EXHIBIT B

ORBITAL DEBRIS ASSESSMENT REPORT
REASON-2 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.

/s/Andrew Yarmola

Andrew Yarmola

Debris Assessment Software (DAS) version used in analysis: v3.2.7

Revision Record				
Revision	Date	Affected Pages	Changes	Author(s)
0.0	April 3, 2026	All–Initial	Initial	Andrew Yarmola
0.1	July 22nd, 2026	Deorbit conops, demisability		Andrew Yarmola, Paxton Scott

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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 constructs Reason-2 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 will descend to 510km shortly after dispatch and the subsequent deorbit plan does not require propulsive deorbit to meet FCC deorbit constraints.	Section 5, Req. 4.5-2	Probability of collision with small debris
5.64 b3	Compliant	Cowboy Space 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 will coordinate with other spacecraft to avoid collisions.	Section 5	Coordination with other spacecraft or systems

5.64 b4iC	Compliant	Cowboy Space 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 will not maintain orbital parameters.	Section 2	Orbital parameter maintenance
5.64 b4iE	Compliant	Cowboy Space 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 will passively track Reason-2.	Section 2	Space station identification and tracking
5.64 b5ii	Compliant	Cowboy Space will register the satellite.	Section 2	Registration with the 18th Space Control Squadron or successor entity
5.64 b5iii	Compliant	Cowboy Space will share information.	Section 2	Sharing information with the 18th Space Defense Squadron
5.64 b6	N/A	Cowboy Space 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's Reason-2 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's Reason-2 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 Reason-2 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. ("Cowboy Space") is a U.S. company based in San Carlos, California.

Foreign Government or Space Agency Participation

- None

Mission Overview

Cowboy Space's Reason-2 is expected to launch in April 2027 into a circular sun-synchronous, low-Earth orbit (LEO). It is expected to be launched in an inclined (97.4–97.8 deg) orbit at an altitude between 490 km and 600 km. The precise orbital altitude will be defined by SpaceX closer to launch. Reason-2 will operate for 6 months at its injection orbit while it conducts in-orbit testing prior to initiating its mission. If Reason-2 is inserted into an orbit above 510 km, at 6 months after launch it will then perform a propulsive deorbit to 510 km, followed by additional operations for less than 4.5 years. This intermediate deorbit is performed early in the mission to reduce collision risk and to lower the orbit while propulsion is known to be healthy and operational, thereby ensuring compliance with the 5-year post-mission disposal requirement even in the unlikely event of subsequent malfunctions with the propulsion system. If Reason-2 is instead inserted at or below 510 km, this intermediate deorbit maneuver is not required and the satellite continues operations at its injection orbit. At end of life, the satellite will use end-of-life deorbit to 450 km. Reason-2 will be equipped with reaction wheels, a Global Positioning System (GPS) receiver; star trackers; sun sensors; magnetorquers; inertial measurement unit (IMU); telescope; laser system; camera; and electric propulsion.

Launch

Cowboy Space's Reason-2 is planned to launch on a SpaceX Falcon 9 rocket on the Transporter-20 mission. Cowboy Space has begun constructing Reason-2 and understands that such construction is at its own risk.[1]

Mission Duration

The anticipated mission lifetime of Cowboy Space's Reason-2 is 5 years, comprising 6 months of nominal operations at the injection orbit, followed by less than 4.5 years of additional operations. For insertion orbits above 510 km, an initial propulsive deorbit to 510 km is performed at the end of the first 6 months; for insertion orbits at or below 510 km, this maneuver is not required.

Deployment Profile

Cowboy Space's Reason-2 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	600 km	600 km	97.8° ± 0.1°
Min Insertion Orbit	490 km	490 km	97.4° ± 0.1°

2. Spacecraft Description

Physical description of the spacecraft

The Reason-2 satellite is based on Apex's Aries supplemented with commercial-off-the-shelf and proprietary items from Cowboy Space. 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,

[1] 47 C.F.R. § 5.64(a).

and a payload. The solar panels generate 250 W Orbit Average Power (OAP) of electrical DC power, which is stored in a 1760 Wh 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-2 spacecraft are provided in the figures below.

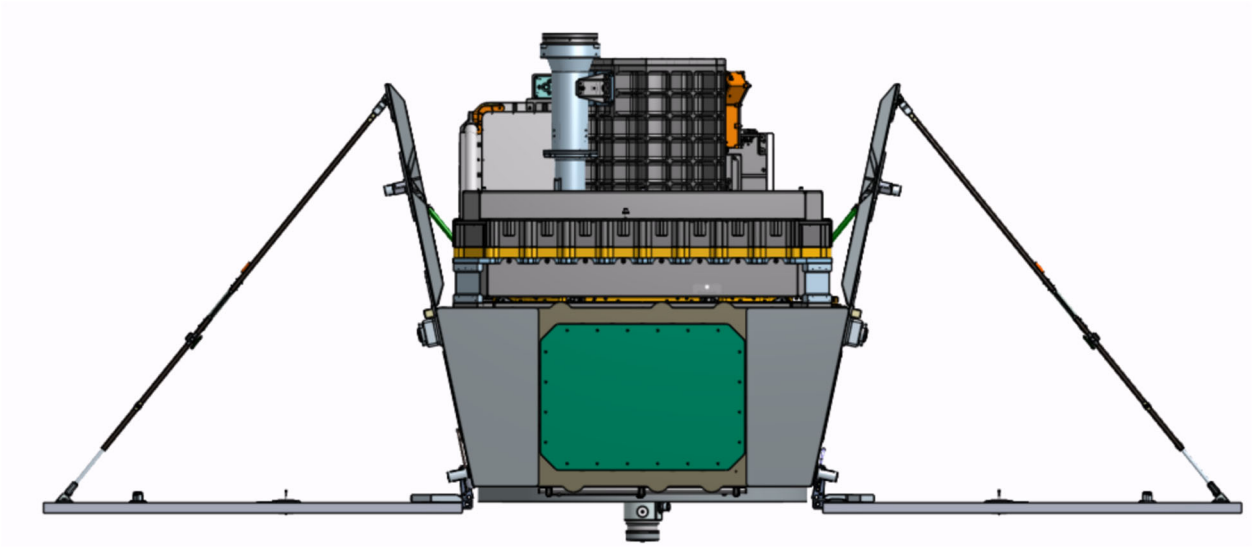

Figure 1. Reason-2 Space Vehicle External View | XY Plane (Deployed)

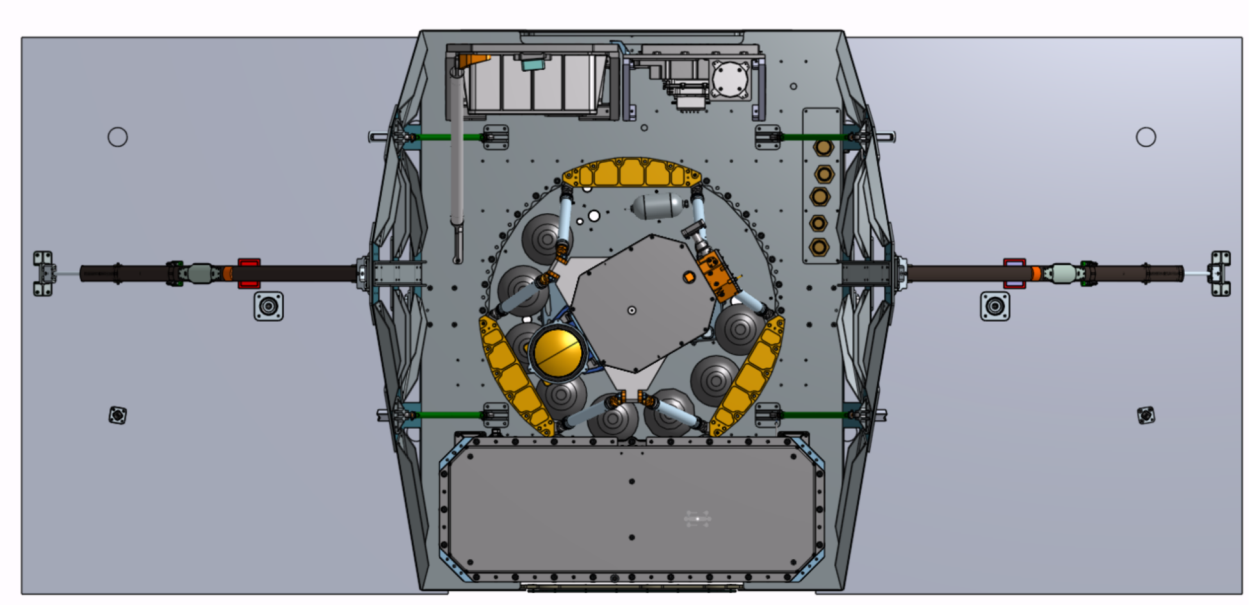

Figure 2. Reason-2 Space Vehicle External View | Top View (Deployed)

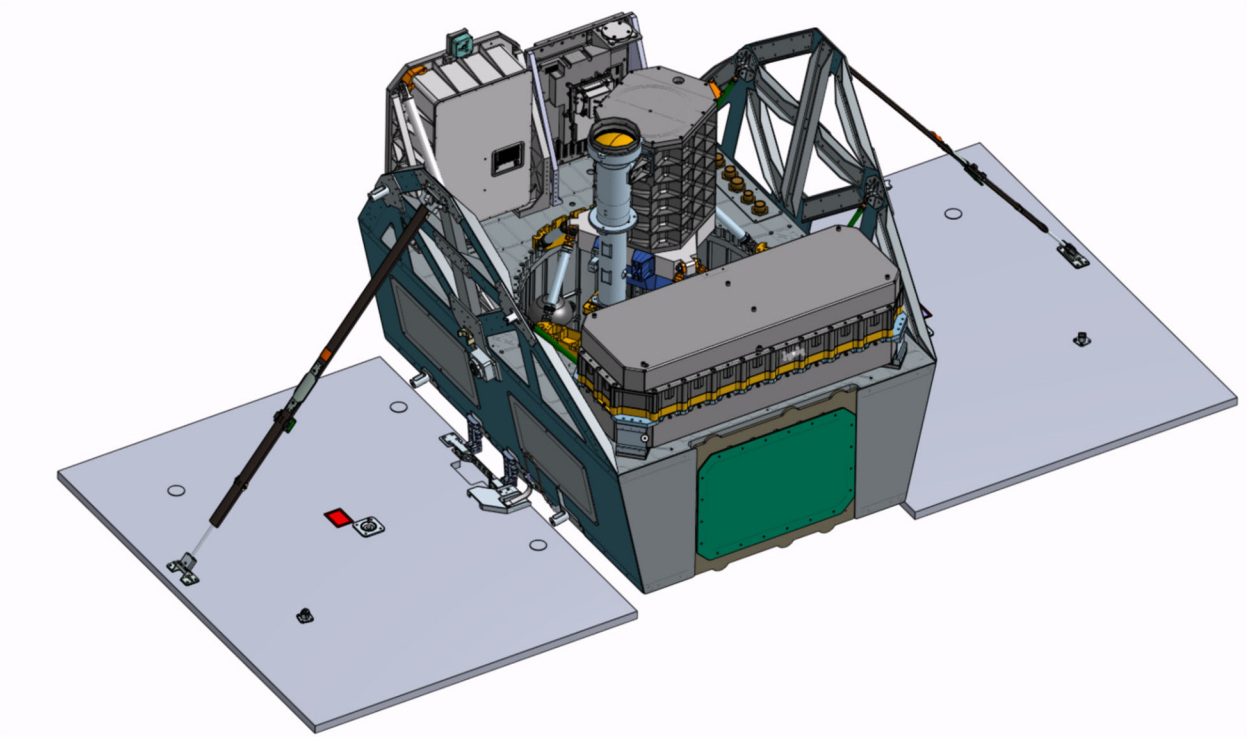

Figure 3. Reason-2 Isometric view (Deployed)

Spacecraft Mass

- Mass: 250 kg

Description of propulsion system

The Aries electric propulsion system consists of a Hall-Effect Thruster (HET), Power Processing Unit (PPU), Feed System and propellant tanks as shown in Figure 2. The Aries bus operates with Xenon as propellant.

Fluids Planned to be On-board

None.

Attitude Control System

The guidance, navigation, and control (GNC) subsystem has a sensor suite consisting of two star trackers, IMU (containing gyros and accelerometers), GPS receiver, three-axis magnetometer, and

sun sensors. The actuator suite consists of an EP thruster, 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-2. 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 bus 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. The electric propulsion system stores Xenon propellant under pressure in its tanks; at end of mission the propellant is depleted and the feed system vented, leaving the tanks in a passive, unpressurized state.

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. 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 Defense Squadron. At this time, Cowboy Space 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 Defense 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 intends to provide the 18th Space Defense 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 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

- **Compliance statement:** No release of debris will occur during the lifetime of Reason-2.

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.

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.

Propulsion System: The Aries electric propulsion subsystem stores Xenon in qualified tanks feeding a Hall-Effect Thruster through a regulated feed system and Power Processing Unit. Because Xenon cannot combust or deflagrate, the only credible explosion mechanism is overpressure rupture of a tank or feed line. This is precluded by design: tanks are qualified to a burst pressure well above maximum expected operating pressure, the feed system provides regulation and relief, and the subsystem has flight heritage on the TRL-9 Aries bus. At EOM the propellant is depleted and the feed system vented to a passive state (see Requirement 4.4-2). Combined faults required for realized failure: overpressure beyond the qualified burst margin AND failure of pressure regulation/relief AND escape from detection in qualification and acceptance testing. This probability is extremely low and keeps the total probability of accidental explosion below the 0.001 threshold of Requirement 4.4-1.

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** – 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.
- **Propellant Tanks (Xenon)** – propellant depleted through nominal thruster operation and the feed system vented to leave the tanks in a passive, unpressurized state. Any residual Xenon that cannot be fully depleted is an inert, non-combustible noble gas and poses no explosion or debris hazard.

Assessment of Spacecraft Compliance with Requirements 4.4-1 through 4.4-4 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).

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 should be contained within the spacecraft due to the lack of penetration energy.
- **Probability:** Extremely Low. It is believed 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-2 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)
    - o **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).
    - o **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
    - o **Mitigation:** Battery venting is not inhibited by the battery holder design or the spacecraft design. The battery can vent gases to the external environment.
    - o **Combined faults required for realized failure:** The cell manufacturer and the satellite integrator must fail to install proper venting.
- **Failure Mode 5:** Crushing
    - o **Mitigation:** Failure mode prevented by design. No moving parts appear near the battery assembly. Battery cells are UL/UN tested for crush and impact.
    - o **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.

Propulsion (Xenon EP) explosion:

- **Effect**: A pressure-vessel or feed-line rupture could release stored Xenon and generate orbital debris. Xenon is an inert, non-combustible noble gas, so no chemical explosion or deflagration is possible — the only credible mechanism is mechanical overpressure rupture, which vents gas rather than fragmenting energetically.
- **Probability**: Extremely Low (< 0.01%). Multiple independent faults must occur for any mode to cause rupture. The EP subsystem has flight heritage on the TRL-9 Apex Aries bus, and tanks are qualified with margin over maximum expected operating pressure (MEOP).
- **Failure Mode 1**: Propellant tank overpressure from thermal excursion
  - **Mitigation**: Tanks qualified to a burst pressure well above MEOP across the full thermal range; thermal design maintains tanks within allowable limits, verified in

thermal-vacuum testing.

    - **Combined faults required**: Thermal design incorrect AND thermal-vacuum verification fails to detect it AND burst-pressure margin exceeded.
- **Failure Mode 2**: Feed-system overpressure from pressure-regulator failure
    - **Mitigation**: Feed system incorporates regulation and relief protecting downstream components, qualified to proof pressure.
    - **Combined faults required:** Regulator fails open AND relief/protection fails to actuate.
- **Failure Mode 3**: Tank rupture from mechanical damage or crushing
    - **Mitigation**: Tanks qualified to shock/vibration; no moving parts near the tanks.
    - **Combined faults required:** A catastrophic external failure occurs AND causes a collision sufficient to breach a qualified tank AND the spacecraft is in a sustained orbit at the time.
- **Failure Mode 4:** PPU high-voltage electrical fault
    - **Mitigation:** PPU has over-voltage/over-current protection and can be commanded off; operates in vacuum with no combustible atmosphere.
    - **Combined faults required**: A PPU fault occurs AND its protection/disconnect fails AND the fault couples into a pressurized element.

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:** The reaction wheels will be spun down to passivate Cowboy Space's Reason-2. In this EOM mode, all subsystems will be cut off from power, batteries depleted, and Xenon propellant tanks vented to an unpressurized state.

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:** Large object impact and debris generation probability: 1.1508E-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's Reason-2 ability to employ differential drag and HEL propulsion system. The HEL system has sufficient Xenon propellant for the entire mission lifetime. In case of propulsion system malfunction or failure, differential drag will be employed. 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-2 spacecraft.

Cowboy Space will register Reason-2 with the US Space Force's 18th Space Defense Squadron, which provides active monitoring. Cowboy Space will attempt to contact and work with any entity that owns a spacecraft, which has the potential to collide with the Reason-2

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-2 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 of passing through the ISS or other inhabitable spacecraft obits is minimal as Reason-2 will be at an SSO inclination while current and planned inhabitable spacecraft are in mid-inclination, making transit almost impossible. Reason-2 will be in its deorbit state during this time, but, if still operational, could employ HEL thrusters to transition through this altitude in a controller manner. Alternatively, differential drag may be used. Cowboy Space will work with the 18th Space Defense Squadron (by uploading predicted ephemeris) to plan and, if operational at that time, execute HEL burns and 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 Space Defense Squadron, Cowboy Space 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-2 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 Reason-2 is equipped with an active electric propulsion system. Following a 5-year operational lifetime, Reason-2 will utilize its on-board propulsion to perform a controlled deorbit to 450 km, ensuring full compliance with post-mission disposal requirements.

6. Spacecraft Post-mission Disposal Plans and Procedures

Description of spacecraft disposal option selected

Consistent with NASA-STD-8719.14C, Cowboy Space's Reason-2 will be disposed of via passive atmospheric reentry. Cowboy Space will utilize the on-board electric propulsion system to actively lower the orbit to 450km after which the vehicle deorbits passively .

Cowboy Space Reason-2 nominal deployed configuration area-to-mass ratio calculation:

- Spacecraft mass: 250 kg (maximum mass)
- Average cross-sectional area: 2.8 m^2
- Area-to-mass ratio: 0.0112 m^2/kg

Orbital Maneuver Delta-V Budget

The following NASA DAS Science and Engineering Orbit-to-Orbit Transfer runs provide the delta-V budget for the two mission maneuvers: (1) the initial propulsive deorbit from the 600 km injection orbit to 510 km after the first 6 months of operations — the bounding case, performed only when the insertion orbit is above 510 km — and (2) the end-of-life propulsive deorbit from 510 km to 450 km.

07 07 2026; 11:11:01AM Science and Engineering - Orbit-to-Orbit Transfer

INPUT

First Orbit
Perigee Altitude = 600.000000 (km)
Apogee Altitude = 600.000000 (km)
Second Orbit
Perigee Altitude = 510.000000 (km)
Apogee Altitude = 510.000000 (km)

OUTPUT

Transfer Orbit Perigee = 510.000000 (km)
Transfer Orbit Apogee = 600.000000 (km)
Delta-V: First Burn = 24.567360 (m/s)
Delta-V: Second Burn = 24.647219 (m/s)
Delta-V: Total = 49.214579 (m/s)

========== End of Orbit-to-Orbit Transfer ==========

07 09 2026; 16:09:12PM Science and Engineering - Orbit-to-Orbit Transfer

INPUT

First Orbit
Perigee Altitude = 510.000000 (km)
Apogee Altitude= 510.000000 (km)
Second Orbit
Perigee Altitude = 450.000000 (km)
Apogee Altitude= 450.000000 (km)

OUTPUT

Transfer Orbit Perigee = 450.000000 (km)
Transfer Orbit Apogee = 510.000000 (km)
Delta-V: First Burn = 16.656318 (m/s)

Delta-V: Second Burn = 16.692789 (m/s)
Delta-V: Total = 33.349107 (m/s)

========== End of Orbit-to-Orbit Transfer ==========

The cumulative delta-V for both propulsive maneuvers is 62.5 m/s (49.21 m/s for the initial deorbit and 33.3 m/s for the end-of-life deorbit). This is well within the approximately 300 m/s of delta-V available from the Apex Aries bus, confirming that the propulsion system has sufficient capability to execute both maneuvers with margin.

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 Reason-2 satellite reentry is COMPLIANT.

Cowboy Space Reason-2 is designed for a 5-year primary mission. Upon mission completion, the satellite will perform an end-of-life deorbit to 450 km. Analysis indicates that the deorbit operations and final reentry will comply with LEO disposal requirements. The DAS reentry run below models natural (unpropelled) orbital decay from 510 km, as 510 km is the altitude Reason-2 occupies following the initial propulsive deorbit performed after the first 6 months of operations; this demonstrates that the vehicle meets the 5-year post-mission disposal requirement even in the event that no further propulsive maneuvers are performed.

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

Cowboy Space Reason-2 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.

- **Compliance statement:** At EOM, reaction wheels will be spun down and the spacecraft will be controlled via torque rods to maximize drag. EOM maneuvers will be executed using the on-board electric propulsion system to support deorbit.

Requirement 4.8 Additional Assessment Requirements for Special Classes of Space Missions

None.

7. Spacecraft Reentry Hazards

Summary of objects expected to survive uncontrolled reentry

Cowboy Space Reason-2 is COMPLIANT for uncontrolled reentry with debris risk less than 1/10,000. Comments above components that have impacting kinetic energy in excess of 15 joules are outlined below. See activity log.

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 1:18,800 with a total casualty area of 4.22 m^2 with kinetic energy above 15 J of energy. There are two contributing components to this risk.

- Cylindrical Tank - Carbon (8) producing a casualty area of 4.22 m^2 with kinetic energy of 37.86 J. These are Xenon propellant tanks for the HEL thruster system.
- The GPU Bus Bar, producing a casualty area of 1.56 m^2 with kinetic energy of 7.76 J. Cowboy Space notes that if this component survives, it will produce less than 15 J of energy.

8. DAS Validation

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

07 22 2026; 09:53:56AM Activity Log Started
07 22 2026; 09:53:56AM Opened Project C:\Mac\Home\Documents\DAS-Reason-2\
07 22 2026; 09:54:13AM Closed Project C:\Mac\Home\Documents\DAS-Reason-2\
07 22 2026; 09:54:13AM Activity Log Started
07 22 2026; 09:54:13AM Opened Project C:\Mac\Home\Documents\DAS-Reason-2\
07 22 2026; 09:55:39AM Processing Requirement 4.3-1: Return Status : Not Run

==========

No Project Data Available

==========

========== End of Requirement 4.3-1 ==========

07 22 2026; 09:55:42AM Processing Requirement 4.3-2: Return Status : Passed

==========

No Project Data Available

==========

========== End of Requirement 4.3-2 ==========

07 22 2026; 10:51:46AM Processing Requirement 4.5-1: Return Status : Passed

==========

Run Data

==========

INPUT

Space Structure Name = Reason-2

Space Structure Type = Payload

Perigee Altitude = 600.000 (km)

Apogee Altitude = 600.000 (km)

Inclination = 97.800 (deg)

RAAN = 0.000 (deg)

Argument of Perigee = 0.000 (deg)

Mean Anomaly = 0.000 (deg)

Final Area-To-Mass Ratio = 0.0112 (m^2/kg)

Start Year = 2027.040 (yr)

Initial Mass = 250.000 (kg)

Final Mass = 244.000 (kg)

Duration = 5.000 (yr)

Station-Kept = False

PMD Perigee Altitude = 90.000 (km)

PMD Apogee Altitude = 90.000 (km)

PMD Inclination = 97.800 (deg)

PMD RAAN = 0.000 (deg)

PMD Argument of Perigee = 0.000 (deg)

PMD Mean Anomaly = 0.000 (deg)

Long-Term Reentry = True

OUTPUT

Collision Probability = 1.1508E-04

Returned Message: Normal Processing

Date Range Message: Normal Date Range

Status = Pass

==========

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

07 22 2026; 10:51:52AM Project Data Saved To File
07 22 2026; 10:51:54AM Requirement 4.5-2: Compliant

========== End of Requirement 4.5-2 ==========

07 22 2026; 10:51:55AM Processing Requirement 4.6 Return Status : Passed

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

INPUT

Space Structure Name = Reason-2
Space Structure Type = Payload

Perigee Altitude = 600.000000 (km)
Apogee Altitude = 600.000000 (km)
Inclination = 97.800000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Area-To-Mass Ratio = 0.011200 (m^2/kg)
Start Year = 2027.040000 (yr)
Initial Mass = 250.000000 (kg)
Final Mass = 244.000000 (kg)
Duration = 5.000000 (yr)
Station Kept = False

Abandoned = False

Long-Term Reentry = True

OUTPUT

Suggested Perigee Altitude = 100.000000 (km)

Suggested Apogee Altitude = 594.176653 (km)

Returned Error Message = Passes Long-term reentry orbit criteria

Released Year = 2032 (yr)

Requirement = 63

Compliance Status = Pass

==========

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

07 22 2026; 10:52:12AM *********Processing Requirement 4.7-1

Return Status : Passed

**********INPUT****

Item Number = 1

name = Reason-2

quantity = 1

parent = 0

materialID = 8

type = Box

Aero Mass = 244.000000

Thermal Mass = 244.000000

Diameter/Width = 0.861000

Length = 1.179000

Height = 0.424000

name = Battery
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 15.300000
Thermal Mass = 15.300000
Diameter/Width = 0.303000
Length = 0.417000
Height = 0.132000

name = Solar Array Cells
quantity = 214
parent = 1
materialID = -1
type = Box
Aero Mass = 0.014000
Thermal Mass = 0.014000
Diameter/Width = 0.063000
Length = 0.145000
Height = 0.000550

name = Solar Array Top Sheet
quantity = 2
parent = 1
materialID = -2
type = Box
Aero Mass = 0.789500
Thermal Mass = 0.789500

Diameter/Width = 0.871000
Length = 1.136000
Height = 0.000550

name = Solar Array Bottom Sheet
quantity = 2
parent = 1
materialID = -2
type = Box
Aero Mass = 0.789500
Thermal Mass = 0.789500
Diameter/Width = 0.871000
Length = 1.136000
Height = 0.000650

name = Solar Array Core
quantity = 2
parent = 1
materialID = -3
type = Box
Aero Mass = 0.621000
Thermal Mass = 0.621000
Diameter/Width = 0.871000
Length = 1.136000
Height = 0.019600

name = Solar Array HDRM Bracket
quantity = 2
parent = 1
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 = 1
materialID = 8
type = Box
Aero Mass = 0.340000
Thermal Mass = 0.340000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = Center Cylinder
quantity = 1
parent = 1
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 = 1
materialID = 8

type = Box
Aero Mass = 0.360000
Thermal Mass = 0.360000
Diameter/Width = 0.136000
Length = 0.182000
Height = 0.095000

name = Precision Gyro
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.135200
Thermal Mass = 0.135200
Diameter/Width = 0.050000
Length = 0.050000
Height = 0.050000

name = Reaction Wheels
quantity = 4
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 1.450000
Thermal Mass = 1.450000
Diameter/Width = 0.146000
Length = 0.045000

name = Star Tracker
quantity = 2
parent = 1

materialID = 8

type = Box

Aero Mass = 0.270000

Thermal Mass = 0.270000

Diameter/Width = 0.050000

Length = 0.095000

Height = 0.044000

name = PX Panel

quantity = 1

parent = 1

materialID = 8

type = Flat Plate

Aero Mass = 5.570000

Thermal Mass = 5.570000

Diameter/Width = 0.424000

Length = 1.179000

name = NX Panel

quantity = 1

parent = 1

materialID = 8

type = Flat Plate

Aero Mass = 23.220000

Thermal Mass = 5.670000

Diameter/Width = 0.424000

Length = 1.179000

name = S-Band Transceiver - Secondary

quantity = 1

parent = 15

materialID = 8

type = Box

Aero Mass = 0.290000

Thermal Mass = 0.290000

Diameter/Width = 0.089000

Length = 0.094000

Height = 0.018500

name = Flight Computer

quantity = 1

parent = 15

materialID = 8

type = Box

Aero Mass = 0.770000

Thermal Mass = 0.770000

Diameter/Width = 0.114000

Length = 0.114000

Height = 0.050000

name = Ethernet Switch

quantity = 1

parent = 15

materialID = 8

type = Box

Aero Mass = 2.460000

Thermal Mass = 2.460000

Diameter/Width = 0.180000

Length = 0.230000

Height = 0.040000

name = Harness/Connectors

quantity = 1

parent = 15

materialID = 54

type = Cylinder

Aero Mass = 14.030000

Thermal Mass = 14.030000

Diameter/Width = 0.050000

Length = 1.000000

name = PY Panel

quantity = 1

parent = 1

materialID = 8

type = Flat Plate

Aero Mass = 1.690000

Thermal Mass = 0.360000

Diameter/Width = 0.424000

Length = 0.861000

name = EP Feed System Module

quantity = 1

parent = 20

materialID = 8

type = Box

Aero Mass = 1.330000

Thermal Mass = 1.330000

Diameter/Width = 0.155000

Length = 0.166000

Height = 0.090000

name = NY Panel

quantity = 1

parent = 1

materialID = 8

type = Flat Plate

Aero Mass = 6.463000

Thermal Mass = 0.470000

Diameter/Width = 0.424000

Length = 0.861000

name = S-band antenna bracket

quantity = 1

parent = 22

materialID = 8

type = Flat Plate

Aero Mass = 0.140000

Thermal Mass = 0.140000

Diameter/Width = 0.100000

Length = 0.100000

name = USX radio

quantity = 1

parent = 22

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 = 22
materialID = 8
type = Box
Aero Mass = 0.693000
Thermal Mass = 0.693000
Diameter/Width = 0.114000
Length = 0.114000
Height = 0.050000

name = PCDU
quantity = 1
parent = 22
materialID = 8
type = Box
Aero Mass = 2.540000
Thermal Mass = 2.540000
Diameter/Width = 0.254000
Length = 0.254000
Height = 0.050000

name = APU
quantity = 1
parent = 22
materialID = 8
type = Box
Aero Mass = 0.610000
Thermal Mass = 0.610000
Diameter/Width = 0.114000
Length = 0.114000
Height = 0.050000

name = PZ Panel
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 23.853000
Thermal Mass = 14.100000
Diameter/Width = 0.352000
Length = 0.854000

name = Magnetometer
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 0.083000
Thermal Mass = 0.083000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.050000

name = EP Power Processing Unit
quantity = 1
parent = 28
materialID = 8
type = Box
Aero Mass = 2.150000
Thermal Mass = 2.150000
Diameter/Width = 0.391000
Length = 0.570000

Height = 0.171000

name = Cylindrical Tank - AL
quantity = 8
parent = 28
materialID = 8
type = Cylinder
Aero Mass = 0.630000
Thermal Mass = 0.630000
Diameter/Width = 0.104000
Length = 0.250000

name = Cylindrical Tank - Carbon
quantity = 8
parent = 28
materialID = 16
type = Cylinder
Aero Mass = 0.310000
Thermal Mass = 0.310000
Diameter/Width = 0.104000
Length = 0.250000

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 = Avionics Tray
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 6.000000
Thermal Mass = 6.000000
Diameter/Width = 0.350000
Length = 0.527000

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 = L-band antenna bracket
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.200000
Thermal Mass = 0.200000
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 = 3253
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.002167
Thermal Mass = 0.002167
Diameter/Width = 0.050000
Length = 0.050000

name = GNSS L-Band Antenna
quantity = 2
parent = 1
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 = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.010000
Thermal Mass = 0.010000
Diameter/Width = 0.082000
Length = 0.098000

name = UHF Antenna
quantity = 2
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.005900
Thermal Mass = 0.005900
Diameter/Width = 0.050000
Length = 0.100000

name = UHF Hybrid Coupler
quantity = 3
parent = 1
materialID = 8
type = Box
Aero Mass = 0.060000
Thermal Mass = 0.060000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = GNSS Receiver

quantity = 1

parent = 1

materialID = 8

type = Box

Aero Mass = 0.310000

Thermal Mass = 0.310000

Diameter/Width = 0.056000

Length = 0.094000

Height = 0.026000

name = S-Band Antenna

quantity = 2

parent = 1

materialID = 8

type = Flat Plate

Aero Mass = 0.180300

Thermal Mass = 0.180300

Diameter/Width = 0.082000

Length = 0.098000

name = Torque Rods

quantity = 3

parent = 1

materialID = 8

type = Cylinder

Aero Mass = 0.539000

Thermal Mass = 0.539000

Diameter/Width = 0.050000

Length = 0.430000

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 = Payload closeout covers

quantity = 4

parent = 1

materialID = 8

type = Flat Plate

Aero Mass = 0.500000

Thermal Mass = 0.500000

Diameter/Width = 0.100000

Length = 0.100000

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 = Heaters

quantity = 8

parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.100000
Length = 0.100000

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 = 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 = EP Thruster
quantity = 1
parent = 1

materialID = 8
type = Cylinder
Aero Mass = 1.180000
Thermal Mass = 1.180000
Diameter/Width = 0.115000
Length = 0.120000

name = EP FDV Adapter ASSEM
quantity = 1
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 0.200000
Thermal Mass = 0.200000
Diameter/Width = 0.057000
Length = 0.114000

name = Lines
quantity = 1
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.140000
Thermal Mass = 0.140000
Diameter/Width = 0.003000
Length = 3.000000

name = Strong Bolts
quantity = 16
parent = 1
materialID = 45

type = Cylinder
Aero Mass = 0.007000
Thermal Mass = 0.007000
Diameter/Width = 0.006350
Length = 0.025400

name = Payload Battery
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 19.800000
Thermal Mass = 15.500000
Diameter/Width = 0.303500
Length = 0.425200
Height = 0.131300

name = Battery Bracket
quantity = 2
parent = 56
materialID = 9
type = Flat Plate
Aero Mass = 1.400000
Thermal Mass = 1.400000
Diameter/Width = 0.140000
Length = 0.371000

name = Battery Bracket Panel
quantity = 1
parent = 56
materialID = 8

type = Flat Plate
Aero Mass = 1.500000
Thermal Mass = 1.500000
Diameter/Width = 0.350000
Length = 0.425000

name = Avionics Enclosure
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 8.220000
Thermal Mass = 1.220000
Diameter/Width = 0.235000
Length = 0.342000
Height = 0.070000

name = Flight Compute Unit
quantity = 1
parent = 59
materialID = 23
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 = 59

materialID = 23
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 = 59
materialID = 23
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 = 59
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 = 59
materialID = 9
type = Flat Plate
Aero Mass = 0.900000
Thermal Mass = 0.900000
Diameter/Width = 0.140000
Length = 0.362000

name = RF Assembly
quantity = 1
parent = 59
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 Structure
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 15.370000
Thermal Mass = 7.000000
Diameter/Width = 0.270000
Length = 0.308000
Height = 0.228000

name = Optical Payload Mounting Crescents

quantity = 3
parent = 66
materialID = 8
type = Flat Plate
Aero Mass = 0.560000
Thermal Mass = 0.560000
Diameter/Width = 0.060000
Length = 0.282000

name = Optical Payload Strut
quantity = 6
parent = 66
materialID = 8
type = Cylinder
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.020000
Length = 0.140000

name = Optical Payload Strut End Fitting
quantity = 12
parent = 66
materialID = 65
type = Cylinder
Aero Mass = 0.050000
Thermal Mass = 0.050000
Diameter/Width = 0.020000
Length = 0.050000

name = Aperture Cover
quantity = 1

parent = 66
materialID = 8
type = Flat Plate
Aero Mass = 1.100000
Thermal Mass = 1.100000
Diameter/Width = 0.230000
Length = 0.270000

name = Receive Optics Assembly
quantity = 1
parent = 66
materialID = 8
type = Cylinder
Aero Mass = 3.500000
Thermal Mass = 3.500000
Diameter/Width = 0.125000
Length = 0.500000

name = Front End Optics Assembly
quantity = 1
parent = 66
materialID = 8
type = Box
Aero Mass = 1.190000
Thermal Mass = 1.000000
Diameter/Width = 0.150000
Length = 0.150000
Height = 0.050000

name = Fast Steering Mirror
quantity = 1

parent = 72
materialID = 8
type = Box
Aero Mass = 0.190000
Thermal Mass = 0.190000
Diameter/Width = 0.035000
Length = 0.055000
Height = 0.035000

name = Thermal Blanketing
quantity = 1
parent = 1
materialID = 44
type = Flat Plate
Aero Mass = 0.500000
Thermal Mass = 0.500000
Diameter/Width = 1.000000
Length = 1.000000

name = Fasteners
quantity = 200
parent = 1
materialID = 57
type = Cylinder
Aero Mass = 0.006000
Thermal Mass = 0.006000
Diameter/Width = 0.050000
Length = 0.050000

name = Connectors
quantity = 100

parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.005000
Thermal Mass = 0.005000
Diameter/Width = 0.050000
Length = 0.050000

name = Compute and Laser Enclosure
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 36.235000
Thermal Mass = 15.200000
Diameter/Width = 0.310000
Length = 0.780000
Height = 0.100000

name = Laser Enclosure
quantity = 1
parent = 77
materialID = 8
type = Box
Aero Mass = 21.035000
Thermal Mass = 4.000000
Diameter/Width = 0.270000
Length = 0.765000
Height = 0.075000

name = Laser Controller Board

quantity = 1
parent = 78
materialID = 8
type = Flat Plate
Aero Mass = 0.800000
Thermal Mass = 0.800000
Diameter/Width = 0.127000
Length = 0.150000

name = Laser Diode Heat Sink
quantity = 1
parent = 78
materialID = 8
type = Flat Plate
Aero Mass = 3.500000
Thermal Mass = 3.500000
Diameter/Width = 0.295000
Length = 0.786000

name = Gain Fiber Spiral
quantity = 1
parent = 78
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 = 78
materialID = 8
type = Box
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.050000
Length = 0.100000
Height = 0.050000

name = Pump Diode Module
quantity = 3
parent = 78
materialID = 54
type = Box
Aero Mass = 0.350000
Thermal Mass = 0.350000
Diameter/Width = 0.150000
Length = 0.150000
Height = 0.050000

name = Laser Fiber Tray
quantity = 1
parent = 78
materialID = 8
type = Box
Aero Mass = 2.285000
Thermal Mass = 2.285000
Diameter/Width = 0.254000
Length = 0.743000
Height = 0.008000

name = GH200 GPU
quantity = 2
parent = 78
materialID = 23
type = Box
Aero Mass = 1.200000
Thermal Mass = 1.200000
Diameter/Width = 0.200000
Length = 0.600000
Height = 0.140000

name = GPDB
quantity = 2
parent = 78
materialID = 23
type = Box
Aero Mass = 2.000000
Thermal Mass = 2.000000
Diameter/Width = 0.200000
Length = 0.500000
Height = 0.200000

name = GPU Bus Bar
quantity = 2
parent = 78
materialID = 19
type = Box
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.330000
Length = 0.500000

Height = 0.025400

name = ADM-VA601
quantity = 1
parent = 78
materialID = 23
type = Box
Aero Mass = 0.400000
Thermal Mass = 0.400000
Diameter/Width = 0.230000
Length = 0.233000
Height = 0.018000

name = GH200 Baseboard
quantity = 2
parent = 78
materialID = 23
type = Flat Plate
Aero Mass = 0.400000
Thermal Mass = 0.400000
Diameter/Width = 0.200000
Length = 0.330000

name = Laser Mounting Flexures
quantity = 4
parent = 1
materialID = 65
type = Flat Plate
Aero Mass = 0.175000
Thermal Mass = 0.175000
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 = Harnessing
quantity = 30
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.010000
Length = 1.000000

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

name = Reason-2
Demise Altitude = 78.003097
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Battery

Demise Altitude = 66.373868

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Solar Array Cells

Demise Altitude = 77.836976

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Solar Array Top Sheet

Demise Altitude = 77.836347

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Solar Array Bottom Sheet

Demise Altitude = 77.836348

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Solar Array Core

Demise Altitude = 77.816712

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Solar Array HDRM Bracket

Demise Altitude = 77.035078

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Solar Array mount brackets

Demise Altitude = 76.686667

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Center Cylinder

Demise Altitude = 74.693681

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = RWA Bracket

Demise Altitude = 77.204006

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Precision Gyro

Demise Altitude = 76.385631

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Reaction Wheels

Demise Altitude = 69.049872

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Star Tracker

Demise Altitude = 76.056879

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = PX Panel

Demise Altitude = 75.324681

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = NX Panel

Demise Altitude = 75.817923

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = S-Band Transceiver - Secondary

Demise Altitude = 73.313018

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Flight Computer

Demise Altitude = 71.983455

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Ethernet Switch

Demise Altitude = 69.647479

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Harness/Connectors

Demise Altitude = 57.503410

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = PY Panel

Demise Altitude = 77.827565

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = EP Feed System Module

Demise Altitude = 74.258660

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = NY Panel

Demise Altitude = 77.779119

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = S-band antenna bracket

Demise Altitude = 76.459653

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = USX radio

Demise Altitude = 74.479290

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Harness interface box

Demise Altitude = 74.510565

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = PCDU

Demise Altitude = 73.097090

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = APU

Demise Altitude = 74.898129

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = PZ Panel

Demise Altitude = 69.822219

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Magnetometer

Demise Altitude = 69.298235

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = EP Power Processing Unit

Demise Altitude = 68.139710

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Cylindrical Tank - AL

Demise Altitude = 67.864589

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Cylindrical Tank - Carbon

Demise Altitude = 0.000000

Debris Casualty Area = 4.220819

Impact Kinetic Energy = 37.860907

****

name = NZ Panel

Demise Altitude = 71.365986

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Avionics Tray

Demise Altitude = 72.074970

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Star Tracker Closeout Baffle and Bracket

Demise Altitude = 77.661902

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = L-band antenna bracket

Demise Altitude = 76.163321

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Strut Assembly

Demise Altitude = 76.794948

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Fastener Shipset

Demise Altitude = 77.947983

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = GNSS L-Band Antenna

Demise Altitude = 72.685630

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = X-Band Antenna

Demise Altitude = 77.901673

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = UHF Antenna

Demise Altitude = 77.907938

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = UHF Hybrid Coupler

Demise Altitude = 77.773149

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = GNSS Receiver

Demise Altitude = 75.314223

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = S-Band Antenna

Demise Altitude = 76.116352

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Torque Rods

Demise Altitude = 76.324410

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Separation System - Fly Away

Demise Altitude = 68.378599

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Payload closeout covers

Demise Altitude = 73.528803

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Thermal blanketing

Demise Altitude = 76.695452

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Heaters

Demise Altitude = 75.714651

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Temperature sensors

Demise Altitude = 77.081091

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Thermal Tape

Demise Altitude = 76.621382

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = EP Thruster

Demise Altitude = 72.508699

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = EP FDV Adapter ASSEM

Demise Altitude = 76.168482

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Lines

Demise Altitude = 77.495728

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Strong Bolts

Demise Altitude = 75.773352

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Payload Battery

Demise Altitude = 67.082419

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Battery Bracket

Demise Altitude = 63.018413

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Battery Bracket Panel

Demise Altitude = 63.948047

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Avionics Enclosure

Demise Altitude = 76.627504

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Flight Compute Unit

Demise Altitude = 73.294044

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Temperature Control Unit

Demise Altitude = 74.907691

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Optics Control Unit

Demise Altitude = 75.000972

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Avionics Radiator

Demise Altitude = 75.078390

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Avionics Bracket

Demise Altitude = 74.636215

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = RF Assembly

Demise Altitude = 73.530773

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Beam Expander Metering Structure

Demise Altitude = 72.857604

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Optical Payload Mounting Crescents

Demise Altitude = 69.558417

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Optical Payload Strut

Demise Altitude = 72.099697

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Optical Payload Strut End Fitting

Demise Altitude = 68.432863

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Aperture Cover

Demise Altitude = 70.132500

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Receive Optics Assembly

Demise Altitude = 68.268936

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Front End Optics Assembly

Demise Altitude = 69.509799

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Fast Steering Mirror

Demise Altitude = 66.327904

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Thermal Blanketing

Demise Altitude = 77.962552

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Fasteners

Demise Altitude = 77.817877

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Connectors

Demise Altitude = 77.872457

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Compute and Laser Enclosure

Demise Altitude = 71.049087

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Laser Enclosure

Demise Altitude = 68.828979

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Laser Controller Board

Demise Altitude = 63.807185

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Laser Diode Heat Sink

Demise Altitude = 64.719064

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Gain Fiber Spiral

Demise Altitude = 68.686334

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Fiber Oscillator Components

Demise Altitude = 67.296355

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Pump Diode Module

Demise Altitude = 66.258948

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Laser Fiber Tray

Demise Altitude = 66.077424

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = GH200 GPU

Demise Altitude = 67.890136

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = GPDB

Demise Altitude = 67.377067

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = GPU Bus Bar

Demise Altitude = 0.000000

Debris Casualty Area = 1.561216

Impact Kinetic Energy = 7.758101

****

name = ADM-VA601

Demise Altitude = 67.652347

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = GH200 Baseboard

Demise Altitude = 67.849156

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Laser Mounting Flexures

Demise Altitude = 70.793223

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Laser Mounting Flexure Adapter

Demise Altitude = 77.497472

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

name = Harnessing

Demise Altitude = 76.805709

Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000

****

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

07 22 2026; 10:52:12AM Project Data Saved To File