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February 9, 2022

VIA ELS

Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street, NE
Washington, DC 20554

Re: General Atomics
Response to FCC Questions, Ref No. 67098 (dated Jan. 26, 2022)
ELS File No. 1064-EX-CN-2020

Dear Ms. Dortch:

General Atomics supplements its pending application and provides the attached response to the email inquiries from the Federal Communications Commission.[1]

Please feel free to contact the undersigned if you have any questions.

Very truly yours,

/s/Tony Lin

Tony Lin
Counsel to General Atomics

Attachment

[1] *See* Email from Doug Young, FCC, to Victor Gomez, General Atomics (Jan. 26, 2022).

General Atomics Responses to FCC Inquiries Regarding OTB-3 Mission

February 9, 2022

Provided below are responses to the FCC's email inquiries in the 1064-EX-CN-2020 application proceeding.[1] The FCC questions are reproduced below in bold.

1. **Your January 12, 2022 response to a previous request for info includes a revised Table 7, shown in answer number 3. That table appears to indicate that the revisions involve modeling the Argos TXU and RPU for purposes of assessing re-entry risk using an assumption that interior components of those units are separate and external, i.e., they are modelled in DAS such that the heating process begins simultaneously with heating of the box in which they are housed. Please address any justification for this approach, and for purposes of comparison please provide an analysis using a more typical assumption concerning "parent/child" relationships between the housing and the housed object, i.e., modeled such that the interior components are not assumed to heat at the same rate as the object in which they are housed.**

General Atomics modeled the TXU and RPU for purposes of assessing re-entry risk using the model embedded in the NASA DAS software. General Atomics did not relax any of those modeling assumptions in providing the higher fidelity analysis in the January 12, 2022 submission, as suggested by the FCC question. Accordingly, there is no associated "justification" to provide for relaxing any modeling assumptions. The language in the General Atomics application and restated in the January 12, 2022 letter was intended simply to highlight that the NASA DAS software itself is conservative, not that General Atomics modified the NASA DAS modeling assumptions.

To be clear, the RPU and TXU interior components (*i.e*. the subcomponents) were modeled as children of the Argos RPU or Argos TXU, respectively. Although not previously included in the table provided to the FCC, the re-entry analysis did, in fact, include consideration of the parent/child relationships. An updated Table 7, which includes the "parent" column and new information recently received from the French Centre National d'Etudes Spatiales ("CNES"), is provided below in the response to question 2.

2. **In addition, each of the subcomponents of the TXU and RPU are modeled with identical dimensions, materials and mass. Please address whether this is the result of assumptions utilized for purposes of modelling, and, if so, please provide additional explanation concerning the rationale for utilizing those assumptions and their suitability for addressing casualty risk.**

The documentation provided by CNES did not provide specific dimensions, mass, or material make up of all the components furnished by the customer. Accordingly, General Atomics made logical assumptions based on the information available. For example, the documentation indicates that each of the subcomponents for the TXU and RPU, respectively, are circuit boards and have roughly the same dimensions. As a result, General Atomics assumes that each subcomponent is made of fiberglass and has the same dimensions and mass.

CNES recently provided additional information regarding the specific mass of the TXU and RPU, and General Atomics has updated Table 7 accordingly.[2] The information that has changed (relative to the January 12, 2022 response) is highlighted in the table below.

[1] *See* Email from Doug Young, FCC, to Victor Gomez, General Atomics (Jan. 26, 2022).
[2] To be clear, General Atomics does not have specific information on the dimensions, mass and material makeup of the specific subcomponents for the RPU and TXU and accordingly has made the assumptions stated earlier.

With the new data from CNES, the NASA DAS software predicts that six subcomponents of the Argos RPU survive re-entry and three subcomponents of the Argos TXU survive re-entry. As noted earlier, the RPU and TXU, and all of the respective subcomponents, are customer-provided components. The components are mission requirements by NOAA and cannot be altered by General Atomics.

The revised re-entry probability for human casualty is 1:13,500, as shown in the screen shot below. This probability is less than 1:10,000 and, accordingly, is compliant with NASA and FCC requirements.

Updated Table 7
(February 9, 2022):

No.	Name	Qty	Parent	Material	Body Type	Mass [kg]	Diameter or Width [m]	Length [m]	Height [m]	Demise Alt[km]	DCA [m^2]	KE [J]
1	**OTB-3**	1	0	Aluminum (generic)	Box	120	0.574	0.859	0.574		5.63	
2	**MLB**	1	1	Aluminum (generic)	Box	2.76	0.381	0.381	0.053	71.5	0	0
3	**Avionics Bay**	1	1	Aluminum (generic)	Box	2.078	0.515	0.555	0.3	76.7	0	0
4	Harness	1	3	Copper Alloy	Flat Plate	7.15	0.2	0.4		62.1	0	0
5	Magnetorquers	3	3	Aluminum (generic)	Box	0.5	0.2	0.2	0.2	75.4	0	0
6	10SP Reaction Wheel	3	3	Aluminum (generic)	Cylin der	1	0.104	0.102		69	0	0
7	Battery	1	3	Aluminum (generic)	Box	4.4	0.159	0.221	0.068	61	0	0
8	Avionics Bay Fasteners	1	3	Aluminum (generic)	Box	4	0.2	0.2	0.2	66.8	0	0
9	**Avionics Stack**	1	3	Aluminum (generic)	Box	2.4	0.515	0.547	0.288	75.1	0	0
10	PIU Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
11	PIU Board	2	9	Fiberglass	Flat Plate	0.7	0.286	0.314		73.4	0	0
12	AIM Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
13	AIM Board	2	9	Fiberglass	Flat Plate	0.7	0.286	0.314		73.4	0	0
14	ASM Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
15	ASM Board	2	9	Fiberglass	Flat Plate	0.7	0.286	0.314		73.4	0	0
16	S-Band Tx/Rx Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
17	S-Band Tx/Rx Board	2	9	Fiberglass	Flat Plate	0.7	0.286	0.314		73.4	0	0
18	OBC 750 Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
19	OBC 750 Board	2	9	Fiberglass	Flat Plate	0.7	0.286	0.314		73.4	0	0
20	PDM Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
21	PDM Board	1	9	Fiberglass	Flat Plate	1.2	0.286	0.314		72.2	0	0

No.	Name	Qty	Parent	Material	Body Type	Mass [kg]	Diameter or Width [m]	Length [m]	Height [m]	Demise Alt[km]	DCA [m^2]	KE [J]
22	BCM Tray	1	9	Aluminum (generic)	Box	0.6	0.294	0.322	0.033	73	0	0
23	BCM Board	1	9	Fiberglass	Flat Plate	1.7	0.286	0.314		71	0	0
24	Tie Rods	8	9	Titanium (6 Al-4 V)	Cylin der	0.066	0.008	0.3		71.4	0	0
25	**Lower Payload Bay**	1	1	Aluminum (generic)	Box	8.489	0.547	0.547	0.4	73	0	0
26	Argos RPU	1	25	Aluminum (generic)	Box	6.96	0.304	0.305	0.2	60.4	0	0
27	DC Converter	1	26	Fiberglass	Box	1.235	0.2	0.304	0.051	0	0.63	428.07
28	SEG	1	26	Fiberglass	Box	1.235	0.2	0.304	0.051	0	0.63	428.07
29	SET1	1	26	Fiberglass	Box	1.235	0.2	0.304	0.051	0	0.63	428.07
30	SET2	1	26	Fiberglass	Box	1.235	0.2	0.304	0.051	0	0.63	428.07
31	SER RX	1	26	Fiberglass	Box	1.235	0.2	0.304	0.051	0	0.63	428.07
32	SER RF Comm	1	26	Fiberglass	Box	1.235	0.2	0.304	0.051	0	0.63	428.07
33	HDRM	2	25	Aluminum (generic)	Cylin der	0.66	0.12	0.093		67.7	0	0
34	Magnetometers	2	25	Aluminum (generic)	Box	0.215	0.061	0.099	0.05	70.4	0	0
35	Lower Payload Bay Fasteners	1	25	Aluminum (generic)	Box	2	0.1	0.1	0.1	57.3	0	0
36	**Upper Payload Bay**	1	1	Aluminum (generic)	Box	8.153	0.547	0.58	0.2	71.9	0	0
37	L-Band Transmitter	2	36	Aluminum (generic)	Cylin der	1.9	0.06	0.25		60.7	0	0
38	Filter	1	36	Aluminum (generic)	Box	0.4	0.068	0.1	0.063	67.6	0	0
39	Switch	1	36	Aluminum (generic)	Box	0.1	0.068	0.1	0.063	70.9	0	0
40	Diplexer	1	36	Aluminum (generic)	Box	0.985	0.127	0.1524	0.0508	63.8	0	0
41	Argos TXU	1	36	Aluminum (generic)	Box	6.55	0.284	0.31	0.121	52.3	0	0
42	Connector RF Switch	1	41	Fiberglass	Box	0.746667	0.121	0.31	0.095	0	0.61	219.23
43	TX1	1	41	Fiberglass	Box	0.746667	0.121	0.31	0.095	0	0.61	219.23
44	TX2	1	41	Fiberglass	Box	0.746667	0.121	0.31	0.095	0	0.61	219.23
45	Upper Payload Bay Fasteners	1	36	Aluminum (generic)	Box	2	0.1	0.1	0.1	55.6	0	0
46	**Argos UHF Antenna**	1	1	Aluminum (generic)	Cylin der	2.8	0.136	0.681		73.7	0	0
47	**S-Band Patch Antennas**	6	1	Aluminum (generic)	Box	0.08	0.082	0.082	0.067	77.1	0	0
48	**Monopole Antenna**	4	1	Aluminum (generic)	Cylin der	0.06	0.06	0.15		77.4	0	0
49	**Argos L-Band Antenna**	1	1	Aluminum (generic)	Cylin der	0.29	0.057	0.263		76.1	0	0
50	**Radiator**	2	1	Aluminum	Flat Plate	1.9	0.58	0.7		75.2	0	0

No.	Name	Qty	Parent	Material	Body Type	Mass [kg]	Diameter or Width [m]	Length [m]	Height [m]	Demise Alt[km]	DCA [m^2]	KE [J]
	Panels			(generic)								
51	**Deployed Solar Panel**	2	1	Aluminum (generic)	Flat Plate	2.9	0.58	0.934		74.6	0	0
52	**Body Solar Panel**	2	1	Aluminum (generic)	Flat Plate	2.02	0.55	0.55		74.1	0	0
53	**Deorbit Sail**	1	1	Polyamide	Flat Plate	2.8	0.45	2.8		77.7	0	0
54	**Sun Sensors**	2	1	Aluminum (generic)	Box	0.35	0.15	0.15	0.15	76.6	0	0
55	**Sun Sensor Bracket**	1	1	Aluminum (generic)	Box	0.28	0.15	0.15	0.15	76.9	0	0
56	**External Fasteners**	1	1	Aluminum (generic)	Box	6	0.2	0.2	0.2	64.1	0	0