ORBITAL DEBRIS MITIGATION PLAN

I. BACKGROUND

The Xona System includes two distinct satellite designs. "Satellite Design 1" and "Satellite Design 2" are described further in § II and analyzed against the FCC orbital debris mitigation regulations in §§ III-VI.[1]

II. SATELLITE DESIGNS

A. Satellite Design 1 - Third Party

The satellite bus is manufactured by a third-party vendor using a satellite platform with extensive flight heritage. It is based on the subsystems of Xona's In-Orbit-Validation satellite launched in June 2025, which has been operational since July 2025. While the spacecraft will be manufactured by a third party, the radionavigation-satellite service ("RNSS" or "GNSS") payload is designed and manufactured by Xona.

The satellite consists of a cube-shaped enclosure that houses and shields the main subsystems. It is equipped with two independent dual-deployable solar arrays, which utilize a Solar Array Drive Assembly ("SADA") to maximize power generation. The Xona RNSS payload transmit antenna is mounted on the nadir face of the satellite (opposite to the separation system). The propulsion system and the in-orbit servicing docking plates are located on opposite sides along the direction-of-travel face of the satellite.

The Satellite Design 1 dimensions and mass characteristics are provided in Table 1.

Table 1: Satellite Design 1 Dimensions and Mass

	Stowed	**Deployed**	
		Wet	**Dry**
Dimensions (mm)	925x1080x1135	6800x1080x1135	
Mass (kg)	221	221	209
Area-to-Mass (m^2/kg) [nominal]	-	0.0036	0.0038
Area-to-Mass (m^2/kg) [tumbling]	0.0049	0.0135	0.0143

B. Satellite Design 2 - Xona

This satellite bus is manufactured in-house. Xona primarily leverages commercially available components with flight heritage and follows engineering and testing best practices. The first two technology development satellites will validate the satellite design in orbit and build flight heritage. Both subsystems and full flight units are extensively tested on the ground to maximize

[1] Xona enlisted the European Space Agency Debris Risk Assessment and Mitigation Analysis ("ESA DRAMA") tool, version 3.1.1, for the Satellite Design 1 assessment and the National Aeronautics and Space Administration Debris Assessment Software ("NASA DAS") tool, version 3.2.6, for the Satellite Design 2 assessment.

flight reliability. Ground testing includes, but is not limited to, vibration, thermal vacuum, thermal cycling and electromagnetic interference/electromagnetic compatibility testing. In addition to testing on the ground, the two technology development satellites will undergo a longer-than-standard commissioning process at their deployment altitude to validate that all systems are performing as expected in the space environment. In-orbit testing will verify power and thermal stability, as well as validate the performance of the system's sensors, actuators, flight software, and communication channels.

The satellite has a flat panel design with a cylindrical enclosure that houses and shields a portion of the propulsion and payload subsystems. The remaining subsystems are mounted on the nadir-facing side of the satellite. Each has its own shield to protect from both radiation and small debris. The satellite is equipped with two independent solar arrays, each with four main panels and eight side panels. The satellite array will automatically unfold once the hold-down mechanism is released using spring-loaded hinges. The RNSS payload antenna is mounted on the nadir side at the end of the cylindrical enclosure. On the side of the enclosure, the satellite's reaction wheels and torque rods are mounted alongside the propulsion system and the in-orbit servicing docking plate.

The Satellite Design 2 dimensions and mass characteristics are provided in Table 2.

Table 2: Satellite Design 2 Dimensions and Mass

Parameters	Stowed	Deployed	
		Wet	Dry
X-axis Area (m^2)	0.616	0.606	
Y-axis Area (m^2)	0.520	0.491	
Z-axis Area (m^2)	2.277	16.905	
Mass (kg)	251	251	231
Area-to-Mass (m^2/kg) [nominal]	-	0.0024	0.0026
Area-to-Mass (m^2/kg) [tumbling]	0.0047	0.0239	0.0260

III. MISSION OVERVIEW

A. Launch Vehicle and Launch Plan

First launch (six satellites). Four "Satellite Design 1" satellites and two "Satellite Design 2" satellites are scheduled to launch in October 2026 aboard a SpaceX Falcon 9 Bandwagon mission from either Cape Canaveral, Florida or Vandenberg Space Force Base, California.

Subsequent launches. The remaining satellites will be deployed through a combination of dedicated and shared launch vehicles from various commercial launch providers.

B. Mission Duration

The maximum possible lifetime is up to 6 years (with Satellite Design 1 having a nominal 3-year operational lifetime and Satellite Design 2 having a nominal 5-year operational lifetime).

C. Concept of Operations

Table 3 summarizes the orbital parameters during the deployment, operational, and post-mission disposal phases.

Table 3: Orbit Summary

	Altitude (km)	Inclination (deg)
Deployment Orbit	350-600	53 ± 2 97 ± 2
Operational Orbit	1080 ± 35	53 ± 2 97 ± 2
Post-Mission Disposal Orbit	350-500	53 ± 2 97 ± 2

Deployment phase. Satellites start in a low-altitude orbit for commissioning and testing before raising to the operational altitude. The actual altitude will depend on the launch vehicle.

Post-separation phase. Solar arrays deploy. Ground stations establish contact. Each satellite broadcasts a unique beacon for tracking.

Health-checks phase. Subsystems and RNSS payload are tested. Critical failures trigger controlled decommissioning to ensure passive re-entry within 5 years.

Orbit-raising phase. After acceptance review, electric propulsion raises orbit over approximately 3 months (except as noted above for the technology demonstration satellites).

Operational phase. Satellites operate in final orbit for mission life. Continuous monitoring occurs.

End-of-life phase. Three-month orbit-lowering process ensures passive de-orbit within 5 years. Satellites are passivated and burn up on re-entry.

IV. COMPLIANCE WITH 47 C.F.R. § 25.114(d)(14)

(14) A description of the design and operational strategies that will be used to mitigate orbital debris, including the following information.

Xona understands the importance of orbital debris mitigation and is committed to building the Xona System with sustainability in mind as a responsible constellation operator. In its planning, Xona has prioritized orbital debris mitigation through both design and operational strategies described in this report.

Among these strategies –

1. Every satellite will be deployed at a lower deployment orbit to screen satellite subsystems before raising to its final operational orbit, ensuring timely disposal of defective spacecraft.

2. The constellation will operate at an uncrowded orbit, minimizing the need for collision avoidance maneuvers with other systems.
3. Satellites are designed to lower their orbit and deorbit within 5 years from mission end through atmospheric re-entry.
4. Xona has proactively invested in installing docking plates to enable direct third-party retrieval when such a service is commercially available and viable in the future.

A. § 25.114(d)(14)(i) - Planned Debris Release

(i) A statement that the space station operator has assessed and limited the amount of debris released in a planned manner during normal operations. Where applicable, this statement must include an orbital debris mitigation disclosure for any separate deployment devices, distinct from the space station launch vehicle, that may become a source of orbital debris.

There is no planned release of debris from the satellites.

B. § 25.114(d)(14)(ii) - Small Object Collision

(ii) A statement indicating whether the space station operator has assessed and limited the probability that the space station(s) will become a source of debris by collision with small debris or meteoroids that would cause loss of control and prevent disposal. The statement must indicate whether this probability for an individual space station is 0.01 (1 in 100) or less, as calculated using the NASA Debris Assessment Software or a higher fidelity assessment tool.

Xona has assessed and limited the probability that the space station(s) will become a source of debris by collision with small debris or meteoroids that would cause loss of control and prevent disposal.

i. Satellite Design 1

The ESA DRAMA tool is used to perform the probability of a unit's penetration throughout the mission duration. In Table 4, the critical units identified are the Battery Module ("BM"), Power Control and Distribution Unit ("PCDU"), On-Board Computer ("OBC"), S-Band Radio ("SSDR"), Propulsion Unit ("PPU"), GNSS receiver, Reaction Wheels, Magnetorquer ("MTQ") and Magnetometer ("MTM"). The front panel (in flight direction) is the Xp panel, and it is modelled in MIDAS with an average thickness of 2.7 mm. This corresponds to the wall thickness computed with the SARA tool. Each unit has an Aluminum casing of 2.5 mm. The largest critical unit is the PCDU as it has the highest penetration probability (the one closest to Xp with the largest cross-section). The other units are further away from the Xp panel (shielded by other units) or have a much smaller cross-section. The PCDU probability is then multiplied by the number of critical units identified.

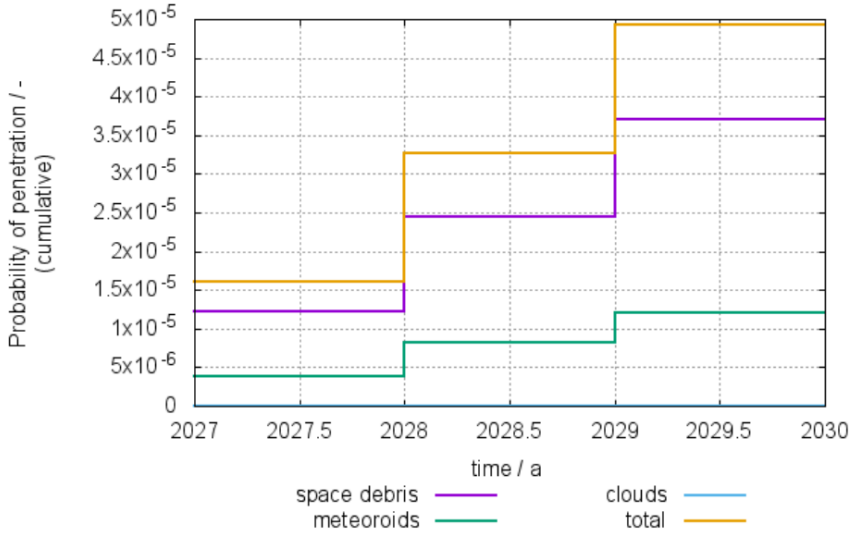
Table 4: Satellite Design 1 Small Debris Impact Analysis Parameters

Parameter	Value	Comment
Outer bumper thickness (cm)	0.27	Platform Xp panel thickness
Outer bumper density (g/cm^3)	2.7	Platform Xp panel density

Parameter	Value	Comment
Inner bumper thickness (cm)	0.25	PCDU casing thickness
Inner bumper density (g/cm³)	2.7	PCDU casing density
Wall spacing (cm)	8	Distance between Xp panel and PCDU
Surface area (m²)	0.02	BM cross-section

The cumulative flux above 10 μm is studied, and Figure 1 shows the probability of penetration at end of mission is 4.9E-5.

Figure 1: PCDU Probability of Penetration vs Time



The number of critical units identified is nine; therefore, the entire system probability of failure (or probability of penetration) is therefore smaller than:

$$PF \leq 1 - (1 - 0.000049)^9 = 4.4E - 4$$

Using ESA DRAMA, the calculated probability is 4.4E-4.

ii. Satellite Design 2

The NASA DAS tool is used to perform the probability of a unit's penetration throughout the mission duration. The critical non-redundant units identified are the BM, PCDU, GNOCI, and Propulsion Unit.

Using NASA DAS, the calculated probability is 2E-5.

C. § 25.114(d)(14)(iii) - Accidental Explosion or Liquids Release

(iii) A statement that the space station operator has assessed and limited the probability, during and after completion of mission operations, of accidental explosions or of release of liquids that will persist in droplet form. This statement must include a demonstration that

debris generation will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft. Energy sources include chemical, pressure, and kinetic energy. This demonstration should address whether stored energy will be removed at the spacecraft's end of life, by depleting residual fuel and leaving all fuel line valves open, venting any pressurized system, leaving all batteries in a permanent discharge state, and removing any remaining source of stored energy, or through other equivalent procedures specifically disclosed in the application.

Xona has assessed and limited the probability, during, and after completion of mission operations, of accidental explosions or of release of liquids that will persist in droplet form during and after completion of mission operations for its satellites.

i. Satellite Design 1

PPU Tanks

- Description: The satellite propulsion system uses Xenon propellant and accommodates a 6.8 L Xenon tank pressurized at 200 bar.
- Failure Mode: Over-pressurization of pressure vessels leading to rupture.
- Mitigation: Pressure vessels feature relief valves to prevent over-pressurization.
- Failure Mode Likelihood: Extremely low.
- End of Life Passivation: Following the post-mission maneuver the satellite will use any remaining propellant to further reduce its orbit and accelerate the de-orbit process.

Battery Cells

- Description: The satellite contains four BMs each containing four independent Battery Pack Assemblies ("BPAs"). A single BPA is composed of eight unpressurized Lithium-ion cells. The BM has a nominal voltage of 28 V (14 Ah capacity) and can store 380 Wh (1.36 MJ) of energy.
- Failure Mode: Battery thermal runaway and rupture.
- Mitigation: Each battery pack is continuously monitored by the PCDU, which features overvoltage/undervoltage cutoffs to avoid overcharging/discharging. The cells were also tested based on the UN 38.3 REV.7, T.1-T.5, which resulted in no case of explosion for the different failure modes tested. Additionally, the cells have a venting cap design preventing them from accumulating energy that could be released explosively.
- Failure Mode Likelihood: Extremely low.
- End of Life Passivation: The satellite can electrically isolate its batteries and deplete any remaining energy. The satellite will be commanded to perform the above actions either at an altitude of 350 km or early passivation if due to satellite health degradation.

ii. Satellite Design 2

PPU Tanks

- Description: The satellite propulsion system uses Xenon propellant and accommodates two 5.9 L tanks (total 11.8 L) pressurized to 90 bar (1300 PSI). The service pressure of the tanks is 207 bar.
- Failure Mode: Over-pressurization of pressure vessels leading to rupture.
- Mitigation: Pressure vessels feature relief valves to prevent over-pressurization and are designed to fail by leak, not by rupture, per Department of Transportation standards.
- Failure Mode Likelihood: Extremely low.
- End of Life: Following the post-mission maneuver, the satellite will use any remaining propellant to reduce its altitude further and proceed to vent the propellant tanks.

Battery Cells

- Description: The satellite will feature four battery packs totaling 3,546 Wh capacity. Each pack will utilize Nickel Cobalt Aluminum Oxide ("NCA") cells in an 8S6P configuration.
- Failure Mode: Battery thermal runaway and rupture.
- Mitigation: Each battery pack is continuously monitored by the internal BMs that uses a dual-core lockstep Hercules MCU that features fault detection and overvoltage/undervoltage cutoffs to avoid overcharging/discharging. The NCA cells have been tested individually and as a multi-cell battery pack. All battery packs will undergo General Environmental Verification Standard-level thermal cycling and vibration testing to ensure proper operation over expected environmental requirements.
- Failure Mode Likelihood: Extremely low.
- End of Life: To expedite the satellite disposal process, Xona has elected to keep its satellites active following the post-mission disposal maneuver to a 350 km altitude. The spacecraft will maintain a high-drag attitude to accelerate orbital decay. During this phase, the satellite will continue to operate until increasing atmospheric torques render it uncontrollable. At that point, the spacecraft will be powered down in preparation for its uncontrolled reentry.

D. § 25.114(d)(14)(iv), 25.114(d)(14)(iv)(A)(1) - Large Object Collision

(iv) A statement that the space station operator has assessed and limited the probability of the space station(s) becoming a source of debris by collisions with large debris or other operational space stations.

Xona has designed its spacecraft to limit the probability of becoming a source of debris from collision with large debris or other operational satellites, including by maintaining space situational awareness and coordinating conjunction deconfliction with other operators.

(A) Where the application is for an NGSO space station or system, the following information must also be included.

(1) A demonstration that the space station operator has assessed and limited the probability of collision between any space station of the system and other large objects (10 cm or larger

in diameter) during the total orbital lifetime of the space station, including any de-orbit phases, to less than 0.001 (1 in 1,000). The probability shall be calculated using the NASA Debris Assessment Software or a higher fidelity assessment tool. The collision risk may be assumed zero for a space station during any period in which the space station will be maneuvered effectively to avoid colliding with large objects.

Xona has assessed and limited the probability of collision between any Xona System satellite and other large objects.

i. Satellite Design 1

The satellite will maintain effective maneuvering capability throughout the orbit-raising, operational, and post-mission disposal phases to mitigate collision risk with large objects. Maneuverability will be achieved through the satellite's Attitude and Orbit Control System ("AOCS"). Table 5 presents the input parameters.

Table 5: Large Object Collision Risk Input Parameters

Parameter	Value
Begin date	2027/01/01
End date	2030/01/01
SMA (km)	7470
Eccentricity (deg)	1E-3
Right Ascension of the Ascending Node ("RAAN") (deg)	0
Inclination (deg)	53
Satellite cross-section (m^2)	0.8
Satellite mass (kg)	221
Drag coefficient	0
Reflectivity coefficient	1.3

Using ESA DRAMA, the calculated probability is 1E-05.

ii. Satellite Design 2

The satellite will maintain effective maneuvering capability throughout the orbit-raising, operational, and post-mission disposal phases to mitigate collision risk with large objects (10 cm or larger in diameter). Maneuverability will be achieved through the satellite's AOCS.

Using NASA DAS, the calculated probability is 9.6944E-06.

E. § 25.114(d)(14)(iv)(A)(2) - Collision Avoidance Measures

(2) The statement must identify characteristics of the space station(s)' orbits that may present a collision risk, including any planned and/or operational space stations in those orbits, and indicate what steps, if any, have been taken to coordinate with the other spacecraft or system, or what other measures the operator plans to use to avoid collision.

All Xona System satellites can conduct collision avoidance maneuvers. When a maneuver is necessary, it will be screened by submitting ephemeris data detailing the proposed maneuver through SpaceTrack. Xona plans to use the Space Defense Squadron ("SDS") automated notification system, provided via SpaceTrack, to coordinate with other operators if a conjunction prediction meets the Emergency Criteria outlined in the SDS's Spaceflight Safety Handbook for Satellite Operators. To minimize the need for collision avoidance maneuvers, Xona has selected orbital regimes that are relatively uncongested. In support of spaceflight safety and coordination, Xona will also provide high-accuracy positional data for its satellites to the 18th Space Defense Squadron ("18th SDS").

F. § 25.114(d)(14)(iv)(A)(3) - Inhabitable Spacecraft Collision Risk

(3) If at any time during the space station(s)' mission or de-orbit phase the space station(s) will transit through the orbits used by any inhabitable spacecraft, including the International Space Station, the statement must describe the design and operational strategies, if any, that will be used to minimize the risk of collision and avoid posing any operational constraints to the inhabitable spacecraft.

Xona will implement appropriate operational strategies in conjunction with its de-orbit maneuvers to ensure safe transit through regions occupied by inhabitable spacecraft. During the de-orbit process, satellites may cross orbital regimes used by inhabitable spacecraft, such as the International Space Station. To mitigate collision risk, Xona will coordinate to the extent possible with their operators and optimize de-orbit altitudes and trajectory parameters to maintain horizontal and radial separation relative to the inhabitable space stations.

iii. Satellite Design 1

The post-mission disposal maneuver will place each satellite at an altitude above inhabited spacecraft. The satellite will naturally decay and transit through orbits occupied by inhabitable spacecraft. The satellite will maintain limited maneuverability and will act to mitigate any potential collision risk after consultation. The satellite will be fully passivated at an altitude of 350 km unless the satellite's health degrades, in which case it will be fully passivated at a higher altitude.

iv. Satellite Design 2

The post-mission disposal maneuver will place each satellite at an altitude of 350 km, below inhabitable spacecraft. During its transit through orbits occupied by inhabitable spacecraft, it will maintain collision avoidance capability and mitigate any potential collision risk.

G. § 25.114(d)(14)(iv)(A)(4) - Orbital Maintenance and Maneuverability

(4) The statement must disclose the accuracy, if any, with which orbital parameters will be maintained, including apogee, perigee, inclination, and the right ascension of the ascending node(s). In the event that a system is not able to maintain orbital tolerances, e.g., its propulsion system will not be used for orbital maintenance, that fact must be included in the debris mitigation disclosure. Such systems must also indicate the anticipated evolution over time of the orbit of the proposed satellite or satellites. All systems must describe the extent

of satellite maneuverability, whether or not the space station design includes a propulsion system.

Each satellite will maintain orbit tolerance and maneuverability using its onboard propulsion systems. Each satellite will have an orbit tolerance of ±2.5 km semi-major axis, ±2 deg inclination and ±0.75 deg RAAN. Table 6 outlines the delta-v reserved for orbital maintenance and collision avoidance maneuvers.

Table 6: Delta-V Budgets

	Satellite Design 1	Satellite Design 2
Orbit Maintenance (m/s)	13	26
Collision Avoidance (m/s)	2	15

H. § 25.114(d)(14)(iv)(A)(5) - Collision Risk Mitigation

(5) The space station operator must 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. As appropriate, steps to assess and mitigate the collision risk should include, but are not limited to: Contacting the operator of any active spacecraft involved in such a warning; sharing ephemeris data and other appropriate operational information with any such operator; and modifying space station attitude and/or operations.

Xona certifies that upon receipt of a conjunction warning from the 18th SDS, the Mission Operations team will review the alert and take all necessary steps to assess and, if required, mitigate the collision risk. As appropriate, mitigation efforts may include, but are not limited to, contacting the operator of any active spacecraft involved in the warning, sharing ephemeris data and other relevant operational information, and adjusting spacecraft attitude and/or operations.

Collision avoidance planning will be initiated if the probability of collision exceeds the 1 in 10,000 threshold, consistent with guidance provided in the SDS Spaceflight Safety Handbook for Satellite Operators. Xona will coordinate, as applicable, with the operator of the other on-orbit asset to facilitate effective collision avoidance.

I. § 25.114(d)(14)(iv)(B) - Collision Avoidance in Geostationary Orbit

(B) Where a space station requests the assignment of a geostationary orbit location, it must assess whether there are any known satellites located at, or reasonably expected to be located at, the requested orbital location, or assigned in the vicinity of that location, such that the station keeping volumes of the respective satellites might overlap or touch. If so, the statement must include a statement as to the identities of those satellites and the measures that will be taken to prevent collisions.

N/A – the Xona System constellation will operate in low-Earth orbit ("LEO").

J. § 25.114(d)(14)(v) - Satellite Trackability

(v) A statement addressing the trackability of the space station(s). Space station(s) operating in low-Earth orbit will be presumed trackable if each individual space station is 10 cm or larger in its smallest dimension, excluding deployable components.

Both satellite designs are presumed trackable given their smallest dimension is ≥ 10 cm.

(A) How the operator plans to identify the space station(s) following deployment and whether space station tracking will be active or passive.

Active tracking. After deployment, Xona will conduct active spacecraft tracking (consistent with Xona's radiofrequency link parameters proposed in its application) by attempting to downlink telemetry from each spacecraft containing information from which its orbital state can be derived.

Passive tracking. All satellites will feature reflectors, which can be used to passively track each satellite following deployment.

(B) Whether, prior to deployment, the space station(s) will be registered with the 18th Space Control Squadron or successor entity.

Xona will register the satellites prior to deployment with the 18th SDS or successor entity.

(C) The extent to which the space station 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.

Xona will provide initial deployment information, ephemeris data, and planned maneuvers to the 18th SDS or successor entity to support space traffic management and coordination with other operators. Following spacecraft separation from the launch vehicle, Xona will conduct both active and passive tracking of its satellites and will share the resulting orbital state data with the SDS to support spacecraft cataloging as part of the SDS's Early Orbit Determination process.

K. § 25.114(d)(14)(vi) - Planned Proximity Operations

(vi) A statement disclosing planned proximity operations, if any, and addressing debris generation that will or may result from the proposed operations, including any planned release of debris, the risk of accidental explosions, the risk of accidental collision, and measures taken to mitigate those risks.

Proximity operations are possible given the post-mission disposal docking plates on each satellite. But no operations are currently planned. Xona does not currently seek such authority but recognizes that it and/or its third-party post-mission disposal partner may need to secure such authority in the future before such operations may occur.

L. § 25.114(d)(14)(vii) - Satellite Disposal Plan

(vii) A statement detailing the disposal plans for the space station, including the quantity of fuel—if any—that will be reserved for disposal maneuvers.

Disposal will occur in less than 5 years after the mission completion. Following the completion of each satellite's mission, the decommissioning phase will begin with an orbit-lowering maneuver using the onboard propulsion system. The satellites will subsequently decay naturally and be disposed of through atmospheric reentry within 5 years of mission completion. The Mission Operations Team will closely monitor all satellite burns throughout the mission to ensure that sufficient propellant remains for end-of-life disposal. If propellant consumption occurs at a higher-than-expected rate during the mission, the decommissioning process will be initiated early to ensure compliance with disposal requirements.

M. § 25.114(d)(14)(vii)(A)/(B)/(C) - Disposal Method

(A) For geostationary orbit space stations, the statement must disclose the altitude selected for a disposal orbit and the calculations that are used in deriving the disposal altitude.

N/A – Each satellite will operate in LEO.

(B) For space stations terminating operations in an orbit in or passing through the low-Earth orbit region below 2,000 km altitude, the statement must disclose whether the spacecraft will be disposed of through atmospheric re-entry, specifying if direct retrieval of the spacecraft will be used. The statement must also disclose the expected time in orbit for the space station following the completion of the mission.

i. Satellite Design 1

All satellites will be disposed of through atmospheric re-entry. The initial satellites' operational service is expected to conclude in early 2030, after which the orbit will be lowered to 500 km. Any remaining propellant at this altitude will be used to further reduce the orbit and accelerate the de-orbit process. Following this maneuver, the satellite will passively decay and is expected to re-enter Earth's atmosphere within 5 years based on analysis incorporating predicted solar activity from the ESA SOLMAG index.

Table 7 provides details on the satellite disposal timeline and reserved propellant. Figure 2 and Figure 3 present the predicted solar activity and orbital lifetime from 500 km until re-entry.

Table 7: Satellite Design 1 Post-Mission Disposal Timeline

Parameter	Value
Expected Mission End of Life	Jan. 2030
Operational Orbit (km)	1080 ± 35
Post-Mission Maneuver Reserved Delta-V (m/s)	308
Post-Mission Maneuver Duration (months)	0.25
Post-Mission Disposal Orbit (km)	500
Natural Decay-to-Re-entry Duration (years)	4.06

Parameter	Value
Disposal Duration (years)	4.31

Figure 2: Predicted Solar Activity

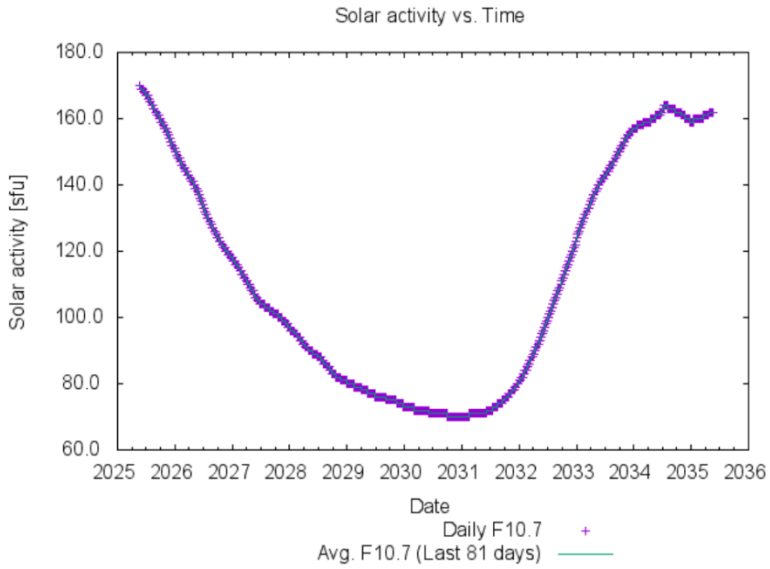
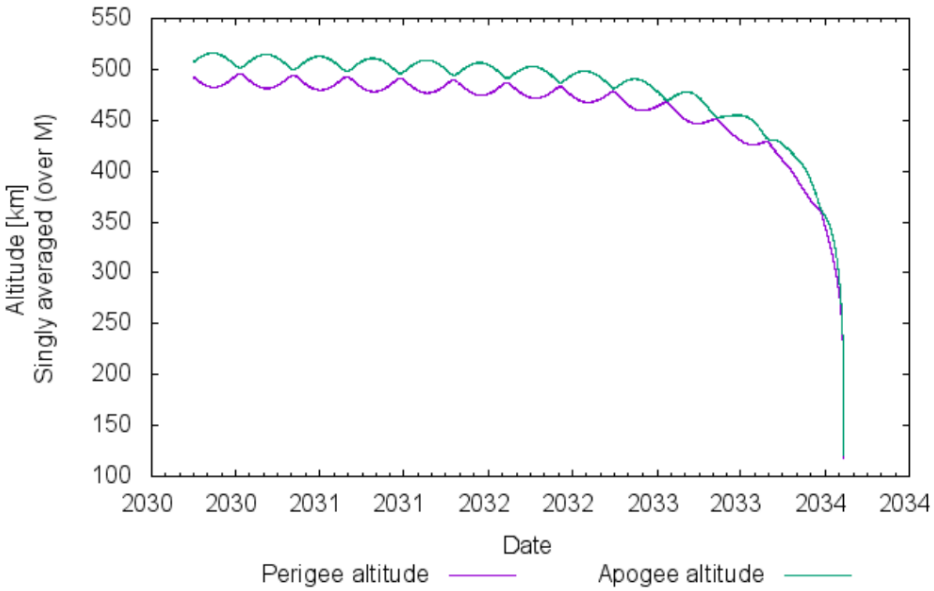


Figure 3: Orbit Lifetime after Orbit Lowering to 500 km



Using ESA DRAMA, the calculated lifetime is 4.06 years after post-mission disposal maneuver.

ii. Satellite Design 2

All satellites will be disposed of through atmospheric re-entry. The initial satellites' operational service is expected to conclude in early 2032, after which their orbit will be lowered to 350 km.

Any remaining propellant at this altitude will be used to further reduce the orbit and accelerate the de-orbit process. Following this maneuver, the satellite will be reoriented to maximize the vehicle's total cross-sectional area and vent the propellant tanks. The satellite will maintain this orientation until the high atmospheric torques from low altitudes cause the vehicle to become uncontrollable.

Figure 4 and Figure 5 present the orbital lifetime in high-drag and tumbling configurations, respectively, from 350 km until re-entry.

Figure 4: Orbit Lifetime after Orbit Lowering to 350 km (High-Drag Orientation)

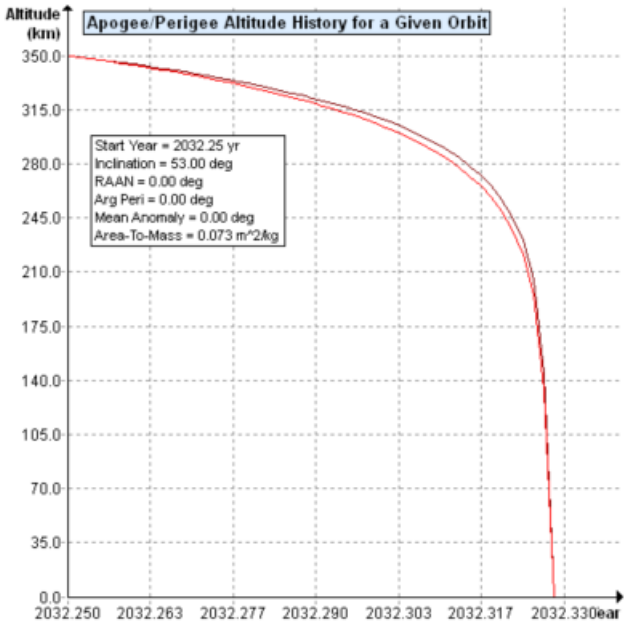
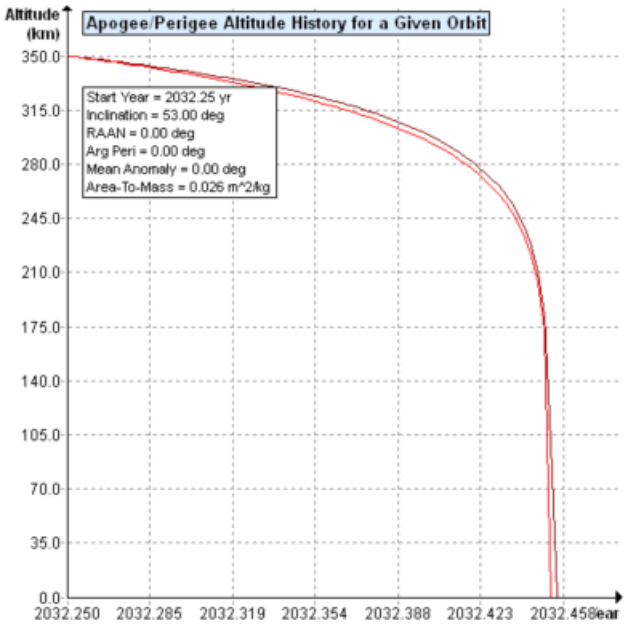


Figure 5: Orbit Lifetime after Orbit Lowering to 350 km (Tumbling)



Using NASA DAS, the calculated lifetime is less than 0.2 years after post-mission disposal maneuver.

(C) For space stations not covered by either paragraph (d)(14)(vii)(A) or (B) of this section, the statement must indicate whether disposal will involve use of a storage orbit or long-term atmospheric re-entry and rationale for the selected disposal plan.

N/A – See preceding response.

N. § 25.114(d)(14)(vii)(D)(1) - Successful Disposal

(1) The statement must include a demonstration that the probability of success of the chosen disposal method will be 0.9 or greater for any individual space station. For space station systems consisting of multiple space stations, the demonstration should include additional information regarding efforts to achieve a higher probability of success, with a goal, for large systems, of a probability of success for any individual space station of 0.99 or better. For space stations under paragraph (d)(14)(vii)(B) of this section ending their mission in or passing through the low-Earth orbit region below 2000 km altitude, successful disposal is defined, for the purposes of this demonstration, as atmospheric re-entry of the spacecraft as soon as practicable, but no later than five years following completion of the mission. For all other space stations under paragraph (d)(14)(vii)(B) and paragraph (d)(14)(vii)(C) of this section, successful disposal will be assessed on a case-by-case basis.

i. Satellite Design 1

The required subsystems for successful disposal of the satellite are power, AOCS (including propulsion), communications (S-band), and the OBC. To minimize the risk of critical components

experiencing a failure in orbit, all subsystems undergo extensive testing on the ground and are screened at the deployment orbit before orbit raising. In addition, electric systems feature appropriate shielding for protection against radiation. Leveraging flight heritage, testing, and manufacturer information, the reliability of each subsystem has been calculated and is presented in Table 8. The single-satellite disposal reliability is calculated to be 0.95.

Xona has also invested in adding Astroscale docking plates to its satellite buses that can be used for direct retrieval of the satellite when such a service is commercially available and financially viable. When accounting for the docking plate, the satellite disposal reliability exceeds 0.99.

Table 8: Satellite Design 1 Post-Mission Disposal Reliability

System	Calculated Reliability
Power	0.998
AOCS	0.985
Communications (S-band)	0.990
OBC	0.996
Propulsion	0.980
Full Single-Satellite	0.950

ii. Satellite Design 2

The required subsystems for successful disposal of the satellite are power, AOCS (including propulsion), communications (S-band), and OBC. To minimize the risk of critical components experiencing a failure in-orbit, all subsystems undergo extensive testing on the ground and are screened at the deployment orbit before orbit raising. In addition, electric systems feature appropriate shielding for protection against radiation. Leveraging flight heritage, testing, and manufacturer information, the reliability of each subsystem has been calculated and is presented in Table 9. The single-satellite disposal success reliability is calculated to be 0.929.

Xona has also invested in adding Astroscale docking plates to its satellite buses that can be used for direct retrieval of the satellite when such a service is commercially available and financially viable. When accounting for the docking plate, the satellite disposal reliability exceeds 0.99.

Table 9: Satellite Design 2 Post-Mission Disposal Reliability

System	Calculated Reliability
Power	0.985
AOCS (including propulsion)	0.967
Communications (S-band)	0.989
OBC	0.986
Full Single-Satellite	0.929

O. § 25.114(d)(14)(vii)(D)(2) - Casualty Risk

(2) If planned disposal is by atmospheric re-entry, the statement must also include:

(i) A disclosure indicating whether the atmospheric re-entry will be an uncontrolled re-entry or a controlled targeted reentry

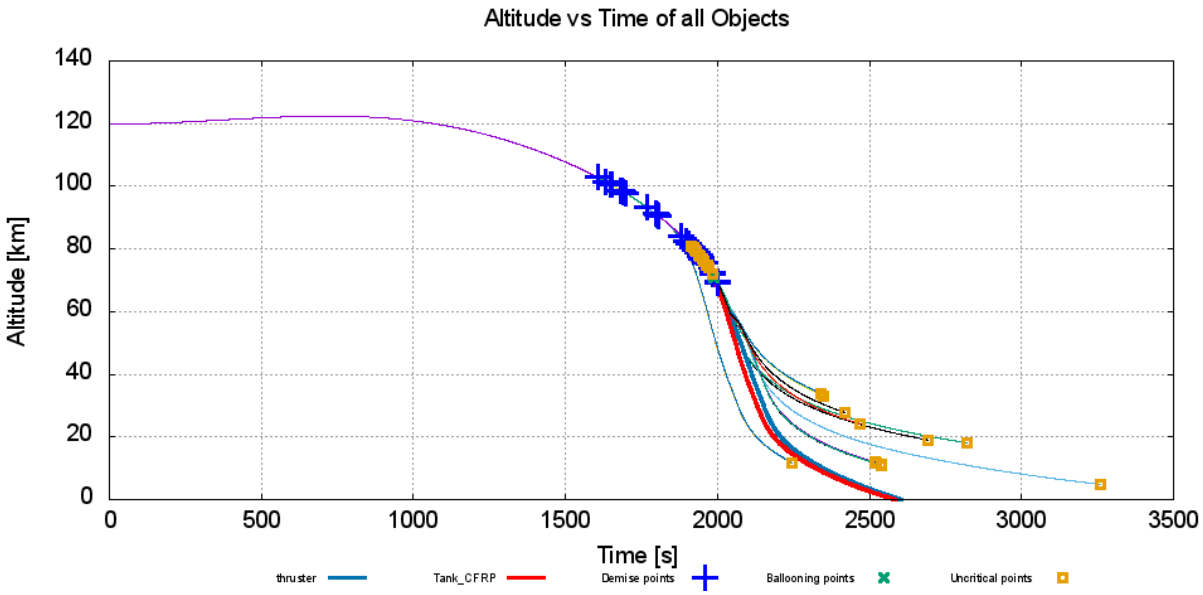
The atmospheric re-entry will be an uncontrolled re-entry.

(ii) An assessment as to whether portions of any individual spacecraft will survive atmospheric re-entry and impact the surface of the Earth with a kinetic energy in excess of 15 joules, and demonstration that the calculated casualty risk for an individual spacecraft using the NASA Debris Assessment Software or a higher fidelity assessment tool is less than 0.0001 (1 in 10,000).

i. Satellite Design 1

The resulting altitude versus time of all components considered is presented in Figure 6.[2] The inputs and outputs appear in § V.

Figure 6: Satellite Components Reentering Altitude vs Time



It shows that elements of two components may reach the Earth's surface:

- thruster (stainless steel part); and
- tank (carbon fiber reinforced polymer part).

[2] The simulation considered a minimum solar activity F10.7=70sfu and a geomagnetic activity value Ap = 0.1. It is a worst-case scenario and therefore does not depend on a specific reentry date (although foreseen reentry is close to a solar cycle maximum). Further, the simulation computes the aerothermodynamics behavior of the falling satellite (tumbling attitude) from 120 km altitude to demise.

The total casualty area they represent is 1.38 m^2. This must be compared to the population distribution across the latitudes seen by the satellite versus the amount of time spent over each latitude. See Figure 7 and Figure 8.

Figure 7: Impact Probability for an Uncontrolled Reentry from a 53-deg Inclination

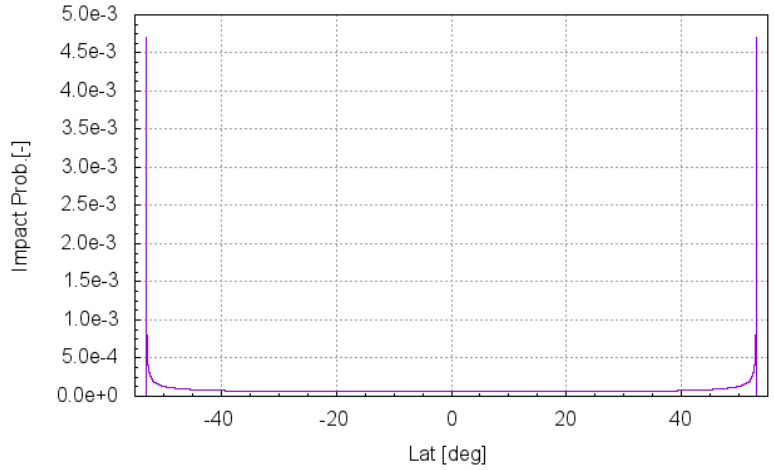
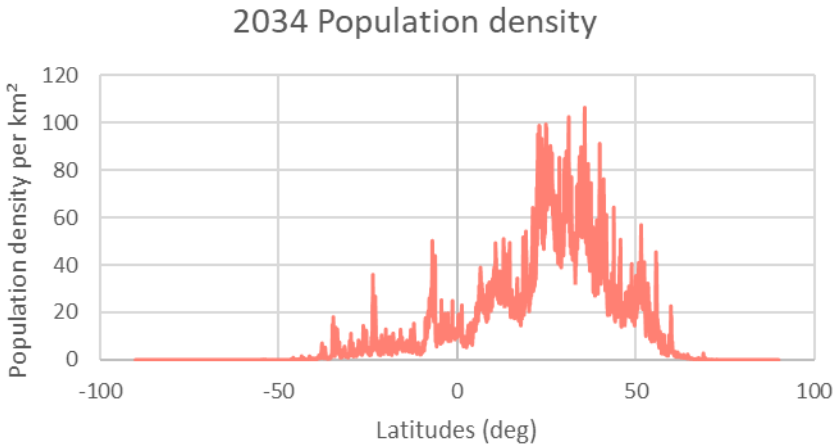
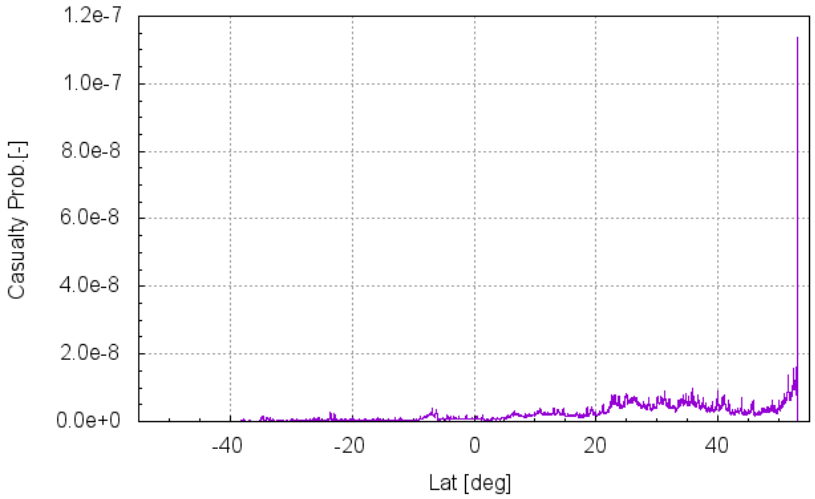


Figure 8: Predicted World Population Density by 2034 with a Medium-Variant Scenario



The maximum allowed casualty area is 5.4 m^2 for a satellite reentry in 2034 to remain below the risk of 1E-4. This value is based on the population density and the probability of falling over a given latitude. The latter is directly deduced from the time spent at different latitudes. In this predicted case, the impact area is 1.38 m^2 and the overall computed risk of casualty is 2.65E-5. The casualty risk per latitude is given in Figure 9.

Figure 9: Casualty Probability over Latitude



Using ESA DRAMA, the human casualty calculated risk is 2.65E-5 (approximately 1:37,000).

ii. Satellite Design 2

Using NASA DAS, the calculated human casualty risk is 2.7E-5 (approximately 1:37,000).

P. § 25.114(d)(14)(vii)(E), 25.114(d)(14)(viii) - Non-FCC Licensing Considerations

(E) Applicants for space stations to be used only for commercial remote sensing may, in lieu of submitting detailed post-mission disposal plans to the Commission, certify that they have submitted such plans to the National Oceanic and Atmospheric Administration for review.

N/A – Xona seeks FCC (not National Oceanic and Atmospheric Administration) post-mission disposal approval.

(viii) For non-U.S.-licensed space stations, the requirement to describe the design and operational strategies to minimize orbital debris risk can be satisfied by demonstrating that debris mitigation plans for the space station(s) for which U.S. market access is requested are subject to direct and effective regulatory oversight by the national licensing authority.

N/A – The Xona System will be U.S.-licensed.

V. APPENDIX 1 - ESA DRAMA LOGS (SATELLITE DESIGN 1)[1]

Name	Primitive	Mass (kg)	Material	Height (m)	Width (m)	Length (m)	Radius (m)
Panel Xm	box	10,57	drama-AA7075	0,62	0,77	0,03	
Tank CFRP	cylinder	2.6	CFRP	0,527			0,08
Tank Alu liner	cylinder	1.5	drama-AA7075	0,525			0,072
Thruster	box	4,86	drama-A316	0,15	0,15	0,15	
PPU	box	3	drama-AA7075	0,055	0,358	0,262	
FCU	box	1,06	drama-AA7075	0,062	0,131	0,125	
MTQ3	cylinder	0,58	drama-Copper	0,43			0,013
IDRS antenna + bracket	box	0,24	drama-AA7075	0,082	0,222	0,07	
Panel Xp	box	7,87	drama-AA7075	0,62	0,77	0,03	
Docking system	cylinder	0,478	drama-AA7075	0,15			0,075
SBA-RX2	box	0,118	drama-El-Mat	0,017	0,07	0,07	
SBA-TX2	box	0,118	drama-El-Mat	0,017	0,07	0,07	
SBA bracket 1	box	0,346	drama-AA7075	0,1435	0,1	0,122	
SBA bracket 2	box	0,346	drama-AA7075	0,1435	0,1	0,122	
IDRS electronics	box	1,1	drama-AA7075	0,096	0,125	0,067	
SSDR	box	0,56	drama-El-Mat	0,1	0,045	0,1	
SSDR2	box	0,56	drama-El-Mat	0,1	0,045	0,1	
MTM	box	0,091	drama-AA7075	0,06	0,018	0,06	
Gyro	box	0,091	drama-AA7075	0,06	0,018	0,06	
Panel Ym	box	19,89	drama-AA7075	0,675	0,83	0,03	
SADM Ym	cylinder	1,5	drama-AA7075	0,1			0,056
XONA PLD box	box	7	drama-AA7075	0,136	0,344	0,344	
Internal units	box	4,74	drama-AA7075	0,11	0,28	0,28	
SADE Ym	box	0,5	drama-AA7075	0,1	0,031	0,078	

[1] The omitted components are the GNSS antenna and Sun Sensor, which are not considered critical elements as they are mainly aluminum with mass less than 30 g each.

Name	Primitive	Mass (kg)	Material	Height (m)	Width (m)	Length (m)	Radius (m)
Panel Yp	box	13,22	drama-AA7075	0,675	0,83	0,03	
SADM Yp	cylinder	1,5	drama-AA7075	0,1			0,056
SADE Yp	box	0,5	drama-AA7075	0,1	0,031	0,078	
MTQ1	cylinder	0,58	drama-Copper	0,43			0,013
MTQ2	cylinder	0,58	drama-Copper	0,43			0,013
RW - bracket 1	box	1,42	drama-AA7075	0,117	0,1415	0,141	
RW - bracket 2	box	1,42	drama-AA7075	0,117	0,1415	0,141	
RW1 - STR	cylinder	1	drama-A316	0,045			0,05
rotor1	cylinder	1	drama-A316	0,04			0,04
RW2 - STR	cylinder	1	drama-A316	0,045			0,05
rotor2	cylinder	1	drama-A316	0,04			0,04
RW3 - STR	cylinder	1	drama-A316	0,045			0,05
rotor3	cylinder	1	drama-A316	0,04			0,04
RW4 - STR	cylinder	1	drama-A316	0,045			0,05
rotor4	cylinder	1	drama-A316	0,04			0,04
Panel Zm	box	29,23	drama-AA7075	0,83	0,77	0,054	
CarboNIX	ring	0,74	drama-AA7075				0,314
OBC	box	1,34	drama-El-Mat	0,117	0,084	0,187	
PCDU	box	2,67	drama-El-Mat	0,105	0,123	0,212	
BM1	box	3,615	drama-Bat-Li	0,104	0,13	0,186	
BM2	box	3,615	drama-Bat-Li	0,104	0,13	0,186	
BM3	box	3,615	drama-Bat-Li	0,104	0,13	0,186	
BM4	box	3,615	drama-Bat-Li	0,104	0,13	0,186	
GBES	box	0,397	drama-El-Mat	0,033	0,18	0,08	
ST bracket	box	0,93	drama-AA7075	0,05	0,203	0,14	
GNSS receiver	box	0,39	drama-AA7075	0,1	0,03	0,1	
Xona - GNSS1	cylinder	0,2	drama-AA7075	0,018			0,05
Xona - GNSS2	cylinder	0,2	drama-AA7075	0,018			0,05
SBA-TX1	box	0,118	drama-El-Mat	0,017	0,07	0,07	
SBA-RX1	box	0,118	drama-El-Mat	0,017	0,07	0,07	

Name	Primitive	Mass (kg)	Material	Height (m)	Width (m)	Length (m)	Radius (m)
ST1	ring	0,215	drama-AA7075				0,025
Glass1	cylinder	0,0106	Glass	0,005			0,015
ST2	ring	0,215	drama-AA7075				0,025
Glass2	cylinder	0,0106	Glass	0,005			0,015
SAA Yp	box	2,4	drama-HC-AA7075	0,75	0,4	0,02	
SAA2 Yp	box	4	drama-HC-AA7075	0,99	0,85	0,02	
SAA3 Yp	box	4	drama-HC-AA7075	0,99	0,85	0,02	
SAA Ym	box	2,4	drama-HC-AA7075	0,75	0,4	0,02	
SAA2 Ym	box	4	drama-HC-AA7075	0,99	0,85	0,02	
SAA3 Ym	box	4	drama-HC-AA7075	0,99	0,85	0,02	
Panel Zp	box	8,83	drama-AA7075	0,83	0,83	0,022	
Xona - TX Antenna - External ring 2	ring	5,59	AlSi10Mg				0,37
Xona - TX Antenna - External ring	ring	3,1	AlSi10Mg				0,228
Xona - TX Antenna - Internal cylinder	cylinder	4,59	AlSi10Mg	0,32			0,085
Xona - Diplexer	box	8,83	drama-AA7075	0,62	0,256	0,126	

A. Demise Data

# Time [s]	Altitude [km]	Lat [deg]	Lon [deg]	Velocity [km/s]	Downrange [km]	Drag	Lift	Side	Knudsen	Mach	UniqueID	Name
1580.550	102.243	48.975	-135.499	7.537	11717.262	0.719	0.000	0.000	0.02781	26.97475	460ec080-981c-41ec-b63c-831defa65775	SBA-RX2
1580.550	102.243	48.975	-135.499	7.537	11717.262	0.719	0.000	0.000	0.02781	26.97475	1787b85f-a115-4429-a85b-d61c7baa4fb3	SBA-TX2
1608.100	100.775	48.173	-133.007	7.534	11921.339	0.701	0.000	0.000	0.02139	27.17468	450e6159-dbaa-4eca-8ee5-222eed039ae7	IDRS_antenna_+_bracket
1625.650	99.801	47.633	-131.463	7.531	12051.331	0.695	0.000	0.000	0.01798	27.27786	d4cc3f94-9070-40d5-a233-c96d4457bc22	SBA-RX1
1628.200	99.656	47.552	-131.242	7.531	12070.218	0.694	0.000	0.000	0.01752	27.29137	b2c8c525-4673-454c-9fc9-f9e17b71b0a0	SBA-TX1
1665.750	97.445	46.316	-128.063	7.522	12348.256	0.688	0.000	0.000	0.01183	27.43956	0fbec0a4-5793-4878-8e1d-718c5604da69	VSP_-_SAA3_Yp
1665.750	97.445	46.316	-128.063	7.522	12348.256	0.688	0.000	0.000	0.01183	27.43956	bd62e64a-8567-4a05-bd0b-dad842483525	VSP_-_SAA3_Ym
1670.300	97.165	46.159	-127.689	7.521	12381.933	0.693	0.000	0.000	0.01615	27.45196	88f23ffd-df35-4218-b826-3a1bbc6823c0	SBA_bracket_1
1670.300	97.165	46.159	-127.689	7.521	12381.933	0.693	0.000	0.000	0.01615	27.45196	da20201c-4d71-4c37-82c3-5fb2843910e2	VSP_-_SAA2_Ym
1670.300	97.165	46.159	-127.689	7.521	12381.933	0.693	0.000	0.000	0.01615	27.45196	3f396bf6-8fe1-4670-aa5f-33985977e620	VSP_-_SAA2_Yp
1671.850	97.069	46.106	-127.562	7.521	12393.405	0.759	0.000	0.000	0.02692	27.45640	0bf83680-a284-46f5-887b-acb08cc591bb	SBA_bracket_2
1677.400	96.723	45.913	-127.109	7.520	12434.483	0.755	0.000	0.000	0.02533	27.47096	1c7bd60c-40ed-464a-a911-cdccd2ec8e92	docking_system
1678.950	96.625	45.859	-126.983	7.520	12445.955	0.764	0.000	0.000	0.02515	27.47459	d04ceda2-34ab-44cf-b5d5-fbec8e5b5bd2	VSP_-_SAA_Yp
1678.950	96.625	45.859	-126.983	7.520	12445.955	0.764	0.000	0.000	0.02515	27.47459	d2cc558c-8839-420b-983a-5ecfcaf06f63	VSP_-_SAA_Ym
1749.500	91.817	43.237	-121.522	7.508	12968.104	0.756	0.000	0.000	0.01911	27.41722	f6e5596b-af6e-4ac2-8f0a-06f23d0d0d6e	Carbonix
1777.050	89.721	42.140	-119.528	7.499	13171.882	0.764	0.000	0.000	0.01336	27.26987	67bd9282-91a5-478f-b05a-dc43da19bbfd	ST2
1779.600	89.520	42.037	-119.348	7.498	13190.735	0.765	0.000	0.000	0.01292	27.25296	dc9df1e5-f75b-4137-b532-a9d117bd018e	ST1
1783.150	89.239	41.892	-119.097	7.496	13216.978	0.806	0.000	0.000	0.01263	27.22815	bf0dae4e-4dc9-49b9-bab5-850488b02a51	Xona_-_GNSS2
1783.150	89.239	41.892	-119.097	7.496	13216.978	0.806	0.000	0.000	0.01263	27.22815	0a241870-3637-40c0-80de-12f96e0e9204	Xona_-_GNSS1
1853.700	83.029	38.911	-114.373	7.428	13736.966	0.798	0.000	0.000	0.00451	26.52583	642edaf7-5783-44a5-933e-617d5f356713	OBC
1855.250	82.876	38.843	-114.275	7.425	13748.333	0.797	0.000	0.000	0.00440	26.50502	14f5f9b1-c60c-4e27-9501-23e8cd602606	VSP_-_Panel_Xp
1864.800	81.918	38.425	-113.674	7.405	13818.274	0.808	0.000	0.000	0.00402	26.36450	2e2719e5-cc5d-44c8-aef1-26f2efdd271b	VSP_-_Panel_Yp
1882.800	79.993	37.652	-112.592	7.064	13946.404	0.802	0.000	0.000	0.00351	25.02315	eed79c41-eb69-4c51-9f80-946fed4f5c3a	VSP_-_Panel_Zp
1901.350	77.878	36.808	-111.455	7.302	14084.160	0.734	0.000	0.000	0.00924	25.66789	ddc4cc92-2c2a-45d4-931f-fb884c26ff5f	RW_-_bracket_1
1901.350	77.879	36.808	-111.455	7.302	14084.169	0.728	0.000	0.000	0.00935	25.66889	b291ae9a-8dc4-4a9a-8af9-0e505d1e2814	RW_-_bracket_2
1893.350	78.819	37.165	-111.932	7.313	14026.005	0.799	0.000	0.000	0.00249	25.79272	5a4a4620-7d29-4aaa-8e8e-21e40d1defef	VSP_-_Panel_Xm
1958.900	69.718	34.228	-108.229	7.007	14493.915	0.881	0.000	0.000	0.00815	23.90867	d16e982d-a387-4f46-a13d-fdd8d2d4264f	RW1_-_STR
1959.900	69.549	34.183	-108.176	6.998	14500.892	0.881	0.000	0.000	0.00795	23.85926	612dc409-0c3c-4a46-83a1-6175bda94123	RW2_-_STR
1959.900	69.552	34.183	-108.176	6.997	14500.904	0.881	0.000	0.000	0.00796	23.85381	7c738a13-c0f6-4ea9-be32-d36d42e3cf51	RW3_-_STR
1959.900	69.551	34.183	-108.176	6.998	14500.914	0.881	0.000	0.000	0.00796	23.85921	96c248c4-306a-48d9-84e5-1e77e3263dd2	RW4_-_STR
1895.900	78.521	37.052	-111.780	7.302	14044.423	0.805	0.000	0.000	0.00255	25.72624	13d686bf-f371-4077-9161-f737ff5a194c	GBES
1905.450	77.371	36.629	-111.220	7.251	14113.132	0.806	0.000	0.000	0.00213	25.44279	15d619f1-9cef-45ff-ac06-a9e860e84e68	VSP_-_Panel_Ym
2003.000	60.447	32.397	-106.131	5.655	14776.062	2.085	0.000	0.000	0.00051	18.15964	06bc2294-d3ba-46db-8f79-be6a4a50f1ec	XONA_PLD_box
1917.000	75.895	36.117	-110.557	7.160	14195.470	0.791	0.000	0.000	0.00199	24.99109	303bba20-374e-472d-8730-0abbfaa0f985	PCDU
1941.550	72.355	35.049	-109.219	6.731	14365.115	0.795	0.000	0.000	0.00116	23.23231	09d53ad0-f23c-449e-95a0-a55c3f4b847f	VSP_-_Panel_Zm

B. Uncritical Data

# Time [s]	Altitude [km]	Lat [deg]	Lon [deg]	Velocity [km/s]	Downrange [km]	Drag	Lift	Side	Knudsen	Mach	UniqueID	Name
2213.450	11.683	35.980	-110.386	0.053	14217.213	0.302	0.000	0.000	0.00001	0.17792	9bb3f30d-e3c1-480d-b365-127ef281b214	Glass2
2214.177	11.703	35.929	-110.320	0.053	14225.494	0.302	0.000	0.000	0.00001	0.17819	b1843b5d-5848-433a-8fa4-77c32fce0418	Glass1
1877.007	80.637	37.907	-112.945	6.424	13904.295	3.002	0.000	0.000	0.05535	22.99547	91b9fede-cad3-4ddd-af82-29f1bd2d8145	Gyro

1877.007	80.637	37.907	-112.945	6.424	13904.295	3.002	0.000	0.000	0.05535	22.99547	676d6081-1d6b-4498-a836-53aa00025d28	MTM
1870.800	81.299	38.165	-113.305	7.287	13861.618	2.142	0.000	0.000	0.03606	25.91901	a74252f3-3d12-48f1-9169-ed3d239b9b8e	SSDR2
1870.800	81.299	38.165	-113.305	7.299	13861.625	2.142	0.000	0.000	0.03606	25.95595	22e21fe1-3ffb-4eb0-9782-bf000b20491d	SSDR
1913.800	76.219	36.294	-110.785	6.267	14166.990	1.041	0.000	0.000	0.01395	22.06643	458e4c13-a2e5-42d2-ada1-3c89a517bef3	IDRS_electronics
1906.350	77.225	36.611	-111.197	6.703	14115.963	2.024	0.000	0.000	0.02142	23.59081	d65ec6d8-34c5-4b90-86e8-19f6f87d2336	SADE_Yp
1884.350	79.840	37.569	-112.478	7.171	13960.001	15.786	0.000	0.000	0.00983	25.40536	8ca68d92-83ba-4970-9caa-f4dea5f6418f	MTQ1
1886.350	79.617	37.482	-112.360	7.025	13974.261	15.786	0.000	0.000	0.00948	24.91809	9767926f-1b50-4e21-8da0-6da9bf7a9a42	MTQ2
1916.350	75.962	36.166	-110.620	6.472	14187.507	1.297	0.000	0.000	0.01528	22.71263	077cb003-7132-4230-9691-b3300b093c5d	SADM_Yp
2610.367	20.907	36.294	-110.712	0.020	14173.605	0.315	0.000	0.000	0.00000	0.07030	c2277f9f-3651-4115-8321-1cce6421cbe9	Xona_-_TX_Antenna_-_External_ring
1897.550	78.222	37.045	-111.771	5.657	14045.568	0.788	0.000	0.000	0.00479	20.10320	5e45cc41-8650-4e8a-801c-f181454a4986	Xona_-_Diplexer
1902.900	77.693	36.746	-111.374	6.636	14094.147	15.784	0.000	0.000	0.00699	23.51920	8c6ec3fc-a70c-4efc-b747-7cfe0ba4e5b3	MTQ3
1902.900	77.697	36.749	-111.378	6.784	14093.633	1.862	0.000	0.000	0.01574	23.91524	a7c4cb2b-209c-4f63-a29a-9225bc0364f1	FCU
1928.195	74.352	35.672	-109.992	4.703	14266.472	3.055	0.000	0.000	0.00399	16.61610	b216fa9b-b389-4cbe-92cc-f97d45974663	PPU
2438.874	13.776	31.288	-104.898	0.031	14946.517	0.457	0.000	0.000	0.00000	0.10870	e74e267a-4bde-4268-95b8-0a3b86051b0c	rotor1
2452.315	13.123	31.260	-104.867	0.030	14950.823	0.457	0.000	0.000	0.00000	0.10523	c7a838cd-3174-47fe-9b63-1e7f551a4ed7	rotor2
2453.274	13.070	31.258	-104.866	0.030	14951.082	0.457	0.000	0.000	0.00000	0.10500	abebb063-b357-43dc-971a-bce61ef3f9e7	rotor3
2452.282	13.127	31.259	-104.867	0.030	14950.906	0.457	0.000	0.000	0.00000	0.10525	a1b7b508-b50a-4c4c-93b9-bbdeb51ad7ef	rotor4
1930.000	74.114	35.557	-109.848	6.341	14284.810	1.984	0.000	0.000	0.01320	22.13890	113add91-426a-4178-ba3c-ec089af3553a	SADE_Ym
1932.000	73.834	35.471	-109.741	6.055	14298.396	1.292	0.000	0.000	0.01100	21.18964	8c5edfe5-0eb4-4e4a-8fe8-09a5b5b16b3d	SADM_Ym
2025.550	54.556	31.646	-105.311	4.021	14890.006	2.071	0.000	0.000	0.00035	12.57886	174d3a90-bff4-4ee5-a266-31b064f73bee	Internal units
1947.100	71.480	34.824	-108.944	5.743	14400.610	2.484	0.000	0.000	0.00802	19.97205	6d6ee1d4-a2f3-4a28-b64c-0d592bff68c4	GNSS_receiver
1950.140	70.979	34.702	-108.798	5.075	14419.651	2.098	0.000	0.000	0.00426	17.65083	62e9adb9-efa3-4953-bafe-a078320215a8	ST_bracket
2365.335	29.060	32.607	-106.323	0.040	14747.852	0.984	0.000	0.000	0.00002	0.12011	a17b9c5d-7140-4ce7-9b00-bd5557f071ea	BM1
2297.499	33.123	32.682	-106.424	0.045	14734.832	0.984	0.000	0.000	0.00003	0.14137	7998acc8-36be-4807-af45-14b01bcd8fa8	BM2
2500.245	19.925	32.337	-106.010	0.026	14790.250	0.984	0.000	0.000	0.00000	0.09080	eaaebe1d-07f2-4ce5-85eb-b5f1d19ef3f9	BM3
2430.190	24.807	32.493	-106.182	0.033	14766.576	0.984	0.000	0.000	0.00001	0.10512	e4524c27-f4cf-4e5e-89e1-695d586fab79	BM4

C. Ballooning Data

# Time [s]	Altitude [km]	Lat [deg]	Lon [deg]	Velocity [km/s]	Downrange [km]	Drag	Lift	Side	Knudsen	Mach	UniqueID	Name
1934.719	72.482	35.557	-109.850	3.182	14284.568	2.224	0.000	0.000	0.00371	11.04099	8a357a36-4018-4845-9e5c-91e730e10491	Xona_-_TX_Antenna_-_Internal_cylinder
1886.216	79.647	37.527	-112.421	4.470	13966.854	0.501	0.000	0.000	0.00543	16.10484	d700b610-26c5-44a8-8085-473b3138cc9a	Xona_-_TX_Antenna_-_External_ring_2

VI. APPENDIX 2 - NASA DAS LOGS (SATELLITE DESIGN 2)

A. Large Object Collision

INPUT

Space Structure Name = PULSAR[1]
Space Structure Type = Payload
Perigee Altitude = 1080.000 (km)
Apogee Altitude = 1080.000 (km)
Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass Ratio = 0.0026 (m^2/kg)
Start Year = 2027.100 (yr)
Initial Mass = 251.000 (kg)
Final Mass = 231.000 (kg)
Duration = 5.000 (yr)
Station-Kept = True
PMD Perigee Altitude = 350.000 (km)
PMD Apogee Altitude = 350.000 (km)
PMD Inclination = 53.000 (deg)
PMD RAAN = 0.000 (deg)
PMD Argument of Perigee = 0.000 (deg)
PMD Mean Anomaly = 0.000 (deg)
Long-Term Reentry = False

OUTPUT
Collision Probability = 9.6944E-06
Returned Message: Normal Processing
Date Range Message: Normal Date Range
Status = Pass

B. Small Object Collision

i. Top

==========
Spacecraft = PULSAR
Critical Surface = Battery 1 (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)

[1] PULSAR is Satellite Design 2.

Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.700 (cm)

OUTPUT

Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========

Spacecraft = PULSAR
Critical Surface = Battery 2 (Top)

==========

INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.700 (cm)

OUTPUT
Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 3 (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.700 (cm)
OUTPUT

Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 4 (Top)
==========
INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)

Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.700 (cm)
OUTPUT
Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Ethernet box (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 2.140 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 2.6943E-07 (2.6943E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = PDCU (Top)

==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 5.370 (g/cm^2)
CS Surface Area = 0.0560 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.890 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 4.6911E-08 (4.6911E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========
Spacecraft = PULSAR
Critical Surface = Tanks (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 7.970 (g/cm^2)
CS Surface Area = 0.0800 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))

CS Pressurized = Yes
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 10.000 (cm)
OUTPUT
Probability of Penetration = 8.8595E-08 (8.8595E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = GNOCI (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 3.260 (g/cm^2)
CS Surface Area = 0.0680 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.890 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 1.0362E-07 (1.0362E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET Elec (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)

Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 11.230 (g/cm^2)
CS Surface Area = 0.0520 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 0.100 (cm)
Outer Wall 2 Density: 2.160 (g/cm^2) Separation: 20.000 (cm)
OUTPUT
Probability of Penetration = 1.3352E-08 (1.3352E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET (Top)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.100 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.540 (g/cm^2) Separation: 10.000 (cm)
OUTPUT
Probability of Penetration = 4.2732E-09 (4.2732E-09)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

ii. Bottom

==========
Spacecraft = PULSAR
Critical Surface = Battery 1 (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.500 (cm)
OUTPUT
Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 2 (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)

Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.500 (cm)
OUTPUT
Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 3 (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.500 (cm)
OUTPUT
Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 4 (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)

Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 12.570 (g/cm^2)
CS Surface Area = 0.0370 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 0.500 (cm)
OUTPUT
Probability of Penetration = 1.1643E-08 (1.1643E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Ethernet box (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 2.140 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 2.6943E-07 (2.6943E-07)

Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========

Spacecraft = PULSAR
Critical Surface = PDCU (Bottom)

==========

INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 5.370 (g/cm^2)
CS Surface Area = 0.0560 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)

OUTPUT

Probability of Penetration = 5.3113E-08 (5.3113E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========

Spacecraft = PULSAR
Critical Surface = Tanks (Bottom)

==========

INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)

Orientation = Fixed Oriented
CS Areal Density = 7.970 (g/cm^2)
CS Surface Area = 0.0800 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = Yes
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 1.500 (cm)
Outer Wall 2 Density: 0.410 (g/cm^2) Separation: 10.000 (cm)
OUTPUT
Probability of Penetration = 2.7779E-07 (2.7779E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = GNOCI (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 3.260 (g/cm^2)
CS Surface Area = 0.0680 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 1.3269E-07 (1.3269E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET Elec (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)

RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 11.230 (g/cm^2)
CS Surface Area = 0.0520 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.410 (g/cm^2) Separation: 2.000 (cm)
OUTPUT
Probability of Penetration = 1.7726E-08 (1.7726E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET Zone 1 (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 29.390 (g/cm^2)
CS Surface Area = 0.0050 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
OUTPUT
Probability of Penetration = 4.1812E-10 (4.1812E-10)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========
Spacecraft = PULSAR
Critical Surface = HET Zone 2 (Bottom)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 20.570 (g/cm^2)
CS Surface Area = 0.0070 (m^2)
Vector = (-1.000000 (u), 0.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.080 (g/cm^2) Separation: 5.000 (cm)
OUTPUT
Probability of Penetration = 1.0052E-09 (1.0052E-09)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

iii. Front

==========
Spacecraft = PULSAR
Critical Surface = Battery 1 (Front)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)

Orientation = Fixed Oriented
CS Areal Density = 27.980 (g/cm^2)
CS Surface Area = 0.0170 (m^2)
Vector = (0.000000 (u), 1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.620 (g/cm^2) Separation: 0.100 (cm)
OUTPUT
Probability of Penetration = 1.0903E-06 (1.0903E-06)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 2 (Front)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 27.980 (g/cm^2)
CS Surface Area = 0.0170 (m^2)
Vector = (0.000000 (u), 1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.620 (g/cm^2) Separation: 0.100 (cm)
OUTPUT
Probability of Penetration = 1.0903E-06 (1.0903E-06)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET Elec (Front)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)

Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 37.270 (g/cm^2)
CS Surface Area = 0.0160 (m^2)
Vector = (0.000000 (u), 1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)
OUTPUT
Probability of Penetration = 7.5168E-07 (7.5168E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Tanks Zone 1 (Front)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 32.550 (g/cm^2)
CS Surface Area = 0.0200 (m^2)
Vector = (0.000000 (u), 1.000000 (v), 0.000000 (w))
CS Pressurized = Yes
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 5.000 (cm)
OUTPUT
Probability of Penetration = 4.3611E-06 (4.3612E-06)

Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========

Spacecraft = PULSAR
Critical Surface = Tanks Zone 2 (Front)

==========

INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 37.980 (g/cm^2)
CS Surface Area = 0.0170 (m^2)
Vector = (0.000000 (u), 1.000000 (v), 0.000000 (w))
CS Pressurized = Yes
Outer Wall 1 Density: 0.540 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)

OUTPUT

Probability of Penetration = 2.3756E-06 (2.3756E-06)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========

Spacecraft = PULSAR
Critical Surface = Tanks Zone 3 (Front)

==========

INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)

Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 26.040 (g/cm^2)
CS Surface Area = 0.0250 (m^2)
Vector = (0.000000 (u), 1.000000 (v), 0.000000 (w))
CS Pressurized = Yes
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)
OUTPUT
Probability of Penetration = 3.6242E-06 (3.6242E-06)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

iv. Back

==========
Spacecraft = PULSAR
Critical Surface = HET Elec (Back)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 37.270 (g/cm^2)
CS Surface Area = 0.0160 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)
OUTPUT
Probability of Penetration = 9.5944E-11 (9.5944E-11)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Tanks Zone 1 (Back)
==========
INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 32.550 (g/cm^2)
CS Surface Area = 0.0200 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = Yes
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 5.000 (cm)
OUTPUT
Probability of Penetration = 2.8739E-09 (2.8739E-09)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Tanks Zone 2 (Back)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 37.980 (g/cm^2)
CS Surface Area = 0.0170 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = Yes
Outer Wall 1 Density: 0.540 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)

OUTPUT
Probability of Penetration = 1.7993E-09 (1.7993E-09)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Tanks Zone 3 (Back)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 26.040 (g/cm^2)
CS Surface Area = 0.0250 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)
OUTPUT
Probability of Penetration = 3.8988E-10 (3.8988E-10)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET (Back)
==========
INPUT

Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)

Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 15.240 (g/cm^2)
CS Surface Area = 0.0090 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = No
OUTPUT
Probability of Penetration = 3.9822E-10 (3.9822E-10)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 1 (Back)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 27.980 (g/cm^2)
CS Surface Area = 0.0170 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.620 (g/cm^2) Separation: 0.100 (cm)
OUTPUT
Probability of Penetration = 2.1312E-10 (2.1312E-10)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 2 (Back)
==========
INPUT
Apogee Altitude = 1080.000 (km)

Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 27.980 (g/cm^2)
CS Surface Area = 0.0170 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.620 (g/cm^2) Separation: 0.100 (cm)
OUTPUT
Probability of Penetration = 2.1312E-10 (2.1312E-10)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Ethernet Box (Back)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 10.420 (g/cm^2)
CS Surface Area = 0.0020 (m^2)
Vector = (0.000000 (u), -1.000000 (v), 0.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.620 (g/cm^2) Separation: 0.300 (cm)
OUTPUT

Probability of Penetration = 1.3179E-10 (1.3179E-10)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

v. Left

==========
Spacecraft = PULSAR
Critical Surface = Battery 1 (Left)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 38.370 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (0.000000 (u), 0.000000 (v), -1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.890 (g/cm^2) Separation: 8.000 (cm)
OUTPUT
Probability of Penetration = 1.4598E-07 (1.4598E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 2 (Left)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)

Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 38.370 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (0.000000 (u), 0.000000 (v), -1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.890 (g/cm^2) Separation: 8.000 (cm)
OUTPUT
Probability of Penetration = 1.4598E-07 (1.4598E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = PDCU (Left)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 22.220 (g/cm^2)
CS Surface Area = 0.0140 (m^2)
Vector = (0.000000 (u), 0.000000 (v), -1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 3.1793E-07 (3.1793E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET (Left)
==========

INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 20.000 (g/cm^2)
CS Surface Area = 0.0070 (m^2)
Vector = (0.000000 (u), 0.000000 (v), -1.000000 (w))
CS Pressurized = No
OUTPUT
Probability of Penetration = 1.9230E-07 (1.9230E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET Elec (Left)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 37.270 (g/cm^2)
CS Surface Area = 0.0160 (m^2)
Vector = (0.000000 (u), 0.000000 (v), -1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)

OUTPUT
Probability of Penetration = 2.0073E-07 (2.0073E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

==========

Spacecraft = PULSAR
Critical Surface = Tanks (Left)

==========

INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 13.750 (g/cm^2)
CS Surface Area = 0.0460 (m^2)
Vector = (0.000000 (u), 0.000000 (v), -1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 10.000 (cm)
OUTPUT
Probability of Penetration = 1.8870E-06 (1.8870E-06)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

vi. Right

==========

Spacecraft = PULSAR
Critical Surface = Battery 1 (Right)

==========

INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)

Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 38.370 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.890 (g/cm^2) Separation: 8.000 (cm)
OUTPUT
Probability of Penetration = 1.4598E-07 (1.4598E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Battery 2 (Right)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 38.370 (g/cm^2)
CS Surface Area = 0.0120 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.270 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 1.890 (g/cm^2) Separation: 8.000 (cm)
OUTPUT
Probability of Penetration = 1.4598E-07 (1.4598E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = GNOCI (Right)

==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 85.940 (g/cm^2)
CS Surface Area = 0.0030 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
OUTPUT
Probability of Penetration = 1.4839E-08 (1.4839E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Ethernet box (Right)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 23.810 (g/cm^2)
CS Surface Area = 0.0010 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No

Outer Wall 1 Density: 3.240 (g/cm^2) Separation: 5.000 (cm)
OUTPUT
Probability of Penetration = 1.9050E-08 (1.9050E-08)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = Tanks (Right)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 13.750 (g/cm^2)
CS Surface Area = 0.0460 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 0.810 (g/cm^2) Separation: 10.000 (cm)
OUTPUT
Probability of Penetration = 1.8870E-06 (1.8870E-06)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET Elec (Right)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)

Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 37.270 (g/cm^2)
CS Surface Area = 0.0160 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No
Outer Wall 1 Density: 1.350 (g/cm^2) Separation: 0.000 (cm)
Outer Wall 2 Density: 0.810 (g/cm^2) Separation: 15.000 (cm)
OUTPUT
Probability of Penetration = 2.0073E-07 (2.0073E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
==========
Spacecraft = PULSAR
Critical Surface = HET (Right)
==========
INPUT
Apogee Altitude = 1080.000 (km)
Perigee Altitude = 1080.000 (km)
Orbital Inclination = 53.000 (deg)
RAAN = 0.000 (deg)
Argument of Perigee = 0.000 (deg)
Mean Anomaly = 0.000 (deg)
Final Area-To-Mass = 0.0026 (m^2/kg)
Initial Mass = 231.000 (kg)
Final Mass = 231.000 (kg)
Station Kept = Yes
Start Year = 2027.100 (yr)
Duration = 5.000 (yr)
Orientation = Fixed Oriented
CS Areal Density = 20.000 (g/cm^2)
CS Surface Area = 0.0070 (m^2)
Vector = (0.000000 (u), 0.000000 (v), 1.000000 (w))
CS Pressurized = No
OUTPUT
Probability of Penetration = 1.9230E-07 (1.9230E-07)
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range

C. Orbital Lifetime

INPUT
Space Structure Name = PULSAR
Space Structure Type = Payload

Perigee Altitude = 1080.000000 (km)
Apogee Altitude = 1080.000000 (km)
Inclination = 53.000000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Area-To-Mass Ratio = 0.002600 (m^2/kg)
Start Year = 2027.100000 (yr)
Initial Mass = 251.000000 (kg)
Final Mass = 231.000000 (kg)
Duration = 5.000000 (yr)
Station Kept = True
Abandoned = False
Long-Term Reentry = False

OUTPUT

Suggested Perigee Altitude = 350.000000 (km)
Suggested Apogee Altitude = 350.000000 (km)
Returned Error Message = Passes LEO reentry orbit criteria.

Released Year = 2033 (yr)
Requirement = 61
Compliance Status = Pass

D. Human Casualty

Return Status : Passed

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

name = PULSAR
quantity = 1
parent = 0
materialID = 8
type = Box
Aero Mass = 231.000000
Thermal Mass = 231.000000
Diameter/Width = 1.150000
Length = 2.000000
Height = 0.487000

name = Chassis
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 59.369999

Thermal Mass = 59.369999
Diameter/Width = 1.150000
Length = 2.000000
Height = 0.100000

name = Payload Enclosure
quantity = 1
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 33.374000
Thermal Mass = 11.165000
Diameter/Width = 0.570000
Length = 0.490000

name = Propulsion - Tank - Luxfer T41A
quantity = 2
parent = 3
materialID = 27
type = Cylinder
Aero Mass = 2.990000
Thermal Mass = 2.990000
Diameter/Width = 0.155000
Length = 0.470000

name = Propulsion - Tank End Cap
quantity = 2
parent = 3
materialID = 54
type = Box
Aero Mass = 0.361000
Thermal Mass = 0.361000
Diameter/Width = 0.041000
Length = 0.041000
Height = 0.041000

name = Propulsion - PPU
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 5.902000
Thermal Mass = 5.902000
Diameter/Width = 0.185000
Length = 0.475000
Height = 0.100000

name = Propulsion - Saddles
quantity = 6
parent = 3
materialID = 8
type = Box
Aero Mass = 0.276000
Thermal Mass = 0.276000
Diameter/Width = 0.065000
Length = 0.165000
Height = 0.015000

name = Propulsion - Clamp/Straps
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 1.425000
Thermal Mass = 1.425000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = Propulsion - Deck
quantity = 1
parent = 3
materialID = 8
type = Flat Plate
Aero Mass = 5.261000
Thermal Mass = 5.261000
Diameter/Width = 0.538000
Length = 0.538000

name = Propulsion - Misc
quantity = 1
parent = 3
materialID = 8
type = Box
Aero Mass = 0.453000
Thermal Mass = 0.453000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = Heaters
quantity = 30

parent = 3
materialID = 54
type = Flat Plate
Aero Mass = 0.027000
Thermal Mass = 0.027000
Diameter/Width = 0.100000
Length = 0.100000

name = Payload Enclosure Top
quantity = 1
parent = 1
materialID = 8
type = Flat Plate
Aero Mass = 21.576999
Thermal Mass = 3.170000
Diameter/Width = 0.600000
Length = 0.600000

name = Payload Main
quantity = 1
parent = 12
materialID = 8
type = Box
Aero Mass = 17.799999
Thermal Mass = 17.799999
Diameter/Width = 0.343000
Length = 0.343000
Height = 0.135000

name = Payload Diplexter
quantity = 1
parent = 12
materialID = 8
type = Cylinder
Aero Mass = 0.607000
Thermal Mass = 0.607000
Diameter/Width = 0.280000
Length = 0.280000

name = Payload Antenna
quantity = 1
parent = 1
materialID = 64
type = Cylinder
Aero Mass = 0.620000
Thermal Mass = 0.620000

Diameter/Width = 0.200000
Length = 0.320000

name = Propulsion - HET
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 1.687000
Thermal Mass = 1.687000
Diameter/Width = 0.100000
Length = 0.165000
Height = 0.070000

name = Propulsion - XFC
quantity = 1
parent = 1
materialID = 54
type = Box
Aero Mass = 0.805000
Thermal Mass = 0.805000
Diameter/Width = 0.070000
Length = 0.135000
Height = 0.020000

name = Propulsion - HET Brackets
quantity = 4
parent = 1
materialID = 8
type = Box
Aero Mass = 0.457000
Thermal Mass = 0.457000
Diameter/Width = 0.180000
Length = 0.200000
Height = 0.020000

name = Propulsion - Tube Closeout
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.137000
Thermal Mass = 0.137000
Diameter/Width = 0.490000
Length = 0.570000
Height = 0.020000

name = Battery
quantity = 4
parent = 1
materialID = 19
type = Box
Aero Mass = 5.170000
Thermal Mass = 5.170000
Diameter/Width = 0.170000
Length = 0.220000
Height = 0.080000

name = GNOCI Board
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.313000
Thermal Mass = 0.313000
Diameter/Width = 0.160000
Length = 0.360000
Height = 0.002000

name = GNOCI Box
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 1.563000
Thermal Mass = 1.563000
Diameter/Width = 0.174000
Length = 0.374000
Height = 0.031000

name = PCDU
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 2.000000
Thermal Mass = 2.000000
Diameter/Width = 0.275000
Length = 0.400000
Height = 0.050000

name = Ethernet Switch

quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.253000
Thermal Mass = 0.253000
Diameter/Width = 0.310000
Length = 0.790000
Height = 0.118000

name = Harnessing
quantity = 25
parent = 1
materialID = 19
type = Cylinder
Aero Mass = 0.200000
Thermal Mass = 0.200000
Diameter/Width = 0.010000
Length = 2.000000

name = GNSS Antenna
quantity = 4
parent = 1
materialID = 8
type = Box
Aero Mass = 0.144000
Thermal Mass = 0.144000
Diameter/Width = 0.080000
Length = 0.080000
Height = 0.020000

name = GNSS Antenna Bracket
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.139000
Thermal Mass = 0.139000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.075000

name = GEO Link Antenna
quantity = 4
parent = 1
materialID = 8

type = Box
Aero Mass = 0.132000
Thermal Mass = 0.132000
Diameter/Width = 0.050000
Length = 0.075000
Height = 0.050000

name = GEO Link Brackets
quantity = 6
parent = 1
materialID = 7
type = Box
Aero Mass = 0.091000
Thermal Mass = 0.091000
Diameter/Width = 0.050000
Length = 0.075000
Height = 0.050000

name = Star Tracker - Camera
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.186000
Thermal Mass = 0.186000
Diameter/Width = 0.056000
Length = 0.066500
Height = 0.047000

name = Star Tracker - Bracket
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.141000
Thermal Mass = 0.141000
Diameter/Width = 0.090000
Length = 0.090000
Height = 0.020000

name = Reaction Wheel
quantity = 4
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 3.000000

Thermal Mass = 3.000000
Diameter/Width = 0.200000
Length = 0.060000

name = Reaction Wheel Brackets
quantity = 8
parent = 1
materialID = 8
type = Box
Aero Mass = 0.024000
Thermal Mass = 0.024000
Diameter/Width = 0.150000
Length = 0.150000
Height = 0.010000

name = Torque Rods X/Y
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.620000
Thermal Mass = 0.620000
Diameter/Width = 0.060000
Length = 0.195000
Height = 0.040000

name = Torque Rod Z /Z
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.500000
Thermal Mass = 0.500000
Diameter/Width = 0.113000
Length = 0.217000
Height = 0.077000

name = Sun sensors
quantity = 3
parent = 1
materialID = 8
type = Box
Aero Mass = 0.016000
Thermal Mass = 0.016000
Diameter/Width = 0.050000
Length = 0.075000

Height = 0.015000

name = S-band Radio
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.220000
Thermal Mass = 0.220000
Diameter/Width = 0.065000
Length = 0.090000
Height = 0.025000

name = S-band Antenna
quantity = 4
parent = 1
materialID = 8
type = Box
Aero Mass = 0.006800
Thermal Mass = 0.006800
Diameter/Width = 0.080000
Length = 0.100000
Height = 0.040000

name = S-band Antenna Bracket
quantity = 4
parent = 1
materialID = 8
type = Box
Aero Mass = 0.266000
Thermal Mass = 0.266000
Diameter/Width = 0.112000
Length = 0.132000
Height = 0.101000

name = External Magnetometer
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.375000
Thermal Mass = 0.375000
Diameter/Width = 0.050000
Length = 0.100000
Height = 0.030000

name = External IMU Assembly
quantity = 3
parent = 1
materialID = 8
type = Box
Aero Mass = 0.209000
Thermal Mass = 0.209000
Diameter/Width = 0.050000
Length = 0.100000
Height = 0.030000

name = Solar Array - Main Panels Comp
quantity = 8
parent = 1
materialID = 27
type = Box
Aero Mass = 1.659000
Thermal Mass = 1.659000
Diameter/Width = 0.900000
Length = 1.110000
Height = 0.013500

name = Solar Array - Main Panels Cells
quantity = 8
parent = 1
materialID = 24
type = Box
Aero Mass = 1.374000
Thermal Mass = 1.374000
Diameter/Width = 0.890000
Length = 1.100000
Height = 0.000800

name = Solar Array - Folout Panels
quantity = 12
parent = 1
materialID = 27
type = Box
Aero Mass = 0.451000
Thermal Mass = 0.451000
Diameter/Width = 0.552000
Length = 0.900000
Height = 0.000900

name = Solar Array - Folout Cells
quantity = 12

parent = 1
materialID = 24
type = Box
Aero Mass = 0.686000
Thermal Mass = 0.686000
Diameter/Width = 0.545000
Length = 0.890000
Height = 0.000800

name = Solar Cap Cone Ti
quantity = 4
parent = 1
materialID = 66
type = Cylinder
Aero Mass = 0.195000
Thermal Mass = 0.195000
Diameter/Width = 0.070500
Length = 0.025000

name = Solar Cap Cone
quantity = 2
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 0.465000
Thermal Mass = 0.465000
Diameter/Width = 0.145000
Length = 0.050000

name = HDRM
quantity = 2
parent = 1
materialID = 54
type = Cylinder
Aero Mass = 0.230000
Thermal Mass = 0.230000
Diameter/Width = 0.040000
Length = 0.040000

name = HDRM Bolt
quantity = 2
parent = 1
materialID = 37
type = Cylinder
Aero Mass = 0.040000
Thermal Mass = 0.040000

Diameter/Width = 0.007000
Length = 0.125000

name = Solar Main Hinge
quantity = 4
parent = 1
materialID = 8
type = Box
Aero Mass = 1.050000
Thermal Mass = 1.050000
Diameter/Width = 0.250000
Length = 0.750000
Height = 0.100000

name = Solar Foldout Hinge
quantity = 24
parent = 1
materialID = 8
type = Box
Aero Mass = 0.150000
Thermal Mass = 0.150000
Diameter/Width = 0.250000
Length = 0.750000
Height = 0.100000

name = Solar Array Fasteners and Inserts
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 1.681000
Thermal Mass = 1.681000
Diameter/Width = 0.100000
Length = 0.100000
Height = 0.100000

name = Separation System - S Ring
quantity = 1
parent = 1
materialID = 54
type = Flat Plate
Aero Mass = 0.762200
Thermal Mass = 0.762200
Diameter/Width = 0.600000
Length = 0.600000

name = Astroscale Plate
quantity = 1
parent = 1
materialID = 8
type = Cylinder
Aero Mass = 0.492000
Thermal Mass = 0.492000
Diameter/Width = 0.100000
Length = 0.050000

name = Laser Retroreflector
quantity = 1
parent = 1
materialID = 8
type = Box
Aero Mass = 0.053000
Thermal Mass = 0.053000
Diameter/Width = 0.053000
Length = 0.053000
Height = 0.027000

name = Digital Camera
quantity = 2
parent = 1
materialID = 8
type = Box
Aero Mass = 0.115000
Thermal Mass = 0.115000
Diameter/Width = 0.043000
Length = 0.048000
Height = 0.043000

name = Thermal Tape
quantity = 10
parent = 1
materialID = 50
type = Flat Plate
Aero Mass = 0.250000
Thermal Mass = 0.250000
Diameter/Width = 0.500000
Length = 0.500000

name = Misc - Fasteners
quantity = 1
parent = 1
materialID = 8

type = Box
Aero Mass = 5.000000
Thermal Mass = 5.000000
Diameter/Width = 0.100000
Length = 0.200000
Height = 0.100000

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

name = PULSAR
Demise Altitude = 77.996599
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Chassis
Demise Altitude = 72.697161
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Payload Enclosure
Demise Altitude = 75.801290
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - Tank - Luxfer T41A
Demise Altitude = 0.000000
Debris Casualty Area = 1.450921
Impact Kinetic Energy = 1278.653088
****
name = Propulsion - Tank End Cap
Demise Altitude = 66.194990
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - PPU
Demise Altitude = 72.589701
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - Saddles
Demise Altitude = 74.822284
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Propulsion - Clamp/Straps
Demise Altitude = 72.678679
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - Deck
Demise Altitude = 73.338500
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - Misc
Demise Altitude = 74.769409
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Heaters
Demise Altitude = 75.178623
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Payload Enclosure Top
Demise Altitude = 76.820888
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Payload Main
Demise Altitude = 67.681818
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Payload Diplexter
Demise Altitude = 76.379793
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Payload Antenna
Demise Altitude = 77.464203
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - HET
Demise Altitude = 74.983362
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - XFC

Demise Altitude = 68.424201
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - HET Brackets
Demise Altitude = 77.174189
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Propulsion - Tube Closeout
Demise Altitude = 77.942433
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Battery
Demise Altitude = 66.950669
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = GNOCI Board
Demise Altitude = 77.591015
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = GNOCI Box
Demise Altitude = 76.472705
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = PCDU
Demise Altitude = 76.630899
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Ethernet Switch
Demise Altitude = 77.953926
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Harnessing
Demise Altitude = 77.558813
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = GNSS Antenna
Demise Altitude = 77.123398

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = GNSS Antenna Bracket
Demise Altitude = 77.602242
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = GEO Link Antenna
Demise Altitude = 77.305185
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = GEO Link Brackets
Demise Altitude = 76.875394
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Star Tracker - Camera
Demise Altitude = 76.908392
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Star Tracker - Bracket
Demise Altitude = 77.266707
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Reaction Wheel
Demise Altitude = 71.295312
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Reaction Wheel Brackets
Demise Altitude = 77.955612
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Torque Rods X/Y
Demise Altitude = 76.438101
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Torque Rod Z /Z
Demise Altitude = 77.306436
Debris Casualty Area = 0.000000

Impact Kinetic Energy = 0.000000
****
name = Sun sensors
Demise Altitude = 77.859426
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = S-band Radio
Demise Altitude = 76.790880
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = S-band Antenna
Demise Altitude = 77.976293
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = S-band Antenna Bracket
Demise Altitude = 77.501998
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = External Magnetometer
Demise Altitude = 76.079728
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = External IMU Assembly
Demise Altitude = 76.907859
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Array - Main Panels Comp
Demise Altitude = 77.617186
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Array - Main Panels Cells
Demise Altitude = 77.714359
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Array - Folout Panels
Demise Altitude = 77.902813
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Solar Array - Folout Cells
Demise Altitude = 77.799012
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Cap Cone Ti
Demise Altitude = 68.111208
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Cap Cone
Demise Altitude = 76.194188
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = HDRM
Demise Altitude = 67.594261
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = HDRM Bolt
Demise Altitude = 74.974235
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Main Hinge
Demise Altitude = 77.604567
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Foldout Hinge
Demise Altitude = 77.948833
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Solar Array Fasteners and Inserts
Demise Altitude = 74.186275
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Separation System - S Ring
Demise Altitude = 0.000000
Debris Casualty Area = 1.471340
Impact Kinetic Energy = 14.459510
****

name = Astroscale Plate
Demise Altitude = 75.302762
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Laser Retroreflector
Demise Altitude = 77.494885
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Digital Camera
Demise Altitude = 76.991085
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Thermal Tape
Demise Altitude = 77.883536
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****
name = Misc - Fasteners
Demise Altitude = 72.013242
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000
****