

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Satélites Mexicanos, S.A. de C.V.)	File No. SAT-PPL-20121218-00217
Petition for Declaratory Ruling)	Call Sign S2889
To Add Satmex 5 to the)	
Permitted Space Station List)	

AMENDMENT AND REQUEST FOR WAIVER

Satélites Mexicanos, S.A. de C.V. (“Satmex”), a Mexican corporation, respectfully files this Amendment and Request for Waiver in connection its pending Petition for Declaratory Ruling to add the Satmex 5 satellite to the Permitted Space Station List at 114.9° W.L. (“Petition”).¹ Satmex herein amends its Petition to supplement the technical information provided in the Orbital Debris Mitigation Plan included within the Technical Appendix.² Satmex also seeks a waiver of Section 25.283(c) of the Commission’s rules, 47 C.F.R. § 25.283(c), regarding the removal of all stored energy at the satellite’s end of life.

I. BACKGROUND

On December 18, 2012, Satmex filed a Petition for Declaratory Ruling to add Satmex 5 to the Commission’s Permitted Space Station List (“Permitted List”) at a new orbital location of 114.9° W.L. The Petition was filed in connection with the upcoming launch of a new satellite, Satmex 8, which the Commission has added to the Permitted List to replace the aging Satmex 5

¹ Satélites Mexicanos, S.A. de C.V. Petition for Declaratory Ruling To Add Satmex 5 to the Permitted Space Station List, IBFS File No. SAT-PPL-20121218-00217, Call Sign S2889 (filed Dec. 18, 2012) (“*Petition*”).

² *Id.*, Attachment A at 5-8.

satellite at its current location of 116.8° W.L.³ Satmex 8 is scheduled for launch at the end of March 2013 and, upon its arrival at 116.8° W.L., Satmex 5 will be shifted to a new orbital location of 114.9° W.L.

II. ADDITIONAL ORBITAL DEBRIS MITIGATION INFORMATION

A. Satmex 5 Contains Residual Helium that Cannot Be Removed

In its initial Petition for Declaratory Ruling to add Satmex 5 to the Permitted List, Satmex provided information on end of life procedures, including venting of stored energy, in the application's technical appendix.⁴ In the context of minimizing accidental explosions, Satmex acknowledged that pyrotechnics are used during the launch phase and that the use of valves to prevent backwards flow in propellant and pressurization lines.⁵ Satmex also referred to removing "all stored energy onboard the spacecraft."⁶ However, Satmex did not focus on the residual helium pressurant remaining upstream of the valve when the pyrotechnic was fired at the conclusion of the launch phase. Among other things, the instant filing is directed at addressing the residual helium that cannot be removed due to the sealed pyrotechnic valve.

Satmex 5 is based on the Boeing model 601HP satellite bus, introduced in 1995.⁷ This design, like many of its era, is mechanically unable to comply fully with the requirements in Section 25.283(c) to vent excess pressurant and relieve all pressure vessels at the end of a

³ Satélites Mexicanos, S.A. de C.V., IBFS File No. SAT-PPL-20120823-00140, Call Sign S2871, grant-stamped Dec. 6, 2012.

⁴ *Petition, Attachment A* at 6.

⁵ *Id.*

⁶ *Id.*

⁷ Boeing 601 Fleet: High Power Spacecraft for the 21st Century, The Boeing Company, <http://www.boeing.com/defense-space/space/bss/factsheets/601/601fleet.html>.

satellite's life.⁸ For these satellite models, such as Satmex 5, the helium pressurant for the vessels that are used during orbit-raising is permanently isolated from the propulsion system by firing a pyrotechnic valve such that the residual gas volume cannot be vented at end of life. The attached supplemental information provides specific values for the tank volume, initial and current mass, current pressure, and pressure rating of the two helium tanks which will retain residual pressure.⁹

Satmex respectfully requests a waiver of the Commission's rules with respect to this residual helium in Section III, *infra*.

B. Propellant Reserved for Deorbit

As indicated in the Technical Appendix attached to the Petition, at satellite end of life Satmex will maneuver Satmex 5 to a disposal orbit with a minimum perigee of 300 km above GSO.¹⁰ Satmex originally calculated that propellant to be reserved for raising Satmex 5 to its disposal orbit included 23.4 kg of xenon.¹¹ Since filing the Petition, Satmex has determined that the orbit raising maneuver will use less xenon than originally calculated. Satmex now estimates, taking into account all fuel measurement uncertainties, that 16 kg of xenon will be available, and has reserved this amount for use in end of life orbit-raising.

⁸ See Letter from Karis A. Hastings, Counsel for SES Americom, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket No. 02-54 (filed Oct. 29, 2009).

⁹ See Attachment 1.

¹⁰ See *Petition*, Technical Appendix at 8.

¹¹ *Id.*

C. Closely Spaced Satellites

In its initial Petition, Satmex indicated that the Solidaridad-2 satellite is located at the 114.9° W.L. to which Satmex 5 would be moved.¹² To ensure no possibility of collision between the two satellites, Satmex indicated that Solidaridad-2 would be de-orbited before Satmex 5 was moved to the 114.9° W.L. orbital location.¹³

Because Satmex is subject to the ultimate authority of the government of Mexico with respect to its satellite operations, Satmex is currently coordinating with the government of Mexico regarding the specific timing and disposition of the Solidaridad-2 satellite. Satmex will apprise the Commission once more definitive information becomes available with respect to this issue. However, Satmex would note that Solidaridad-2 no longer provides service to the United States and will not do so in the future. Thus, Satmex will coordinate with the Commission to ensure appropriate disposition of the Permitted Space Station List entry for this satellite.

In addition, subsequent to filing the Petition, the Mexsat-3 satellite was launched and is now operating at the 114.8° W.L. orbit location. The stationkeeping boxes of Mexsat-3 and Satmex 5 overlap but Satmex will coordinate with the government of Mexico (operator of the Mexsat-3 satellite) to ensure appropriate separation between the satellites. Coordinated stationkeeping will ensure the satellites can be maneuvered in tandem through similar segments of their respective stationkeeping boxes (e.g., easternmost portion) and/or utilize north-south (inclination) differences to maintain appropriate spacecraft separation.

¹² *Petition* at 6-7, Technical Appendix at 7.

¹³ *Id.*

III. WAIVER OF SECTION 25.283(C)

Satmex seeks a waiver of Section 25.283(c)¹⁴ to the extent necessary to permit Satmex 5 to be added to the Permitted List at 114.9° W.L. Grant of the requested waiver would be consistent with Commission precedent and policy.

The Commission may waive a rule for good cause shown. Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule. Generally, the Commission may grant a waiver of its rules in a particular case if the relief requested would not undermine the policy objective of the rule in question and would otherwise serve the public interest.¹⁵

There is ample precedent in support of Satmex's waiver request. First, the Boeing 601-HP platform that Satmex 5 is based on is a satellite bus design that was developed and debuted in 1995. Launched in 1998, Satmex 5 is among a limited class of remaining in-operation satellites designed, constructed and launched before the Commission adopted its rules in 2004 pertaining to orbital debris and venting requirements.¹⁶ Grant of a waiver of Section 25.283(c) would therefore not undermine the public policy objective of the rules.

Second, the Commission has in the past waived Section 25.283(c) for in-orbit spacecraft with similar end of life limitations.¹⁷ The Commission has even waived this rule in a number of

¹⁴ Section 25.283(c) contains the substantive venting requirement. Section 25.114(d)(14)(ii), 47 C.F.R. § 15.114(d)(14)(ii), requires applicants to submit information that addresses "whether stored energy will be removed at the spacecraft's end of life." Satmex is seeking only a waiver of Section 25.283(c) as it pertains to the Satmex 5 satellite.

¹⁵ PanAmSat Licensee Corp., 17 FCC Rcd. 10483, ¶ 22 (Int'l Bur. 2002) (footnotes omitted).

¹⁶ See *Mitigation of Orbital Debris*, Second Report and Order, 19 FCC Rcd 11567 (2004).

¹⁷ See, e.g., *Telesat Canada*, File Nos. SAT-APL-20111117-00222, SAT-PPL-20110630-00123, Call Sign S2703, grant-stamped April 11, 2012, Attachment at ¶ 3 (granting partial waiver of Section 25.283(c) for Anik F2, an in-orbit spacecraft unable to vent residual helium at end of life); *Hispanar Satellites, S.A.*, File Nos. SAT-PPL-20100506-00093, SAT-APL-20101209-00247, Call Sign S2793, grant-stamped Dec. 21, 2010, Attachment at ¶ 1 (granting waiver of

cases to permit the launch and operation of spacecraft that do not allow for full venting of pressure vessels at end of life, based on a finding that modifying the space station design at a late stage of construction would pose an undue hardship.¹⁸

Finally, because Satmex 5 already in orbit and operational, there is no possibility of bringing the satellite into compliance with the rule. The Commission has expressly recognized this, finding a waiver of Section 25.283(c) to be justified for in-orbit spacecraft that cannot satisfy the rule's requirements. For example, in a decision involving the SES AMC-2 satellite, the Commission waived Section 25.283(c) on its own motion, observing that venting the spacecraft's sealed oxidizer tanks "would require direct retrieval of the satellite, which is not currently possible."¹⁹ The same practical obstacle is present here. Satmex can do nothing to enable venting the minimal pressure remaining in the helium tank for this in-orbit satellite.

In view of the foregoing, the public interest would plainly be served by granting a waiver to permit Satmex 5, an in-orbit satellite launched years before the effective date of the

Section 25.283(c) in connection with residual helium that will be present on in-orbit Amazonas-2 satellite at end of life).

¹⁸ See, e.g., DIRECTV Enterprises, LLC, File No. SAT-LOA-20090807-00086, grant-stamped Dec. 15, 2009, Attachment at ¶ 4 (granting a partial waiver of Section 25.283(c) for DIRECTV-14, a Boeing 702 model spacecraft, on grounds that requiring modification of the satellite would present an undue hardship EchoStar Satellite Operating Corp., File No. SAT-LOA-20071221-00183, grant-stamped Mar. 12, 2008, Attachment at ¶ 4 (same for AMC-14 satellite, a Lockheed Martin A2100 model spacecraft); PanAmSat Licensee Corp., File Nos. SAT-MOD-20070207-00027 and SAT-AMD-20070716-00102, grant-stamped Oct. 4, 2007) Attachment at ¶ 7 (same for Intelsat 11 satellite, an Orbital Sciences Star model spacecraft).

¹⁹ SES Americom, Inc., Call Sign S2134, File No. SAT-MOD-20101215-00261, grant-stamped Mar. 8, 2011, Attachment at ¶ 4. See also XM Radio Inc., Call Sign S2616, File No. SAT-MOD-20100722-00165, grant-stamped Oct. 14, 2010, Attachment at ¶ 2 (waiving Section 25.283(c) for XM-4 satellite, a Boeing 702 model spacecraft, because "modification of the spacecraft would present an undue hardship, since XM-4 is an in-orbit space station and venting XM-4's helium and xenon tanks would require direct retrieval of the satellite, which is not currently possible").

Commission's orbital debris rules, to continue to serve the U.S. market from its proposed new orbit location.

IV. CONCLUSION

Satmex submits this supplemental information to provide the Commission with a more complete overview of the orbital debris mitigation/end-of-life plans for the Satmex 5 satellite. Satmex respectfully requests a waiver of Section 25.283(c) of the Commission's rules to the extent necessary for Satmex 5 to continue to serve the U.S. market consistent with the public interest. Satmex further urges the Commission to consider and grant the Petition, as amended herein, at the earliest practicable time.

**SUPPLEMENTAL ORBITAL DEBRIS MITIGATION/
SATELLITE END-OF-LIFE INFORMATION**

Satélites Mexicanos, S.A. de C.V. (“Satmex”) provides the following information to update and supplement Section 9.2 of the Technical Appendix which accompanied Satmex’s Petition for Declaratory Ruling to include the Satmex 5 satellite on the Commission’s Permitted Space Station List at a new orbital location.¹

Residual Helium. Section 9.2 of the Technical Appendix addresses the issue of “Minimizing Accidental Explosions” as required by Section 25.114(d)(14)(ii) of the rules. Satmex supplements the information provided in its initial filing with the following details regarding the quantity of residual helium pressurant remaining in two identical tanks onboard Satmex 5 at end of life:

Contents	Volume/ Tank	Initial Total Mass	Current Total Mass	Pressure rating	Remaining Pressure
Helium	55 liters	5.2 kg	0.4 kg	28950 kPa	1900 kPa

Propellant for De-Orbit. Satmex originally calculated that 23.4 kg of xenon propellant was available for raising Satmex 5 to its disposal orbit. Satmex has now determined that the xenon available is less than originally estimated. Satmex now estimates, taking into account all fuel measurement uncertainties, that 16 kg of xenon are available to raise the Satmex 5 satellite to its disposal orbit.

Closely Spaced Satellites. Satmex indicated in its Petition that Solidaridad-2 operating at 114.9° W.L. would be de-orbited prior to the arrival of Satmex 5 at that location. Satmex is coordinating with the government of Mexico regarding specific timing and disposition of the Solidaridad-2 satellite, and will apprise the Commission once more definitive information becomes available.

Subsequent to filing the Petition, the Mexsat-3 satellite was launched and is now operating at the 114.8° W.L. orbit location. The stationkeeping boxes of Mexsat-3 and Satmex 5 overlap but Satmex will coordinate with the government of Mexico (operator of the Mexsat-3 satellite) to ensure appropriate separation between the satellites. Coordinated stationkeeping will ensure the satellites can be maneuvered in tandem through similar segments of their respective stationkeeping boxes (e.g., easternmost portion) and/or utilize north-south (inclination) differences to maintain appropriate spacecraft separation.

¹ Satélites Mexicanos, S.A. de C.V. Petition for Declaratory Ruling To Add Satmex 5 to the Permitted Space Station List, IBFS File No. SAT-PPL-20121218-00217, Call Sign S2889 (filed Dec. 18, 2012).