

July 26, 2016

Via IBFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Ex Parte* Filing
IBFS File Nos. SAT-MOD-20150802-00053; SAT-STA-20150821-00060; SAT-LOA-
20151123-00078

Dear Ms. Dortch:

Planet Labs Inc. (“Planet”), through its counsel, requests that the International Bureau (“Bureau”) grant the remaining portion of the Planet modification application (the “Application”), thereby permitting the launch and operation of the fifty-six Flock 2c satellites manifested on the SHERPA spacecraft.¹ Planet has demonstrated already that its proposed system, including the Flock 2c satellites, meets FCC requirements and NASA collision-risk standards.² None of the speculative and unsupported objections made by ORBCOMM License Corp. (“ORBCOMM”) in its Petition and other filings refute these conclusions.³ In response to ORBCOMM’s most recent allegations, Planet is submitting with this letter a technical analysis demonstrating that the in-plane collision risks for all of the secondary payloads manifested on the SHERPA mission meet appropriate NASA risk standards

¹ See Application of Planet Labs Inc., File No. SAT-MOD-20150802-00053 (filed Aug. 2, 2015); see also Planet Labs Inc., Stamp Grant, File No. SAT-MOD-20150802-00053 (released June 15, 2016) (“Planet Stamp Grant”). The SHERPA is an integrated payload stack designed to deploy 90 small spacecraft into low-Earth orbit and to be launched from the Falcon 9 (Formosat 5) launch vehicle. See, e.g., Public Notice, Report No. SAT-01130 (Jan. 22, 2016).

² See, e.g., Planet Labs Inc., Opposition to Petition to Dismiss, Deny or Hold in Abeyance, File No. SAT-MOD-20150802-00053 (filed Feb. 3, 2016) (“Planet Opposition”).

³ See ORBCOMM License Corp. Petition to Dismiss, Deny or Hold in Abeyance, File No. SAT-MOD-20150802-00053 (filed Jan. 19, 2016) (“Petition”); see also Informal Comments of ORBCOMM License Corp., File No. SAT-STA-20150821-00060 (filed May 11, 2016), attached in Letter from Walter H. Sonnenfeldt, Regulatory Counsel, ORBCOMM License Corp. & Vice President, Regulatory Affairs, ORBCOMM Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, File No. SAT-MOD-20150802-00053 (filed May 13, 2016).

and are well below any reasonable, objective measure of risk.⁴ For these reasons, the Bureau should deny the Petition.⁵

Planet recognizes that there is a potential risk of collision between the Flock 2c satellites (720 x 450 km, 98 degree inclination elliptical orbit), as well as the other objects to be deployed from the SHERPA spacecraft, and the 17 operational ORBCOMM second-generation satellites (“OG2”) (715 km, 47 degree inclination circular orbit). But that mere theoretical possibility does not justify denial of the Application or of the SHERPA mission more generally. The risk should be calculated and measured against a reasonable, objective standard.

Throughout this Application proceeding, Planet has gone above and beyond its legal obligations, consistent with its goals of acting responsibly, openly and cooperatively.⁶ In response to the Petition, Planet conducted a high-fidelity, collision analysis specifically analyzing the risk identified by ORBCOMM.⁷ The analysis showed that over the lifetime of the Flock 2c satellites (under conservative assumptions) there would be an aggregate collision risk of 0.000025, well below NASA standards, which is logical given that the OG2 satellites and the Flock 2c satellites are in different inclinations and have different apogee/perigee altitudes.⁸

Because ORBCOMM was not persuaded by this objective analysis, Planet voluntarily engaged in good faith coordination discussions with ORBCOMM, consistent with Planet’s demonstrated history of cooperation with other parties.⁹ Planet has been working diligently since January of this year in this regard. These efforts have included multiple trips from California to ORBCOMM’s headquarters

⁴ See Planet Labs Inc., SHERPA Conjunction Assessment, attached as Exhibit A.

⁵ See *also* Letter from Trey Hanbury, Counsel for Spire Global, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, File No. SAT-LOA-20151123-00078 (filed July 26, 2016) (“Spire Letter”) (requesting the FCC deny ORBCOMM’s petition against Spire’s satellite application); Letter from H. Indra Hornsby, General Counsel, Spaceflight Industries, Inc., to Mike Safyan, Director of Launch and Regulatory Affairs, Planet Labs Inc., attached as Exhibit B (verifying the accuracy of the technical information used to calculate the in-plane conjunction analysis).

⁶ Planet takes a proactive approach to responsible space stewardship by being a member of the Space Data Association (“SDA”), actively working with the Air Force’s Joint Space Operations Center, and openly publishing refined satellite ephemerides so that other operators may better assess potential conjunctions. See Planet Opposition, at 8-9.

⁷ *Id.*

⁸ Planet Opposition, Technical Appendix at A-2.

⁹ For example, in its initial satellite license application, Planet coordinated with DigitalGlobe, Inc., a competing satellite imaging company, to address potential interference issues. See DigitalGlobe, Inc., Notice of Withdrawal, File No. SAT-LOA-20130626-00087 (filed Sep. 16, 2013). Similarly, Planet successfully coordinated with the Society of Broadcasting Engineers with respect to a number of earth station applications. See, e.g., Planet Labs Inc., Stamp Grant, File No. SES-STA-20140212-00074, at Condition 2 (released Apr. 3, 2014). More recently, Planet worked closely with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and the National Telecommunications and Information Administration to ensure their cooperation in supporting grant of the instant application. See Planet Stamp Grant, at Conditions 5 and 7 (discussing the further coordination obligations of the parties resulting from their pre-grant cooperation).

in Virginia for face-to-face meetings and numerous conference calls. Planet also has expended considerable time and effort to model and quantify the potential collision risks and to respond to ORBCOMM's various informational requests. Moreover, to address ORBCOMM's demand for more refined ephemerides, Planet reallocated technical teams to accelerate the development of its on-orbit satellite GPS capabilities.

In April 2016, the parties appeared to have reached an agreement in principle on the basic conditions that would allow for the Flock 2c deployment to proceed without objection. Namely, Planet agreed: (i) to limit the number of satellites it would launch into orbits that intersect the OG2 715 km orbit to the fifty-six satellites on the Flock 2c launch; and (ii) to share with ORBCOMM GPS-derived position data for the Flock 2c satellites in order to minimize the number of "false positive" conjunctions and increase the effectiveness of any collision avoidance maneuvers. But, after months of inexplicable delays and repeated efforts by ORBCOMM to move the "goalpost" by introducing new and different concerns, it has become abundantly clear that a negotiated resolution is not possible and that Bureau action is required.

In response to ORBCOMM's most recent allegations, Planet is attaching a technical analysis demonstrating that: (1) the risk of in-plane collisions over a two-year period for all 91 objects (including the SHERPA) among themselves is 7.8×10^{-7} ; and (2) the risk of collision over a two-year period between these objects and the OG2 satellites is 2.0×10^{-7} .¹⁰ Both results are well below the NASA risk standard¹¹ and any other reasonable, objective measure of risk.¹²

For the reasons provided in this letter and in the Application proceeding, the Bureau should deny the ORBCOMM Petition and grant the remaining portion of the Application, thereby allowing the launch and operation of the fifty-six Flock 2c satellites manifested on the SHERPA vehicle.

Respectfully submitted,

/s/Tony Lin

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¹⁰ Additionally, the analysis shows that the risk of collision over the lifetime of the 91 objects is COMPLIANT, as calculated under the NASA DAS program.

¹¹ See *Process for Limiting Orbital Debris*, NASA-STD 8719.14A, Section 4.5.2.1. (probability of collision with space objects larger than 10 cm should be less than 0.001).

¹² See Spire Letter at 5-6 (arguing that ORBCOMM in its own application asserted that a NASA DAS calculated collision risk of 3.2×10^{-4} was a reasonable and acceptable risk).

Exhibit A



SHERPA Conjunction Assessment

Introduction

The Falcon 9 deploys Formosat-5, the primary payload, in a 720 km SSO circular orbit. A perigee-lowering burn brings the SHERPA (an integrated payload stack) and the upper stage into a 720 km x 450 km elliptical SSO orbit at an inclination of 97.4°. The SHERPA then performs 82 independent deployments,¹ which results in 90 secondary payloads in orbit. Thus, the total number of new objects in orbit, including SHERPA, is 91. By comparison, as of June 21, 2016, there were already 3,399 catalogued objects intersecting the Orbcomm OG2 orbit.

The SHERPA separates from the Falcon 9 upper stage using a RUAG 1575S Separation System. Planetary Systems Mark II Motorized Lightbands are used to deploy the two Micro satellites, and the remaining Cubesats are deployed using ISIS QuadPacks, which is a configurable 12U dispenser. All deployment mechanisms have extensive flight heritage.

SHERPA deploys the objects in each deployment slot on a pre-programmed schedule in 30-second intervals, except between the deployment of the second and the third objects, which will be a 90-second interval. The deployment points in the inertial reference frame are shown in Figure 1. The risk of in-plane collision amongst the deployed satellites, including the SHERPA, and the risk of collision between the deployed satellites and the Orbcomm OG2 satellites is presented here.

¹ Consistent with standard cubesat deployment practices, in some cases (specifically, deployment slots 33, 36, 52, 60, and 66), more than one satellite is placed into a single slot inside the deployer system and the satellites are deployed by a single command. The two satellites associated with deployment slot 60 remained attached to each other after deployment and will separate after approximately 30 days. See Table B in Appendix A.

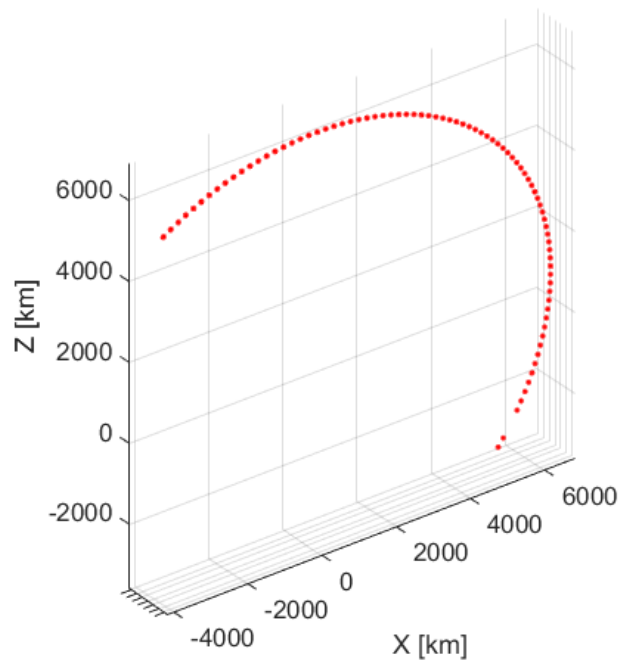


Figure 1: Representation of objects deployed along the SHERPA orbit

Methodology

As a first point of reference, NASA’s Debris Assessment Software (“DAS”) version 2.0.2, which is the NASA-approved method for assessing orbital collision risk, is run for the entire SHERPA mission. Planet has previously run DAS for the 56 Flock 2c satellites and found Flock 2c to be COMPLIANT with “Large Object Collision Risk” standard as defined in NASA-STD 8719.14, section 4.5.2.1.² The DAS results for the entire SHERPA mission are equally COMPLIANT, and the full DAS analysis is shown in Appendix B.

For further analysis, a Monte Carlo simulation is used to find the probability of an in-plane collision occurring between any two objects deployed by the SHERPA (inclusive of the SHERPA itself). Another Monte Carlo simulation is used to compute the collision probability between the satellites from the SHERPA mission and satellites from the Orbcomm OG2 constellation. The OG2 satellites are assumed to be in a circular orbit of 715 km altitude at an inclination of 47°. A sample pair is a random realization of the initial conditions of two randomly selected deployed satellites for the in-plane scenario. The second scenario has one randomly selected deployed satellite (inclusive of the SHERPA), and one OG2 satellite.

² Accidental Collision Risk Assessment, Application of Planet Labs Inc., File No. SAT-MOD-20150802-00053 (filed Dec. 8, 2015).

For both simulations, sample pairs are propagated over a period of two years after deployment to compute the collision probability. Over the two years, the deployed objects will continue to spread out and lower in apogee, and therefore, the time of flight can be considered a conservative time bound for assessing risk of collision. A collision is considered to occur when the separation between two satellites is smaller than the combined object radius. The Monte Carlo simulations include perturbations due to J2 and an exponential atmosphere for a representative model of the dominant environmental conditions.

Each deployed satellite is represented as a sample, which is generated at the deployment point by adding a random deployment velocity vector, ΔV , to an orbital state of the SHERPA at deployment time. The direction of the velocity vector is randomly chosen in spherical coordinates to account for the tumbling SHERPA. The magnitude of the velocity vector is randomly selected because of the variability in the deployment forces. The magnitude of the ΔV is generated from the following uniform distributions:

$$|\Delta V|_{Cubesat} \sim U(0.9, 1.2) \text{ m/s}$$

$$|\Delta V|_{Microsat} \sim U(0.3, 0.5) \text{ m/s}$$

The distribution of the ΔV vectors effectively forms a spherical shell centered on the nominal velocity of the SHERPA as seen in Figure 2. The initial state for an OG2 sample is from a circular orbit at 715 km altitude, inclination of 47° . A random argument of perigee, right ascension of ascending node, and true anomaly are chosen for the selected OG2 satellite from a uniform distribution in the range 0° to 360° .

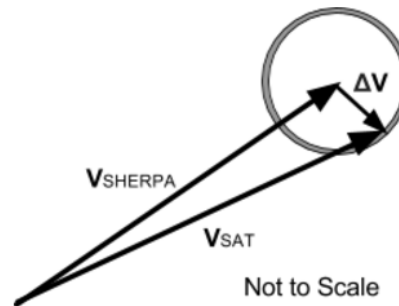


Figure 2: Random ΔV given to the deployed satellites

For each satellite, ballistic coefficients (BC) are randomly selected between the bounds presented in Table A of Appendix A to account for different attitude states of the satellites throughout their lifetime (e.g. tumbling, high drag, low drag, etc.). The following uniform distribution is used for each satellite based on the data presented in Table A:

$$BC \sim U(BC_{min}, BC_{max}) \text{ kg/m}^2$$

The ballistic coefficients for the OG2 satellites are set to be high enough that drag does not have a noticeable effect on their orbit over the 2 years simulated.

A representative randomly generated sample pair for the in-plane simulation is shown in Figure 3. The hard-body radius for the different types of satellites deployed is shown in Table A of Appendix A. The deployment order and the form factor of the satellites is shown in Table B.

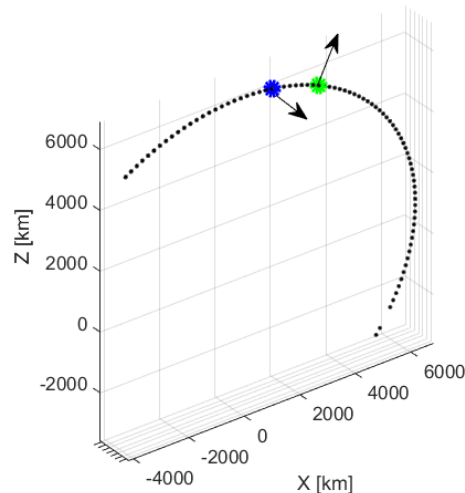


Figure 3: Sample pair generated using random deployment slots, ΔV vectors (Not to Scale), and Ballistic Coefficient (BC)

Results & Analysis

Long-Term Collision Risk:

The Monte Carlo simulation for the in-plane analysis uses **18 million** sample pairs.³ Analyzing 1 million sample pairs takes approximately 2.5 days of computation. Only 14 of the sample pairs simulated had a close approach separation smaller than the combined hard-body radius. Therefore, the collision probability is calculated as 7.8×10^{-7} .

The Monte Carlo simulation for the 91 SHERPA-deployed objects and the OG2 satellites uses **10 million** sample pairs. Only 2 of the sample pairs have a close approach separation smaller than the combined hard-body radius. Therefore the collision probability is calculated as 2.0×10^{-7} .

Short-Term Collision Risk:

Although the SHERPA is tumbling during deployment, the deployment timing and order has been selected following a trade analysis to minimize the risk of re-contact of any of the deployed objects without the need for active control authority over the SHERPA.⁴ Before the end of its battery life, the SHERPA deploys all the satellites such that any re-contact is avoided. The

³ Planet substantially increased the number of simulations from 5 million to 18 million to address initial feedback that Planet had not conducted sufficient simulations.

⁴ Kelley, K., Elson, M., and Andrews, J., Deploying 87 Satellites in One Launch: Design trades completed for the 2015 SHERPA flight hardware, AIAA/USU Conference on Small Satellites, Logan, UT, 2015.



SHERPA has a GPS onboard and will report deployment states to the satellite operators and to JSpOC to further aid tracking efforts.

A small handful of SHERPA deployment scenarios could result in a “re-contact” amongst the SHERPA deployed objects in the initial days or weeks after deployment. However, the probability of such initial conditions occurring is miniscule. The Monte Carlo analysis performed herein encompasses a uniform distribution of *all* possible deployment scenarios, and thus the aggregate risk of collision is comprehensively captured in this study.

Summary & Conclusion

The entire SHERPA mission is found to be COMPLIANT by NASA DAS. The risk of in-plane collisions over a period of two years for all 91 objects amongst themselves is 7.8×10^{-7} . The risk of collision between any of the SHERPA deployed satellites and an OG2 satellite is 2.0×10^{-7} over a period of two years. The aforementioned values are the results of extensive Monte Carlo simulations. The combined effect of separation between the deployment slots, random deployment velocities, different ballistic coefficients, and small size of the satellites ensures that the satellites safely separate and continue to operate with a low risk of collision.

It should also be noted that the DAS and Monte Carlo analyses conservatively compute collision risk for the mission. Refined orbit determination (e.g. GPS-derived satellite position data) and operational mitigation strategies will help reduce the actual operational impact on all parties involved. While it may seem daunting on the surface, the release of 91 new objects into a 720 km x 450 km elliptical SSO orbit poses a minimal risk of overall collision, in-plane collision amongst the deployed satellites (including the SHERPA), and an equally minimal risk of collision between the deployed satellites and the Orbcomm OG2 satellites.



Appendix A: Satellites Deployed by SHERPA

Table A: Properties of the satellites deployed by SHERPA. The ballistic coefficient (BC) bounds for satellites other than Planet Labs or Spire satellites are computed using the surface area and drag coefficients ranging from 2.0 to 2.2.

Quantity	Form Factor	L [mm]	W [mm]	H [mm]	Mass [kg]	BC min [kg/m ²]	BC max [kg/m ²]
56	3U CubeSat: Planet Labs	610.5	325	207	5.0	11.00	45.00
8	3U CubeSat: Spire	1000	1000	300	4.5	21.90	67.60
7	3U CubeSat	340.5	100	100	5.0	66.75	250.00
2	1.5U CubeSat	170.3	100	100	2.5	66.73	125.00
10	1U CubeSat	113.5	100	100	1.3	52.06	65.00
1	2U CubeSat	227	100	100	2.0	40.05	100.00
1	6U CubeSat	340.5	226.3	100	6.0	35.39	132.56
3	6U XL CubeSat	365.9	226.3	100	11.0	60.38	243.04
1	Microsatellite	450	450	1250	50.0	40.40	123.46
1	Microsatellite	1000	1000	1000	160.0	72.73	80.00
1	SHERPA	2742	2608	1423	603.0	80.60	88.70



Table B: SHERPA deployment order provided and confirmed by Spaceflight

Deployment Slot	Form Factor	Time from Launch [s]
1	160 kg MicroSat	1800
2	50 kg MicroSat	1830
3	6U XL	1920
4	3U	1950
5	3U	1980
6	3U	2010
7	3U	2040
8	3U	2070
9	3U	2100
10	3U	2130
11	3U	2160
12	3U	2190
13	3U	2220
14	3U	2250
15	3U	2280
16	3U	2310
17	3U	2340
18	3U	2370
19	3U	2400
20	3U	2430
21	3U	2460
22	3U	2490
23	3U	2520
24	3U	2550
25	3U	2580
26	3U	2610
27	3U	2640
28	3U	2670
29	3U	2700
30	3U	2730
31	3U	2760
32	3U	2790
33	1U x 3	2820

34	3U	2850
35	3U	2880
36	1U x 3	2910
37	3U	2940
38	3U	2970
39	3U	3000
40	6U	3030
41	3U	3060
42	3U	3090
43	3U	3120
44	3U	3150
45	3U	3180
46	3U	3210
47	3U	3240
48	3U	3270
49	3U	3300
50	3U	3330
51	3U	3360
52	1.5U x 2	3390
53	3U	3420
54	3U	3450
55	3U	3480
56	6U XL	3510
57	3U	3540
58	3U	3570
59	3U	3600
60	1U, 2U	3630
61	3U	3660
62	3U	3690
63	3U	3720
64	3U	3750
65	3U	3780
66	1U x 3	3810
67	3U	3840
68	3U	3870
69	6U XL	3900



70	3U	3930
71	3U	3960
72	3U	3990
73	3U	4020
74	3U	4050
75	3U	4080
76	3U	4110
77	3U	4140
78	3U	4170
79	3U	4200
80	3U	4230
81	3U	4260
82	3U	4290



Appendix B: DAS Analysis for Entire SHERPA Mission

07 25 2016; 14:12:24PM

Processing Requirement 4.5-1:

Return Status : Passed

=====
Run Data
=====

INPUT

Space Structure Name = MicroSat-160
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.006250 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 160.000000 (kg)
Final Mass = 160.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000030
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====
Run Data
=====

INPUT

Space Structure Name = MicroSat-50
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008850 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 50.000000 (kg)
Final Mass = 50.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)



PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000010
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 6UXL-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.004300 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 11.000000 (kg)
Final Mass = 11.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 6UXL-2
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.004300 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 11.000000 (kg)
Final Mass = 11.000000 (kg)
Duration = 25.000000 (yr)



Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 6UXL-3
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.004300 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 11.000000 (kg)
Final Mass = 11.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 6U-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)



Final Area-To-Mass Ratio = 0.007400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 6.000000 (kg)
Final Mass = 6.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = SPIRE-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = SPIRE-2
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)



Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = SPIRE-3
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====



INPUT

Space Structure Name = SPIRE-4
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = SPIRE-5
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000002
Returned Error Message: Normal Processing



Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = SPIRE-6
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = SPIRE-7
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)



OUTPUT

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = SPIRE-8
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.020800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000002
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)



PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-2
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-3
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)



Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-4
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-5
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)



Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-6
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-7



Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-8
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass



=====

****INPUT****

Space Structure Name = PLANET-9
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-10
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****



Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-11
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-12
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)



PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-13
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-14
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False



Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-15
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-16
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)



Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-17
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-18
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)



Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-19
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****



Space Structure Name = PLANET-20
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-21
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range



Status = Pass

=====

INPUT

Space Structure Name = PLANET-22
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-23
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)



OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-24
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-25
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)



PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-26
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-27
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)



Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-28
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-29
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)



Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-30
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-31
Space Structure Type = Payload



Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-32
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====



INPUT

Space Structure Name = PLANET-33
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-34
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003



Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-35
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-36
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)



PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-37
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-38
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True



PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-39
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-40
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)



Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-41
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-42
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)



RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-43
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****



Space Structure Name = PLANET-44
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = PLANET-45
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass



=====

****INPUT****

Space Structure Name = PLANET-46
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-47
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****



Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-48
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-49
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)



PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-50
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-51
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)



Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-52
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-53
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)



Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-54
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-55
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)



Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = PLANET-56
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.038000 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 5.000000 (kg)
Final Mass = 5.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000003
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====



INPUT

Space Structure Name = 3U-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = 3U-2
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000001
Returned Error Message: Normal Processing



Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = 3U-3
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = 3U-4
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)



OUTPUT

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = 3U-5
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

INPUT

Space Structure Name = 3U-6
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)



PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 3U-7
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005800 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 4.500000 (kg)
Final Mass = 4.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000001
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)



Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-2
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-3
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)



Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-4
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-5



Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-6
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass



=====

****INPUT****

Space Structure Name = 1U-7
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-8
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****



Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-9
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1U-10
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.008400 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 1.300000 (kg)
Final Mass = 1.300000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)



PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1p5U-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005900 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 2.500000 (kg)
Final Mass = 2.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 1p5U-2
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005900 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 2.500000 (kg)
Final Mass = 2.500000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False



Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = 2U-1
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.009200 (m²/kg)
Start Year = 2016.000000 (yr)
Initial Mass = 2.000000 (kg)
Final Mass = 2.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000000
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

****INPUT****

Space Structure Name = SHERPA
Space Structure Type = Payload
Perigee Altitude = 450.000000 (km)
Apogee Altitude = 720.000000 (km)
Inclination = 97.400000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.005600 (m²/kg)



Start Year = 2016.000000 (yr)
Initial Mass = 603.000000 (kg)
Final Mass = 603.000000 (kg)
Duration = 25.000000 (yr)
Station-Kept = False
Abandoned = True
PMD Perigee Altitude = -1.000000 (km)
PMD Apogee Altitude = -1.000000 (km)
PMD Inclination = 0.000000 (deg)
PMD RAAN = 0.000000 (deg)
PMD Argument of Perigee = 0.000000 (deg)
PMD Mean Anomaly = 0.000000 (deg)

****OUTPUT****

Collision Probability = 0.000115
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

=====

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

Exhibit B



July 22, 2016

VIA ELECTRONIC MAIL

Mike Safyan
Director of Launch and Regulatory Affairs
Planet Labs Inc.
346 9th Street
San Francisco, California 94103

Re: Planet Labs SHERPA Conjunction Study

Dear Mike:

This letter in support of your efforts confirms the accuracy of the information that we have provided to you regarding the satellites to be deployed by the SHERPA that is set forth in Appendix A of your SHERPA Conjunction Study dated July 11, 2016. Further, we endorse the analysis methods Planet Labs employed and the results of the analysis as presented.

Please note that the information is based upon the current SHERPA manifest. We do not intend to add additional spacecraft to the manifest. If any of the scheduled customers cannot deliver their spacecraft for launch, we will substitute a mass dummy for the missing spacecraft, which will not be deployed, so there will be fewer total objects deployed and, therefore, less risk of in-plane collision.

Sincerely,

A handwritten signature in blue ink, appearing to be "H. Indra Hornsby". The signature is stylized and fluid, with a long horizontal stroke extending to the right.

H. Indra Hornsby
General Counsel - Spaceflight Industries, Inc.

CERTIFICATE OF SERVICE

I, Jeffrey Westling, hereby certify that on July 26, 2016, a true and correct copy of this *ex parte* letter was sent by United States mail, first class postage prepaid, to the following:

Walter H. Sonnenfeldt, Esq.
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Vice President, Regulatory Affairs
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Counsel to Spaceflight, Inc.

/s/ Jeffrey Westling

Jeffrey Westling