system **AND** the failure must cause a collision sufficient to crush the batteries leading to an internal short circuit **AND** the satellite must be in a naturally sustained orbit at the time the crushing occurs.

● **Failure Mode 6:** Low level current leakage or short-circuit through battery pack case or due to moisture-based degradation of insulators

- **Mitigation:** These modes are negated by a) battery holder/case design made of non conductive plastic and b) operation in a vacuum such that no moisture can affect insulators.
- **Combined faults required for realized failure:** Abrasion or piercing failure of circuit board coating or wire insulators **AND** dislocation of battery packs **AND** failure of battery terminal insulators **AND** failure to detect such failure modes in environmental tests must occur for this failure mode.

● **Failure Mode 7:** Excess battery cell temperature due to orbital environment and high discharge combined

- **Mitigation:** The spacecraft thermal design will negate this possibility. Thermal rise has been analyzed in combination with space environment temperatures showing that the batteries do not exceed normal allowable operating temperatures under a variety of modeled cases, including worst case orbital scenarios. Analysis shows these temperatures to be well below temperatures of concern for explosions. Battery cells are UL/UN thermal tested without fire or explosion.
- **Combined faults required for realized failure:** Incorrect thermal analysis **AND** thermal design **AND** mission simulations in thermal-vacuum chamber testing **AND** over-current monitoring and control must all fail for this failure mode to occur.

Requirement 4.4-2: Design for passivation after completion of mission operations while in orbit about Earth or the Moon

● *Design of all spacecraft and launch vehicle orbital stages shall include the ability to deplete*

all onboard sources of stored energy and disconnect all energy generation sources when they are no longer required for mission operations or post-mission disposal or control to a level which cannot cause an explosion or deflagration large enough to release orbital debris or break up the spacecraft (Requirement 56450).

- **Compliance statement:** Compliant. The reaction wheels will be spun down to passivate Cowboy Space Corp's Reason-1. In this EOM mode, all subsystems will be cut off from power and batteries depleted.

Requirement 4.4-3: Limiting the long-term risk to other space systems from planned breakups

- **Compliance statement:** This requirement is not applicable. There are no planned breakups.

Requirement 4.4-4: Limiting the short-term risk to other space systems from planned breakups

- **Compliance statement:** This requirement is not applicable. There are no planned breakups.

5. Spacecraft Potential for On-Orbit Collisions

Requirement 4.5-1: Limiting debris generated by collisions with large objects when operating in Earth orbit

- *For each spacecraft and launch vehicle orbital stage in or passing through LEO, the program or project shall demonstrate that, during the orbital lifetime of each spacecraft and orbital stage, the probability of accidental collision with space objects larger than 10 cm in diameter is less than 0.001 (Requirement 56506).*
- **Compliance statement:** Compliant. Large object impact and debris generation probability: 1.4050E-04.

Detailed description and assessment of efficacy of any planned debris avoidance capability intended to help in meeting requirement 4.5-1

There is no significant risk of collision based on Cowboy Space Corp's Reason-1 ability to employ differential drag. Studies by Planet Labs and other companies have shown that

differential drag can be an effective collision avoidance technique. The effective cross-sectional surface area of the satellite can change from 0.8 to 2.8 m^2 by adjusting the orientation of the Reason-1 spacecraft.

Cowboy Space Corp will register Reason-1 with the US Space Force's 18th Space Defense Squadron, which provides active monitoring. Cowboy Space Corp will attempt to contact and work with any entity that owns a spacecraft, which has the potential to collide with the Reason-1 satellite, to avoid collision.

If at any time during the spacecraft's mission or de-orbit phase the spacecraft will operate in or transit through the orbits used by any planned or inhabitable spacecraft, including the International Space Station, describe the design and operational strategies, such as coordination, that will be used to minimize the risk of collision and avoid posing any operational constraints to the spacecraft

During the deorbit phase, the Reason-1 spacecraft will transfer from an altitude greater than that of the ISS and other inhabitable spacecraft to an altitude below that of the ISS and other inhabitable spacecraft; however, the chance passing through the ISS or other inhabitable spacecraft obits is minimal as Reason-1 will be at an SSO inclination while current and planned inhabitable spacecraft are in mid-inclination, making transit almost impossible. Reason-1 will be in its deorbit state during this time, but if still operational could employ differential drag. Cowboy Space Corp will work with the 18th Space Defense Squadron (by uploading predicted ephemeris) to plan and, if operational at that time, execute differential drag deorbit maneuvers to minimize the risk of collision.

Certify that upon receipt of a space situational awareness conjunction warning, the operator will review and take all possible steps to assess the collision risk, and will mitigate the collision risk if necessary

Upon receipt of an actionable Conjunction Data Message (CDM) from the 18th, Cowboy Space Corp certifies that it will attempt to contact the operator of any active spacecraft involved in such

a warning, share ephemeris data and other appropriate operational information with any such operator, and modify the spacecraft's attitude, orbit, and/or operations to avoid a collision. If the operator of the other spacecraft does not have maneuvering capabilities, the operator for Reason-1 will upload a special ephemeris including potential collision avoidance maneuvers (CAMs) via the Application Programming Interface (API) to the 18th Space Defense Squadron to avoid a collision after consultation.

Requirement 4.5-2: Limiting the probability of damage from small objects when operating in Earth or lunar orbit

- *For each spacecraft, the program or project shall demonstrate that, during the mission of the spacecraft, the probability of accidental collision with orbital debris and meteoroids sufficient to prevent compliance with the applicable post-mission disposal requirements is less than 0.01 (Requirement 56507).*
- **Compliance Statement:** Small objects impact and debris generation probability: N/A Cowboy Space Corp Reason-1 will not carry propulsion or other post-mission disposal system. Instead it will employ a passive deorbit approach. After an operational lifetime of 5 years, our DAS analysis shows the deployed spacecraft will deorbit within 5 years of EOM to meet the deorbit requirement.

6. Spacecraft Post-mission Disposal Plans and Procedures

Description of spacecraft disposal option selected

Consistent with NASA-STD 8719.4C, Cowboy Space Corp's Reason-1 will be disposed of via atmospheric reentry (natural decay). The operational altitude in LEO lends to natural forces that will lead to atmospheric reentry once the operations are ceased. The orbit of Reason-1 will decay because of atmospheric drag, and the satellite will eventually deorbit by atmospheric reentry.

Cowboy Space Corp Reason-1 nominal deployed configuration area-to-mass ratio calculation:

- Spacecraft mass: 230 kg (maximum mass)
- Cross-sectional area: 2.8 m^2
- Area-to-mass ratio: 0.012 m^2/kg

Assessment of spacecraft compliance with ODAR requirements 4.6-1 to 4.6-4

Requirement 4.6-1(a): Disposal for space structures in or passing through LEO

- **Compliance statement:** The Cowboy Space Corp Reason-1 satellite reentry is COMPLIANT.

Cowboy Space Corp Reason-1 has a mission lifetime of < 5 years after which it will commence deorbit procedures. During the deorbit phase, reaction wheels will be spun down and the spacecraft will be controlled via torque rods to maximize drag. DAS calculations show that the spacecraft will reenter by 2034 (assuming worst case scenario of 530km altitude), which is compliant with the 5 year mission and 5 year post mission disposal requirement.[3]

Requirement 4.6-2: Disposal for space structure near GEO

- **Compliance statement:** Not applicable

Requirement 4.6-3: Disposal for space structures between LEO and GEO

- **Compliance statement:** Not applicable

Requirement 4.6-4: Reliability of post-mission disposal operations

- **Compliance statement:** At EOM, reaction wheels will be spun down and the spacecraft will be controlled via torque rods to maximize drag. No other EOM maneuver is necessary to support deorbit within 5 years of mission completion.

Requirement 4.8 Additional Assessment Requirements for Special Classes of Space Missions

None.

[3] Cowboy Space Corp Reason-1 is built on top of the TRL-9 Apex Aries bus that has been designed and validated for a five year operational mission in LEO.

7. Spacecraft Reentry Hazards

Summary of objects expected to survive uncontrolled reentry

For Cowboy Space Corp Reason-1, no spacecraft components are expected to survive uncontrolled reentry with an impact energy of greater than 15 J. See activity log below. Note, we made updates to the DAS listing from our previous submission to reflect the current flight-like configuration of the spacecraft. Component differences from the previous submission are included at the end of this section.

Compliance Assessment for Requirement 4.7-1

Limit the risk of human casualty.

Requirement 4.7-1(a):

- *The potential for human casualty is assumed for any object with an impacting kinetic energy in excess of 15 joules. For uncontrolled reentry, the risk of human casualty from surviving debris shall not exceed 0.0001 (1:10,000) (Requirement 56626).*
- **Compliance statement:** Our DAS accessed casualty risk is 1:12600 with a total casualty area of 6.12 m^2. There are three contributing components to this risk
    - Solar Array Panel (2) producing a casualty area of 3.54 m^2 with kinetic energy of 37.12 J. This is because the panels are modeled as Reinforced Carbon-Carbon. This material selection was performed by our satellite vendor. These panels are aluminum honeycomb sandwiched thin sheets (~1 mm) of epoxy bonded carbon fiber material. Graphite Epoxy and Aluminum are more valid material models, but we choose to leave the material selection as provided by our vendor. Using Graphite Epoxy and Aluminum would make these demise in DAS.
    - Battery Bracket (2) producing a casualty area of 1.29 m^2 with kinetic energy of 292.35 J. These are Titanium Grade 5 (6 Al-4 V) triangular, honeycomb light-weighted brackets. We model these as Flat Plates as their height is on average one-tenth the width. In DAS, we use the Titanium (6 Al-4 V) material. If modeled with Titanium (Generic) these brackets demise above 69 km according to DAS.
    - Avionics Brackets (2) producing a casualty area of 1.28 m^2 with kinetic energy of 124.99 J. These are Titanium Grade 5 (6 Al-4 V) triangular, honeycomb light-

weighted brackets. We model these as Flat Plates as their height is on average one-tenth the width. In DAS, we use the Titanium (6 Al-4 V) material. If modeled with Titanium (Generic) these brackets demise above 72 km according to DAS.

- Changing materials as described above produced a casualty risk of 0 with a full vehicle demise altitude of 69 km.

8. DAS Validation

The following section provides the raw results of the debris analysis using NASA DAS.

For the deorbit timeline, let's consider both the nominal case of 510km and the worst case scenario of 530km.

Altitude (km)	**Deorbit time (years)**	**DAS**
530	8.0 years	**INPUT** Start Year = 2026.100000 (yr) Perigee Altitude = 530.000000 (km) Apogee Altitude = 530.000000 (km) Inclination = 97.400000 (deg) RAAN = 0.000000 (deg) Argument of Perigee = 0.000000 (deg) Area-To-Mass Ratio = 0.012000 (m^2/kg) **OUTPUT** Orbital Lifetime from Startyr = 8.005640 (yr) Time Spent in LEO during Lifetime = 8.005640 (yr) Last year of Propagation = 2034 (yr) Returned Error Message: Object reentered
510	5.9 years	**INPUT** Start Year = 2026.100000 (yr) Perigee Altitude = 510.000000 (km) Apogee Altitude = 510.000000 (km) Inclination = 97.400000 (deg) RAAN = 0.000000 (deg) Argument of Perigee = 0.000000 (deg) Area-To-Mass Ratio = 0.012000 (m^2/kg) **OUTPUT** Orbital Lifetime from Startyr = 5.919355 (yr) Time Spent in LEO during Lifetime = 5.919355 (yr) Last year of Propagation = 2032 (yr) Returned Error Message: Object reentered

05 19 2026; 18:09:55PM Processing Requirement 4.5-1: Return Status : Passed

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Run Data

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INPUT

Space Structure Name = Reason-1
Space Structure Type = Payload
Perigee Altitude = 510.000 (km)
Apogee Altitude = 510.000 (km)
Inclination = 97.400 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.0120 (m^2/kg)
Start Year = 2026.100 (yr)
Initial Mass = 230.000 (kg)
Final Mass = 230.000 (kg)
Duration = 5.000 (yr)
Station-Kept = False
Abandoned = True
Long-Term Reentry = False

OUTPUT

Collision Probability = 2.5315E-05
Returned Message: Normal Processing
Date Range Message: Normal Date Range
Status = Pass

==========

========== End of Requirement 4.5-1 ==========

05 19 2026; 18:10:08PM Processing Requirement 4.6 Return Status : Passed

==========
Project Data
==========

INPUT

Space Structure Name = Reason-1
Space Structure Type = Payload

Perigee Altitude = 510.000000 (km)
Apogee Altitude = 510.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Area-To-Mass Ratio = 0.012000 (m^2/kg)
Start Year = 2026.100000 (yr)
Initial Mass = 230.000000 (kg)
Final Mass = 230.000000 (kg)
Duration = 5.000000 (yr)
Station Kept = False
Abandoned = True
PMD Perigee Altitude = 388.617783 (km)
PMD Apogee Altitude = 389.327143 (km)
PMD Inclination = 97.511893 (deg)
PMD RAAN = 65.102098 (deg)
PMD Argument of Perigee = 191.653333 (deg)
PMD Mean Anomaly = 0.000000 (deg)
Long-Term Reentry = False

OUTPUT

Suggested Perigee Altitude = 388.617783 (km)
Suggested Apogee Altitude = 389.327143 (km)
Returned Error Message = Passes LEO reentry orbit criteria.

Released Year = 2032 (yr)

Requirement = 61
Compliance Status = Pass

==========

========== End of Requirement 4.6 ==========

05 19 2026; 18:10:19PM *********Processing Requirement 4.7-1
Return Status : Passed

**********INPUT****
Item Number = 1

name = Reason-1
quantity = 1
parent = 0
materialID = 8
type = Box
Aero Mass = 230.000000
Thermal Mass = 230.000000
Diameter/Width = 0.861000
Length = 1.179000
Height = 0.424000

name = Battery
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 14.380000
Thermal Mass = 14.380000
Diameter/Width = 0.303000
Length = 0.417000
Height = 0.132000

name = Solar Array panel
quantity = 2
parent = 1
materialID = 16
type = Box

Aero Mass = 1.300000
Thermal Mass = 1.300000
Diameter/Width = 0.871000
Length = 1.136000
Height = 0.020000

name = Solar Array AL structure
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 3.350000
Thermal Mass = 3.350000
Diameter/Width = 1.000000
Length = 1.000000
Height = 0.020000

name = Solar Array Cell and CIC
quantity = 2
parent = 1
materialID = 27
type = Box
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.871000
Length = 1.136000
Height = 0.000300

name = PX Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 56.064000
Thermal Mass = 5.570000
Diameter/Width = 0.424000
Length = 1.179000

name = Center Cylinder
quantity = 1

parent = 6
materialID = 8
type = Cylinder
Aero Mass = 8.320000
Thermal Mass = 8.320000
Diameter/Width = 0.600000
Length = 0.325000

name = RWA Bracket
quantity = 4
parent = 6
materialID = 8
type = Box
Aero Mass = 0.360000
Thermal Mass = 0.360000
Diameter/Width = 0.136000
Length = 0.182000
Height = 0.095000

name = Avionics Tray
quantity = 1
parent = 6
materialID = 8
type = Flat Plate
Aero Mass = 5.100000
Thermal Mass = 5.100000
Diameter/Width = 0.350000
Length = 0.527000

name = Reaction Wheels
quantity = 4
parent = 6
materialID = 8
type = Cylinder
Aero Mass = 1.450000
Thermal Mass = 1.450000
Diameter/Width = 0.146000
Length = 0.045000

name = Torque Rods

quantity = 3
parent = 6
materialID = 8
type = Cylinder
Aero Mass = 0.539000
Thermal Mass = 0.539000
Diameter/Width = 0.050000
Length = 0.430000

name = Star Tracker
quantity = 2
parent = 6
materialID = 8
type = Box
Aero Mass = 0.270000
Thermal Mass = 0.270000
Diameter/Width = 0.050000
Length = 0.095000
Height = 0.044000

name = GNSS Receiver
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 0.310000
Thermal Mass = 0.310000
Diameter/Width = 0.056000
Length = 0.094000
Height = 0.026000

name = GNSS L-Band Antenna
quantity = 2
parent = 6
materialID = 8
type = Cylinder
Aero Mass = 0.350000
Thermal Mass = 0.350000
Diameter/Width = 0.090000
Length = 0.027000

name = X-Band Antenna
quantity = 1
parent = 6
materialID = 8
type = Flat Plate
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.082000
Length = 0.098000

name = S-Band Transceiver - Secondary
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 0.290000
Thermal Mass = 0.290000
Diameter/Width = 0.089000
Length = 0.094000
Height = 0.018500

name = Ethernet Switch
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 2.460000
Thermal Mass = 2.460000
Diameter/Width = 0.180000
Length = 0.230000
Height = 0.040000

name = PCDU
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 2.540000
Thermal Mass = 2.540000

Diameter/Width = 0.254000
Length = 0.254000
Height = 0.050000

name = Flight Computer
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 0.770000
Thermal Mass = 0.770000
Diameter/Width = 0.114000
Length = 0.114000
Height = 0.050000

name = Harness/Connectors
quantity = 1
parent = 6
materialID = 54
type = Cylinder
Aero Mass = 12.115800
Thermal Mass = 12.115800
Diameter/Width = 0.050000
Length = 1.000000

name = Payload closeout covers
quantity = 4
parent = 6
materialID = 8
type = Flat Plate
Aero Mass = 0.500000
Thermal Mass = 0.500000
Diameter/Width = 0.100000
Length = 0.100000

name = Heaters
quantity = 8
parent = 6
materialID = 8
type = Flat Plate

Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.100000
Length = 0.100000

name = UHF Hybrid Coupler
quantity = 3
parent = 6
materialID = 8
type = Box
Aero Mass = 0.060000
Thermal Mass = 0.060000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = COMM Carrier Board
quantity = 1
parent = 6
materialID = 8
type = Flat Plate
Aero Mass = 0.150000
Thermal Mass = 0.150000
Diameter/Width = 0.100000
Length = 0.100000

name = Magnetometer
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 0.083000
Thermal Mass = 0.083000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.050000

name = IMU
quantity = 1
parent = 6

materialID = 8
type = Box
Aero Mass = 0.055200
Thermal Mass = 0.055200
Diameter/Width = 0.050000
Length = 0.050000
Height = 0.050000

name = Solar Array HDRM Bracket
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = Solar Array mount brackets
quantity = 2
parent = 6
materialID = 8
type = Box
Aero Mass = 0.340000
Thermal Mass = 0.340000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = S-band antenna bracket
quantity = 1
parent = 6
materialID = 8
type = Flat Plate
Aero Mass = 0.140000
Thermal Mass = 0.140000
Diameter/Width = 0.100000
Length = 0.100000

name = L-band antenna bracket
quantity = 1
parent = 6
materialID = 8
type = Flat Plate
Aero Mass = 0.200000
Thermal Mass = 0.200000
Diameter/Width = 0.100000
Length = 0.100000

name = USX radio
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 2.010000
Thermal Mass = 2.010000
Diameter/Width = 0.150000
Length = 0.250000
Height = 0.100000

name = Harness interface box
quantity = 1
parent = 6
materialID = 8
type = Box
Aero Mass = 0.693000
Thermal Mass = 0.693000
Diameter/Width = 0.114000
Length = 0.114000
Height = 0.050000

name = NX Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 5.670000
Thermal Mass = 5.670000
Diameter/Width = 0.424000

Length = 1.179000

name = PY Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.360000
Thermal Mass = 0.360000
Diameter/Width = 0.424000
Length = 0.861000

name = NY Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.470000
Thermal Mass = 0.470000
Diameter/Width = 0.424000
Length = 0.861000

name = PZ Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 14.100000
Thermal Mass = 14.100000
Diameter/Width = 0.352000
Length = 0.854000

name = NZ Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 9.740000
Thermal Mass = 9.740000
Diameter/Width = 0.352000

Length = 0.854000

name = Star Tracker Closeout Baffle and Bracket
quantity = 2
parent = 1
materialID = 50
type = Cylinder
Aero Mass = 0.170000
Thermal Mass = 0.170000
Diameter/Width = 0.100000
Length = 0.200000

name = S-Band Antenna
quantity = 4
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.122000
Thermal Mass = 0.122000
Diameter/Width = 0.082000
Length = 0.098000

name = Separation System - Fly Away
quantity = 1
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 3.550000
Thermal Mass = 3.550000
Diameter/Width = 0.150000
Length = 0.150000

name = Thermal blanketing
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 3.450000
Thermal Mass = 3.450000
Diameter/Width = 1.000000

Length = 1.000000

name = Temperature sensors
quantity = 12
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.100000
Thermal Mass = 0.100000
Diameter/Width = 0.100000
Length = 0.100000

name = UHF Antenna
quantity = 2
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.059000
Thermal Mass = 0.059000
Diameter/Width = 0.050000
Length = 0.100000

name = Thermal Tape
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.150000
Thermal Mass = 0.150000
Diameter/Width = 0.100000
Length = 0.100000

name = Strut Assembly
quantity = 4
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 0.130000
Thermal Mass = 0.130000
Diameter/Width = 0.100000

Length = 0.050000

name = Fastener Shipset
quantity = 100
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.006000
Thermal Mass = 0.006000
Diameter/Width = 0.050000
Length = 0.050000

name = Payload Battery
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 14.800000
Thermal Mass = 14.800000
Diameter/Width = 0.303500
Length = 0.425200
Height = 0.131300

name = Battery Bracket
quantity = 2
parent = 1
materialID = 65
type = Flat Plate
Aero Mass = 1.300000
Thermal Mass = 1.300000
Diameter/Width = 0.140000
Length = 0.371000

name = Battery Bracket Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 1.400000
Thermal Mass = 1.400000

Diameter/Width = 0.350000
Length = 0.425000

name = Laser Enclosure
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 15.000000
Thermal Mass = 15.000000
Diameter/Width = 0.270000
Length = 0.765000
Height = 0.075000

name = Laser Heat Sink
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 20.000000
Thermal Mass = 20.000000
Diameter/Width = 0.270000
Length = 0.765000
Height = 0.050000

name = Gain Fiber Spiral
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.200000
Length = 0.200000

name = Fiber Oscillator Components
quantity = 5
parent = 1
materialID = 8
type = Box

Aero Mass = 0.020000
Thermal Mass = 0.020000
Diameter/Width = 0.050000
Length = 0.100000
Height = 0.050000

name = Pump Diode Module
quantity = 18
parent = 1
materialID = 54
type = Box
Aero Mass = 0.200000
Thermal Mass = 0.200000
Diameter/Width = 0.150000
Length = 0.150000
Height = 0.050000

name = Laser Mounting Flexures
quantity = 4
parent = 1
materialID = 65
type = Flat Plate
Aero Mass = 0.164000
Thermal Mass = 0.164000
Diameter/Width = 0.070000
Length = 0.082000

name = Laser Mounting Flexure Adapter
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.600000
Thermal Mass = 0.600000
Diameter/Width = 0.270000
Length = 0.765000

name = Flight Compute Unit
quantity = 1
parent = 1

materialID = 8
type = Box
Aero Mass = 2.000000
Thermal Mass = 2.000000
Diameter/Width = 0.200000
Length = 0.315000
Height = 0.040000

name = Temperature Control Unit
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.450000
Thermal Mass = 0.450000
Diameter/Width = 0.080000
Length = 0.232000
Height = 0.020000

name = Optics Control Unit
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.750000
Thermal Mass = 0.750000
Diameter/Width = 0.250000
Length = 0.250000
Height = 0.020000

name = Avionics Radiator
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 1.000000
Thermal Mass = 1.000000
Diameter/Width = 0.290000
Length = 0.360000

name = Avionics Bracket
quantity = 2
parent = 1
materialID = 65
type = Flat Plate
Aero Mass = 0.840000
Thermal Mass = 0.840000
Diameter/Width = 0.140000
Length = 0.362000

name = RF Assembly
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 1.000000
Thermal Mass = 1.000000
Diameter/Width = 0.100000
Length = 0.166000
Height = 0.060000

name = Beam Expander Metering Tube
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 4.180000
Thermal Mass = 4.180000
Diameter/Width = 0.270000
Length = 0.308000
Height = 0.228000

name = Optical Payload Mounting Crescents
quantity = 3
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.530000
Thermal Mass = 0.530000
Diameter/Width = 0.060000

Length = 0.282000

name = Optical Payload Strut
quantity = 6
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 0.015000
Thermal Mass = 0.015000
Diameter/Width = 0.020000
Length = 0.140000

name = Optical Payload Strut End Fitting
quantity = 12
parent = 1
materialID = 65
type = Cylinder
Aero Mass = 0.028000
Thermal Mass = 0.028000
Diameter/Width = 0.020000
Length = 0.050000

name = Deployable Cover
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 1.100000
Thermal Mass = 1.100000
Diameter/Width = 0.230000
Length = 0.270000

name = Beam Expander Primary Bulkhead
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 3.900000
Thermal Mass = 3.900000
Diameter/Width = 0.296000

Length = 0.338000
Height = 0.090000

name = Beam Expander Primary Mirror
quantity = 1
parent = 1
materialID = 71
type = Cylinder
Aero Mass = 3.500000
Thermal Mass = 3.500000
Diameter/Width = 0.200000
Length = 0.100000

name = Beam Expander Secondary Mirror
quantity = 1
parent = 1
materialID = 71
type = Cylinder
Aero Mass = 0.100000
Thermal Mass = 0.100000
Diameter/Width = 0.050000
Length = 0.050000

name = Receive Optics Assembly
quantity = 1
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 3.500000
Thermal Mass = 3.500000
Diameter/Width = 0.125000
Length = 0.500000

name = Fast Steering Mirror
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.176000
Thermal Mass = 0.176000

Diameter/Width = 0.035000
Length = 0.055000
Height = 0.035000

name = Front End Optics Assembly
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.800000
Thermal Mass = 0.800000
Diameter/Width = 0.150000
Length = 0.150000
Height = 0.050000

name = Thermal Blanketing
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 3.000000
Thermal Mass = 3.000000
Diameter/Width = 2.000000
Length = 2.000000

name = Fasteners
quantity = 100
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.006000
Thermal Mass = 0.006000
Diameter/Width = 0.050000
Length = 0.050000

name = Harness
quantity = 1
parent = 1
materialID = 54
type = Cylinder

Aero Mass = 5.300000
Thermal Mass = 5.300000
Diameter/Width = 0.050000
Length = 2.000000

name = Structural Spacer
quantity = 2
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 2.500000
Thermal Mass = 2.500000
Diameter/Width = 0.150000
Length = 0.150000

**********OUTPUT****
Item Number = 1

name = Reason-1
Demise Altitude = 77.998756
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery
Demise Altitude = 73.655176
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Solar Array panel
Demise Altitude = 0.000000
Debris Casualty Area = 3.544477
Impact Kinetic Energy = 37.115647

****
name = Solar Array AL structure
Demise Altitude = 77.582590
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Solar Array Cell and CIC
Demise Altitude = 77.965809
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = PX Panel
Demise Altitude = 77.103653
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Center Cylinder
Demise Altitude = 75.841840
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = RWA Bracket
Demise Altitude = 76.788132
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Avionics Tray
Demise Altitude = 75.245940
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Reaction Wheels
Demise Altitude = 73.245224
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Torque Rods
Demise Altitude = 76.443266

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Star Tracker
Demise Altitude = 76.326589
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = GNSS Receiver
Demise Altitude = 76.024970
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = GNSS L-Band Antenna
Demise Altitude = 75.001400
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = X-Band Antenna
Demise Altitude = 76.899660
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = S-Band Transceiver - Secondary
Demise Altitude = 76.178127
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Ethernet Switch
Demise Altitude = 74.951969
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = PCDU
Demise Altitude = 75.378621
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Flight Computer
Demise Altitude = 75.701303
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Harness/Connectors
Demise Altitude = 61.384551
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Payload closeout covers
Demise Altitude = 75.327379
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Heaters
Demise Altitude = 76.202072
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = UHF Hybrid Coupler
Demise Altitude = 77.015654
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = COMM Carrier Board
Demise Altitude = 76.563336
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Magnetometer
Demise Altitude = 76.927297
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = IMU
Demise Altitude = 76.843424
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Solar Array HDRM Bracket
Demise Altitude = 76.720674
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Solar Array mount brackets
Demise Altitude = 76.585211
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = S-band antenna bracket
Demise Altitude = 76.597338
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = L-band antenna bracket
Demise Altitude = 76.380871
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = USX radio
Demise Altitude = 75.826066

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Harness interface box
Demise Altitude = 75.844041
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = NX Panel
Demise Altitude = 77.016177
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = PY Panel
Demise Altitude = 77.955782
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = NY Panel
Demise Altitude = 77.924008
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = PZ Panel
Demise Altitude = 74.552184
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = NZ Panel
Demise Altitude = 75.597619
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Star Tracker Closeout Baffle and Bracket
Demise Altitude = 77.644767
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = S-Band Antenna
Demise Altitude = 77.481082
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Separation System - Fly Away
Demise Altitude = 73.598536
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Thermal blanketing
Demise Altitude = 77.561351
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Temperature sensors
Demise Altitude = 77.627091
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = UHF Antenna
Demise Altitude = 76.995394
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Thermal Tape
Demise Altitude = 77.443357
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Strut Assembly
Demise Altitude = 77.513863
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Fastener Shipset
Demise Altitude = 77.880744
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Payload Battery
Demise Altitude = 73.608902
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Battery Bracket
Demise Altitude = 0.000000
Debris Casualty Area = 1.292355
Impact Kinetic Energy = 292.347857

****
name = Battery Bracket Panel
Demise Altitude = 77.360239
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Laser Enclosure
Demise Altitude = 74.427980
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Laser Heat Sink
Demise Altitude = 72.904709

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Gain Fiber Spiral
Demise Altitude = 77.956081
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Fiber Oscillator Components
Demise Altitude = 77.945942
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Pump Diode Module
Demise Altitude = 76.784080
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Laser Mounting Flexures
Demise Altitude = 70.936662
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Laser Mounting Flexure Adapter
Demise Altitude = 77.804979
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Flight Compute Unit
Demise Altitude = 76.711478
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Temperature Control Unit
Demise Altitude = 77.295270
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Optics Control Unit
Demise Altitude = 77.385726
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Avionics Radiator
Demise Altitude = 77.408334
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Avionics Bracket
Demise Altitude = 0.000000
Debris Casualty Area = 1.282105
Impact Kinetic Energy = 124.983141

****
name = RF Assembly
Demise Altitude = 76.720387
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Beam Expander Metering Tube
Demise Altitude = 76.626405
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Optical Payload Mounting Crescents
Demise Altitude = 76.790272
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Optical Payload Strut
Demise Altitude = 77.903815
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Optical Payload Strut End Fitting
Demise Altitude = 74.813513
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Deployable Cover
Demise Altitude = 77.033303
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Beam Expander Primary Bulkhead
Demise Altitude = 76.310646
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Beam Expander Primary Mirror
Demise Altitude = 63.150654
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Beam Expander Secondary Mirror
Demise Altitude = 74.353895
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Receive Optics Assembly
Demise Altitude = 75.957858

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Fast Steering Mirror
Demise Altitude = 76.950112
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Front End Optics Assembly
Demise Altitude = 76.924939
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Thermal Blanketing
Demise Altitude = 77.862930
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Fasteners
Demise Altitude = 77.880744
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Harness
Demise Altitude = 72.892414
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structural Spacer
Demise Altitude = 74.813569
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

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========== End of Requirement 4.7-1 ==========