EXHIBIT D – ORBITAL DEBRIS STATEMENT FOR EV7

This Exhibit D to Form 312 submitted by Kongsberg Satellite Services AS ("KSAT") contains the orbital debris statement for the Canadian-owned and licensed non-geostationary satellite called, exactView-7 ("EV7" or "Satellite"), also known as Maritime Monitoring and Messaging Microsatellite ("M3MSat"). This statement conforms to the requirements of 47 C.F.R. §§ 25.137(d) and 25.114(d)(14).

The Satellite has no propulsion system; nonetheless the Satellite's post-mission atmospheric reentry will occur within 25 years in accordance with the Commission's orbital debris mitigation policy.

1. Satellite Design and Orbital Parameters

No.	System Description	Comment
1.	Satellite Bus Design	Microsatellite with dimensions of 60 x 60 x 85 cm, a box-shape, and a launch mass of 85 kg. Bus design: AIM, by Honeywell Canada (formerly COM DEV)
2.	Satellite Payload	Primary payload: AIS receiver. Experimental payloads: a Low Data Rate (LDR) UHF terminal to demonstrate a satellite-based AIS data relay capability; and a Deep-Dielectric Charging Monitor (DDCM) to measure the static energy that has accumulated in the satellites' electronics.
3.	Satellite Orbit	As of February 21, 2017, the satellite's orbital parameters are as follows: Apogee of 520 km and Perigee of 486 km, Mean inclination of 97.5 degrees, Right Ascension of Ascending Node of 116 degrees, Argument of Perigee of 117 degrees, Mean Anomaly of 243.3 degrees, and an Orbital Period of 5690 seconds.
4.	Power Subsystem	There are 6 body-mounted solar panels, with triple-junction GaInP/GaAs/Ge solar cells. The predicted orbital average power generation is 66 W. The battery consists of 24 SAFT MPS 176065 (5.8 Ah) lithium-ion cells arranged in an 8-series/3-parallel (8S3P) configuration. The battery pack has an End of Charge Voltage of 32.8 V, and a capacity of 480 Wh. The solar panels are connected to a set of six battery charge regulators, which provide constant voltage or peak power tracking, and regulate the charging current into the battery. See row 9, *Mitigating Risk of Accidental Explosion*, below, for additional detail on the battery.

5.	Attitude Control	The Satellite has no propulsion. Three-axis stabilized bus platform. The attitude determination and control system suite can point at either an inertial or nadir target to within 5 degrees. The attitude actuation suite consists of a set of reaction wheels, and a set of magnetic torque rods with redundant coils. The reaction wheels are organized as two redundant sets of three orthogonal wheels each. Each wheel has a momentum capacity of 80 mNms at 1000 rad/s angular speed, and can generate a maximum torque of 5 mNm. The torque rods are capable of 15 Am^2 each and are used for initial detumbling, and for reaction wheel desaturation.
6.	Surface Area	Final Area to Mass: 0.006 m^2 / kg

2. Orbital Debris Mitigation

No.	47 C.F.R. § 25.114	Required Statements	Comment
7.	(d)(14)(i)	*Planned Release of Debris* A statement that the space station operator has assessed and limited the amount of debris released in a planned manner during normal operations	No objects will be intentionally released during the Satellite mission. The Satellite is designed so as not release any debris. There are no deployable devices or instruments (or associated pyrotechnics). All mechanisms (such as reaction wheels) are enclosed within the body of the satellite to ensure that a structural failure does not result in debris being distributed outside the spacecraft. The battery is contained within MLI blankets and located in compact areas of the spacecraft.
8.	(d)(14)(i)	*Collisions with Small Debris and Loss of Control* A statement that the space station operator . . . has assessed and limited the probability of the space station becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control	The Satellite has an outer structure (honeycomb panels) which will minimize the effects of a strike from another orbital object. The spacecraft also has redundant systems to reduce the risk that small debris or a meteoroid strike would cause a loss of control. The bus is fully redundant, provided by two independent strings, with each containing a full complement of the systems required to operate the spacecraft (the magnetorquers, which

		and prevent post-mission disposal	have redundant coils/electronics, are not fully independent). As a result, the bus is single-failure tolerant. S-Band antennas (used for TT&C) are mounted on two opposing faces to ensure successful communication without attitude control. All six faces of the satellite have solar panels, to ensure power can be generated at all attitudes. Even if control of the Satellite were lost, it would still deorbit as planned within 25 years, as described in row 11, *Orbital Maintenance and Evolution*, below.
9.	(d)(14)(ii)	*Mitigating Risk of Accidental Explosion* A statement that the space station operator has assessed and limited the probability of accidental explosions during and after completion of mission operations. ▪ This statement must include a demonstration that debris generation will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft. Energy sources include chemical, pressure, and kinetic energy. ▪ This demonstration should address whether stored energy will be removed at the spacecraft's end of	Breakup due to accidental explosion during or after the mission is unlikely either because the sources of energy that can lead to explosions are not present or because measures have been taken to mitigate potential failure modes that can lead to break up, as explained below: *Propulsion System and Pressure Vessels* – The spacecraft contains no propulsion system and, therefore, does not contain any propellants, fluids or high pressure vessels that require venting or safing. *Battery Failure* – Batteries may create debris if they leak or burst due to overcharging, overheating, or shorting. The Satellite's battery consists of 24 SAFT MPS 176065 (5.8 Ah) lithium-ion cells arranged in an 8-series/3-parallel (8S3P) configuration. The battery pack has a nominal full voltage of 32.8 V, and a capacity of 480 Wh. While the battery's charging circuits are not severed at the end of the mission, the risk of debris generation is

		life, by depleting residual fuel and leaving all fuel line valves open, venting any pressurized system, leaving all batteries in a permanent discharge state, and removing any remaining source of stored energy, or through other equivalent procedures specifically disclosed in the application;	effectively mitigated by the measures described below. To prevent the creation of orbital debris, the battery is shielded within the Satellite and contains many of the safety features highlighted in NASA's Guidelines on Lithium-ion Battery Use in Space Applications, NASA/TM-2009-215751. First, the battery is shielded within the Satellite structure by MLI blankets, such that the rupturing of cells will not break the spacecraft's outer shell. Second, the battery contains self-protection features to reduce the risk of cells leaking or rupturing, including circuit breakers to prevent overcharging and shutdown separators and burst discs, which function automatically without intervention from the ground. Each battery cell has a circuit breaker that will open the cell circuit should it be overcharged. In addition, each cell is equipped with a mechanical vent that will preclude the cell from bursting due to overpressure. The battery's shutdown separators are designed to prevent short circuits and to ensure cell safety in the case of excess temperature. Due to the cell design, the probability of a short is very low, but if one of the cells were to short this would lead to the opening of the cell circuit breaker to prevent further damage. *Catastrophic Reaction Wheel Failure* – Reaction wheels are enclosed within a mechanical structure which will contain all debris. At the end of the mission, power to the reaction wheels will be terminated by command, allowing them to spin-down.

			The nominal rotational speed of the wheels is well below the maximum rotational speed (typically 200 rad/s) so as to not create undue stress that would increase the likelihood of fragmentation. *Pyrotechnics or Self-destruct Systems* – The spacecraft does not employ pyrotechnics or self-destruct systems.
10.	(d)(14)(iii)	*Collision with Large Debris or Other Objects* A statement that the space station operator has assessed and limited the probability of the space station becoming a source of debris by collisions with large debris or other operational space stations. . . . ▪ Where a space station will be launched into a low-Earth orbit that is identical, or very similar, to an orbit used by other space stations, the statement must include an analysis of the potential risk of collision and a description of what measures the space station operator plans to take to avoid in-orbit collisions. ▪ If the space station operator is relying on coordination with another system, the statement must indicate	The potential for collision with other spacecraft was taken into account when selecting the orbit for the Satellite. An analysis of the Satellite's orbital parameters has been performed using NASA's Debris Assessment Software, version 2.0.2. DAS was used to simulate the probability of the Satellite colliding with an orbiting object larger than 10 cm in diameter; the collision probability value was 0.000004. The log of the DAS analysis is appended in section 3.1 below. See section 3.1, Probability of Collision with Large Objects (below). exactEarth will rely on the accurate and timely information from JSpOC to enable all operators to maintain situational awareness and to expediently respond to any possible conjunctions.

		what steps have been taken to contact, and ascertain the likelihood of successful coordination of physical operations with, the other system. . . .	
11.	(d)(14)(iii)	*Orbital Maintenance and Evolution* The statement must disclose the accuracy—if any—with which orbital parameters of non-geostationary satellite orbit space stations will be maintained, including apogee, perigee, inclination, and the right ascension of the ascending node(s). ▪ In the event that a system is not able to maintain orbital tolerances, i.e., it lacks a propulsion system for orbital maintenance, that fact should be included in the debris mitigation disclosure. Such systems must also indicate the anticipated evolution over time of the orbit of the proposed satellite or satellites	Because the Satellite does not have a propulsion system, it does not have the ability to maintain its orbit with accuracy. The spacecraft's orbit will decay naturally from its present orbit of 520 x 486 km (as of February 21, 2017) (see additional orbital details in row 3, above). The Satellite has a mission/design life of 5 years. It has a final area-to-mass ratio of approximately 0.006 m^2/kg. Using NASA's Debris Assessment Software, v 2.0.2, the Satellite has a calculated orbit lifetime of approximately 6.8 years remaining and will reenter the Earth's atmosphere in the year 2024. See the details of the DAS analysis and the simulated evolution of the orbit in section 3.2, Orbit Evolution, below.
12.	(d)(14)(iv)	*Post-Mission Disposal Plan* A statement detailing the post-mission disposal plans for the space station at end of	The Satellite contains no propulsion system and thus has no means of performing a deliberate post-mission reentry maneuver. The disposal plan is to let the Satellite's orbit decay naturally until it reenters the atmosphere and disintegrates.

		life, including the quantity of fuel—if any—that will be reserved for post-mission disposal maneuvers. . . .	Based on estimates using NASA's DAS, reentry will occur approximately 8 years from launch, which occurred in June 2016. See row 11. At the end of mission, all intentional transmissions from the Satellite and power to its reaction wheels are set to terminate. See section 3.3, Post-Mission Disposal (below).
13.	(d)(14)(iv)	*Casualty Risk Assessment for Atmospheric Reentry* The statement must also include a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the space station. In general, an assessment should include an estimate as to whether portions of the spacecraft will survive re-entry and reach the surface of the Earth, as well as an estimate of the resulting probability of human casualty. . . .	Because the post-mission disposal plan for the Satellite involves atmospheric reentry, a casualty risk assessment has been performed using the NASA Debris Assessment Software, Version 2.0.2. The DAS analysis indicates that EV7 is compliant with NASA Requirement 4.7-1. See the results of the DAS analysis in section 3.4, Casualty Risk Analysis (below).

3. Inputs to and Results from NASA Debris Assessment Software, v2.0.2

3.1. Probability of Collision with Large Objects – § 25.114(d)(14)(iii)

04 19 2017; 16:23:39PM Processing Requirement 4.5-1: Return Status : Passed

==============
Run Data
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INPUT

Space Structure Name = EV7
Space Structure Type = Payload
Perigee Altitude = 486.000000 (km)
Apogee Altitude = 520.000000 (km)
Inclination = 97.500000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Final Area-To-Mass Ratio = 0.006000 (m^2/kg)
Start Year = 2017.142000 (yr)
Initial Mass = 85.000000 (kg)
Final Mass = 85.000000 (kg)
Duration = 5.000000 (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 = 0.000004
Returned Error Message: Normal Processing
Date Range Error Message: Normal Date Range
Status = Pass

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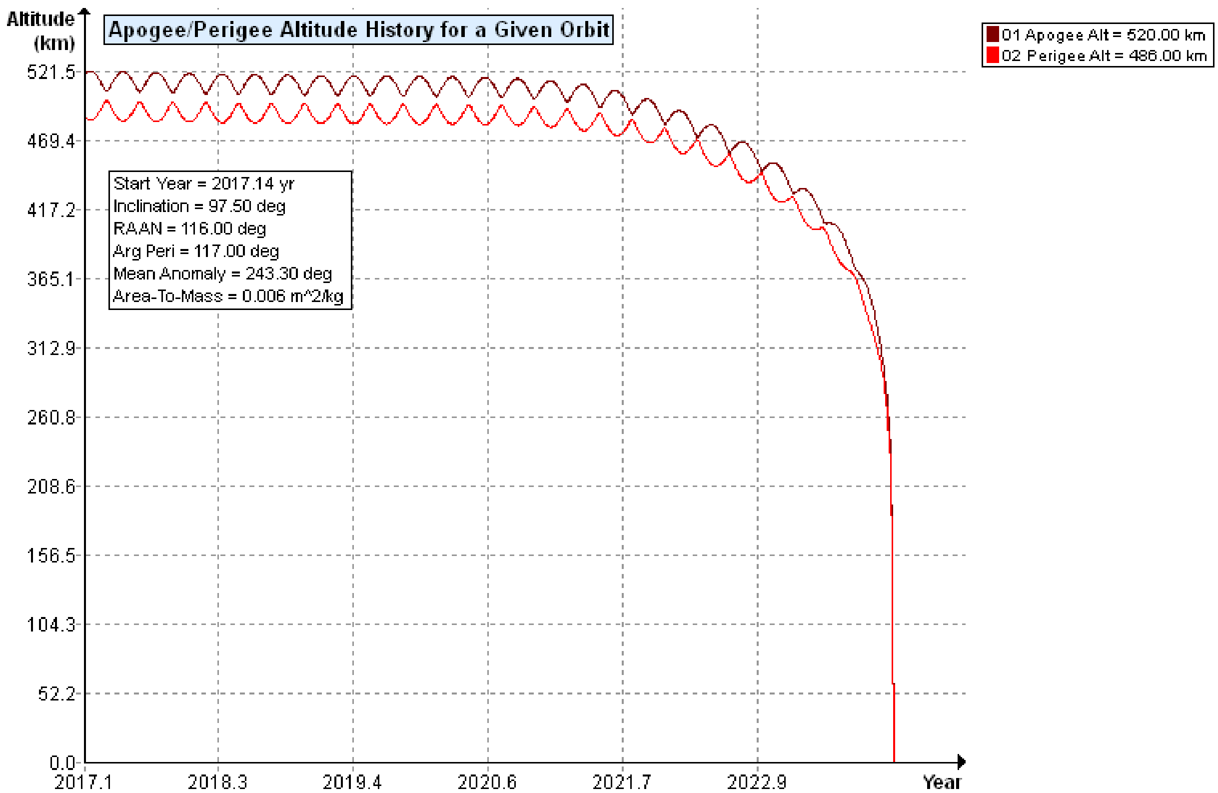
============== End of Requirement 4.5-1 ===============

3.2. Orbit Evolution – § 25.114(d)(14)(iii)



04 19 2017; 16:23:49PM Science and Engineering - Apogee/Perigee History for a Given Orbit

INPUT

Perigee Altitude = 486.000000 (km)
Apogee Altitude = 520.000000 (km)
Inclination = 97.500000 (deg)
RAAN = 116.000000 (deg)
Argument of Perigee = 117.000000 (deg)
Mean Anomaly = 243.300000 (deg)
Area-To-Mass Ratio = 0.006000 (m^2/kg)
Start Year = 2017.142000 (yr)
Integration Time = 50.000000 (yr)

OUTPUT

Plot

04 19 2017; 16:24:13PM Science and Engineering - Orbit Lifetime/Dwell Time

INPUT

Start Year = 2017.142000 (yr)
Perigee Altitude = 486.000000 (km)
Apogee Altitude = 520.000000 (km)
Inclination = 97.500000 (deg)
RAAN = 116.000000 (deg)
Argument of Perigee = 117.000000 (deg)
Area-To-Mass Ratio = 0.006000 (m^2/kg)

OUTPUT

Orbital Lifetime from Startyr = 6.899384 (yr)
Time Spent in LEO during Lifetime = 6.899384 (yr)
Last year of Propagation = 2024 (yr)
Returned Error Message: Object reentered

3.3. Post-Mission Disposal – Atmospheric Reentry – § 25.114(d)(14)(iv)

04 19 2017; 16:24:20PM Processing Requirement 4.6 Return Status : Passed

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Project Data
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INPUT

Space Structure Name = EV7
Space Structure Type = Payload

Perigee Altitude = 486.000000 (km)
Apogee Altitude = 520.000000 (km)
Inclination = 97.500000 (deg)
RAAN = 0.000000 (deg)
Argument of Perigee = 0.000000 (deg)
Mean Anomaly = 0.000000 (deg)
Area-To-Mass Ratio = 0.006000 (m^2/kg)
Start Year = 2017.142000 (yr)
Initial Mass = 85.000000 (kg)
Final Mass = 85.000000 (kg)
Duration = 5.000000 (yr)

Station Kept = False
Abandoned = True
PMD Perigee Altitude = 456.137079 (km)
PMD Apogee Altitude = 499.639981 (km)
PMD Inclination = 97.692652 (deg)
PMD RAAN = 42.701580 (deg)
PMD Argument of Perigee = 90.031435 (deg)
PMD Mean Anomaly = 0.000000 (deg)

OUTPUT

Suggested Perigee Altitude = 456.137079 (km)
Suggested Apogee Altitude = 499.639981 (km)
Returned Error Message = Passes LEO reentry orbit criteria.

Released Year = 2024 (yr)
Requirement = 61
Compliance Status = Pass

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

3.4. Casualty Risk Analysis – § 25.114(d)(14)(iv)

The DAS analysis indicates that EV7 is compliant with the FCC's guidelines. We simulated the Satellite's uncontrolled atmospheric reentry and the resulting risk of human casualty from reentry debris using DAS 2.0.2, testing compliance with Requirement 4.7-1 of NASA-STD 8719.14, where "potential for human casualty is assumed for any object with an impacting kinetic energy in excess of 15 joules." The DAS simulation indicates that eleven of the Satellite's components may survive reentry – the eleven titanium support plates – with impact energy of approximately 2 joules, which is below the 15 joule threshold. Below is a table listing all of the components used in the simulation and, following that, we have inserted the DAS log indicating compliance with Requirement 4.7-1:

Component Name	Quantity	Material Type	Mass (kg)	Object Shape	Diameter/ Width (m)	Length (m)	Height (m)
EV7	1	Aluminum (generic)	85	Box	0.600	0.850	0.600

Component Name	Quantity	Material Type	Mass (kg)	Object Shape	Diameter/ Width (m)	Length (m)	Height (m)
Structure + Solar Arrays - Zenith/-Y	2	Aluminum (generic)	4.00	Flat Plate	0.600	0.850	N/A
Structure + Solar Arrays - Anti-PAF	1	Aluminum (generic)	2.547	Flat Plate	0.600	0.600	N/A
Structure + Solar Arrays - +Y	1	Aluminum (generic)	3.26	Flat Plate	0.600	0.850	N/A
Structure + Solar Arrays - Nadir	1	Aluminum (generic)	1.129	Flat Plate	0.600	0.850	N/A
Structure + Solar Arrays - PAF	1	Aluminum (generic)	10.26	Box	0.440	0.530	0.054
Corner posts	2	Aluminum (generic)	2.085	Box	0.104	0.560	0.104
Payload connector plate	1	Aluminum (generic)	2.578	Flat Plate	0.496	0.570	0.020
Battery	1	Aluminum (generic)	4.486	Box	0.170	0.225	0.090
Rate sensor assy	1	Aluminum (generic)	1.08	Box	0.126	0.126	0.055
Reaction Wheel	2	Aluminum (generic)	1.338	Box	0.139	0.170	0.082
Torque Rod	3	Aluminum (generic)	1.096	Cylinder	0.056	0.236	N/A
AIS antenna	1	Aluminum (generic)	4.831	Box	0.354	0.354	0.065
Antenna support	6	Aluminum (generic)	0.127	Box	0.069	0.207	0.019
Receiver assy	2	Aluminum (generic)	2.238	Box	0.215	0.230	0.081
C-band transmitter	1	Aluminum (generic)	3.80	Box	0.181	0.232	0.109
LDR transponder	1	Aluminum (generic)	1.41	Box	0.244	0.257	0.048
Data recorder	2	Aluminum (generic)	3.657	Box	0.184	0.316	0.103
ADCS/CDSU	1	Aluminum (generic)	0.99	Box	0.138	0.400	0.028

Component Name	Quantity	Material Type	Mass (kg)	Object Shape	Diameter/ Width (m)	Length (m)	Height (m)
S-band transponder	2	Aluminum (generic)	0.815	Box	0.128	0.144	0.049
Power module/OBC	1	Aluminum (generic)	2.868	Box	0.220	0.220	0.118
Communications module	1	Aluminum (generic)	1.269	Box	0.192	0.215	0.087
Support plates	11	Titanium (generic)	0.019	Box	0.050	0.050	0.020
Launch separation ring	1	Aluminum (generic)	1.20	Box	0.440	0.440	0.088
Sun sensor	2	Aluminum (generic)	0.16	Box	0.715	0.850	0.113
Sun sensor CIM	1	Aluminum (generic)	0.263	Box	0.810	0.848	0.612
GPS	1	Aluminum (generic)	0.52	Box	0.1737	0.402	0.095
LNA Assembly	1	Aluminum (generic)	0.45	Box	0.0938	0.1057	0.0627
C band base plate	1	Aluminum (generic)	0.89	Box	0.154	0.1652	0.1487

04 19 2017; 16:24:50PM *********Processing Requirement 4.7-1
Return Status : Passed

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

name = EV7
quantity = 1
parent = 0
materialID = 5
type = Box
Aero Mass = 85.000000
Thermal Mass = 85.000000
Diameter/Width = 0.600000
Length = 0.850000
Height = 0.600000

name = Structure + Solar Arrays - Zenith/-Y
quantity = 2

parent = 1
materialID = 5
type = Flat Plate
Aero Mass = 4.000000
Thermal Mass = 4.000000
Diameter/Width = 0.600000
Length = 0.850000

name = Structure + Solar Arrays - Anti-PAF
quantity = 1
parent = 1
materialID = 5
type = Flat Plate
Aero Mass = 2.547000
Thermal Mass = 2.547000
Diameter/Width = 0.600000
Length = 0.600000

name = Structure + Solar Arrays - +Y
quantity = 1
parent = 1
materialID = 5
type = Flat Plate
Aero Mass = 3.260000
Thermal Mass = 3.260000
Diameter/Width = 0.600000
Length = 0.850000

name = Structure + Solar Arrays - Nadir
quantity = 1
parent = 1
materialID = 5
type = Flat Plate
Aero Mass = 1.129000
Thermal Mass = 1.129000
Diameter/Width = 0.600000
Length = 0.850000

name = Structure + Solar Arrays - PAF
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 10.260000

Thermal Mass = 10.260000
Diameter/Width = 0.440000
Length = 0.530000
Height = 0.054000

name = Corner posts
quantity = 2
parent = 1
materialID = 5
type = Box
Aero Mass = 2.085000
Thermal Mass = 2.085000
Diameter/Width = 0.104000
Length = 0.560000
Height = 0.104000

name = Payload connector plate
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 2.578000
Thermal Mass = 2.578000
Diameter/Width = 0.496000
Length = 0.570000
Height = 0.020000

name = Battery
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 4.486000
Thermal Mass = 4.486000
Diameter/Width = 0.170000
Length = 0.225000
Height = 0.090000

name = Rate sensor assy
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 1.080000

Thermal Mass = 1.080000
Diameter/Width = 0.126000
Length = 0.126000
Height = 0.055000

name = Reaction Wheel
quantity = 2
parent = 1
materialID = 5
type = Box
Aero Mass = 1.338000
Thermal Mass = 1.338000
Diameter/Width = 0.139000
Length = 0.170000
Height = 0.082000

name = Torque Rod
quantity = 3
parent = 1
materialID = 5
type = Cylinder
Aero Mass = 1.096000
Thermal Mass = 1.096000
Diameter/Width = 0.056000
Length = 0.236000

name = AIS antenna
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 4.831000
Thermal Mass = 4.831000
Diameter/Width = 0.354000
Length = 0.354000
Height = 0.065000

name = Antenna support
quantity = 6
parent = 1
materialID = 5
type = Box
Aero Mass = 0.127000
Thermal Mass = 0.127000

Diameter/Width = 0.069000
Length = 0.207000
Height = 0.019000

name = Receiver assy
quantity = 2
parent = 1
materialID = 5
type = Box
Aero Mass = 2.238000
Thermal Mass = 2.238000
Diameter/Width = 0.215000
Length = 0.230000
Height = 0.081000

name = C-band transmitter
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 3.800000
Thermal Mass = 3.800000
Diameter/Width = 0.181000
Length = 0.232000
Height = 0.109000

name = LDR transponder
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 1.410000
Thermal Mass = 1.410000
Diameter/Width = 0.244000
Length = 0.257000
Height = 0.048000

name = Data recorder
quantity = 2
parent = 1
materialID = 5
type = Box
Aero Mass = 3.657000
Thermal Mass = 3.657000

Diameter/Width = 0.184000
Length = 0.316000
Height = 0.103000

name = ADCS/CDSU
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.990000
Thermal Mass = 0.990000
Diameter/Width = 0.138000
Length = 0.400000
Height = 0.028000

name = S-band transponder
quantity = 2
parent = 1
materialID = 5
type = Box
Aero Mass = 0.815000
Thermal Mass = 0.815000
Diameter/Width = 0.128000
Length = 0.144000
Height = 0.049000

name = Power module/OBC
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 2.868000
Thermal Mass = 2.868000
Diameter/Width = 0.220000
Length = 0.220000
Height = 0.118000

name = Communications module
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 1.269000
Thermal Mass = 1.269000

Diameter/Width = 0.192000
Length = 0.215000
Height = 0.087000

name = Support plates
quantity = 11
parent = 1
materialID = 66
type = Box
Aero Mass = 0.019000
Thermal Mass = 0.019000
Diameter/Width = 0.050000
Length = 0.050000
Height = 0.020000

name = Launch separation ring
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 1.200000
Thermal Mass = 1.200000
Diameter/Width = 0.440000
Length = 0.440000
Height = 0.088000

name = Sun sensor
quantity = 2
parent = 1
materialID = 5
type = Box
Aero Mass = 0.160000
Thermal Mass = 0.160000
Diameter/Width = 0.715000
Length = 0.850000
Height = 0.113000

name = Sun sensor CIM
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.263000
Thermal Mass = 0.263000

Diameter/Width = 0.810000
Length = 0.848000
Height = 0.612000

name = GPS
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.520000
Thermal Mass = 0.520000
Diameter/Width = 0.173700
Length = 0.402000
Height = 0.095000

name = LNA Assembly
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.450000
Thermal Mass = 0.450000
Diameter/Width = 0.093800
Length = 0.105700
Height = 0.062700

name = C band base plate
quantity = 1
parent = 1
materialID = 5
type = Box
Aero Mass = 0.890000
Thermal Mass = 0.890000
Diameter/Width = 0.154000
Length = 0.165200
Height = 0.148700

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

name = EV7
Demise Altitude = 77.993785
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structure + Solar Arrays - Zenith/-Y
Demise Altitude = 71.358714
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structure + Solar Arrays - Anti-PAF
Demise Altitude = 72.080785
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structure + Solar Arrays - +Y
Demise Altitude = 72.707386
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structure + Solar Arrays - Nadir
Demise Altitude = 76.349761
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Structure + Solar Arrays - PAF
Demise Altitude = 54.374085
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Corner posts
Demise Altitude = 73.265496
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Payload connector plate
Demise Altitude = 72.429347
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****

name = Battery
Demise Altitude = 61.887128
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Rate sensor assy
Demise Altitude = 68.901136
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Reaction Wheel
Demise Altitude = 70.727425
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Torque Rod
Demise Altitude = 69.714527
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = AIS antenna
Demise Altitude = 64.088667
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Antenna support
Demise Altitude = 76.686715
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Receiver assy
Demise Altitude = 68.976542
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = C-band transmitter
Demise Altitude = 65.306417

Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = LDR transponder
Demise Altitude = 71.911878
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Data recorder
Demise Altitude = 68.137683
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = ADCS/CDSU
Demise Altitude = 73.971199
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = S-band transponder
Demise Altitude = 71.476019
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Power module/OBC
Demise Altitude = 67.770167
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Communications module
Demise Altitude = 72.525675
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Support plates
Demise Altitude = 0.000000
Debris Casualty Area = 4.531446
Impact Kinetic Energy = 1.806095

****
name = Launch separation ring
Demise Altitude = 75.442574
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Sun sensor
Demise Altitude = 77.829551
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = Sun sensor CIM
Demise Altitude = 77.849683
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = GPS
Demise Altitude = 76.696379
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = LNA Assembly
Demise Altitude = 73.407691
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

****
name = C band base plate
Demise Altitude = 74.200691
Debris Casualty Area = 0.000000
Impact Kinetic Energy = 0.000000

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