Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
SES AMERICOM, INC.	)	File No. SAT-MOD-_____
	)	Call Sign S2434
Application for Modification of AMC-9	)	
Fixed-Satellite Space Station License	)	

REQUEST OF SES AMERICOM, INC.

SES Americom, Inc. ("SES Americom"), hereby respectfully requests modification of its license for the AMC-9 fixed-satellite space station at 83° W.L. to reflect a slightly altered C-band coverage pattern than what was originally authorized for the satellite at this orbital location. Grant of the requested authority will enable SES Americom to provide enhanced service to the Southern United States, Mexico and Central America in response to customer demand.

A completed FCC Form 312 is attached, and SES Americom incorporates by reference the technical information previously provided in support of AMC-9.[1] In addition, SES Americom is providing information relating to the proposed modification to the AMC-9 license in the attached Technical Appendix.

[1] *See* File Nos. SAT-LOA-20020114-00008; SAT-AMD-20030722-00133; SAT-AMD-20040319-00041; & SAT-AMD-20040421-00084.

MODIFICATION

AMC-9 is a C/Ku-band hybrid spacecraft launched in 2003 and operating at 83° W.L.[2] In response to the service requirements of a potential customer, SES Americom seeks modification of the AMC-9 license to reflect a repointing of the satellite's C-band reflector slightly southward. SES Americom has already implemented this change pursuant to a grant of Special Temporary Authority,[3] and now seeks modification of the AMC-9 license in order to retain the altered coverage configuration on a long-term basis.

As SES Americom described in the AMC-9 STA Request, the repointing involved a .4 degree change in the north/south orientation of the C-band reflector from what was previously authorized in order to strengthen the C-band signal levels over the southern United States, Mexico and Central America.[4] The AMC-9 C-band and Ku-band reflectors are on different gimbals, and SES Americom has reoriented only the C-band reflector. No change in the satellite's Ku-band footprint is planned.

Retaining the revised orientation of the AMC-9 C-band reflector will not adversely affect any other operators. Contour maps showing the AMC-9 C-band coverage area with the proposed reorientation are included in the attached Technical Appendix. As the Technical Appendix demonstrates, the small shift in AMC-9's C-band antenna coverage has a negligible effect on the interference environment in which adjacent satellites operate. The closest operational C-band satellite to the west of AMC-9 is the Brazilian-licensed Brasilsat B4

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2 *See* Call Sign S2434, File Nos. SAT-LOA-20020114-00008 & SAT-AMD-20030722-00133 (grant-stamped June 15, 2004); SAT-AMD-20040319-00041 & SAT-AMD-20040421-00084 (grant-stamped Sept. 3, 2004).

3 *See* Call Sign S2434, File No. SAT-STA-20110301-00043 ("AMC-9 STA Request"), grant-stamped Mar. 25, 2011.

4 *See id.*, Narrative at 1-2.

spacecraft at 84° W.L., which has coverage of Brazil and parts of South America, but not of Central America, Mexico, or the U.S.[5] To the east of AMC-9, the closest C-band satellite is Intelsat 3R, which has been authorized by the Commission to operate temporarily at 81° W.L. pursuant to the International Telecommunication Union ("ITU") filings of the Administration of Argentina.[6] The operations of AMC-9 with the slight change in pointing discussed herein continue to be consistent with SES Americom's coordination agreements, including its agreements with Brazil and Argentina.

The Commission has generally permitted satellite operators the flexibility to design and modify their networks in response to customer requirements, absent compelling countervailing public interest considerations.[7] Here, grant of the requested modification will allow SES Americom to operate AMC-9 with a C-band coverage pattern that has been adjusted to respond to customer demand.

WAIVER REQUEST

SES Americom seeks any necessary waiver of Sections 25.114(d)(14)(ii) and 25.283(c) of the Commission's rules in connection with the requested AMC-9 modification. Grant of the waiver is consistent with Commission 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

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5 *See* http://www.lyngsat-maps.com/maps/brasilb4_national.html; http://www.satbeams.com/footprints.

6 *See* Call Sign PAS-2R, File No. SAT-STA-20100402-00063 (grant-stamped Aug. 3, 2010).

7 *See, e.g. AMSC Subsidiary Corporation*, 13 FCC Rcd 12316 at ¶ 8 (IB 1998) (the Commission generally leaves space station design decisions to the licensee "because the licensee is in a better position to determine how to tailor its system to meet the particular needs of its customers.") (footnote omitted).

> 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.[8]

Sections 25.114(d)(14)(ii) and 25.283(c) address requirements relating to venting stored energy sources at the spacecraft's end of life.[9] AMC-9 is a Thales Alenia (formerly Alcatel) Spacebus 3000B3 model spacecraft and was constructed and launched before the venting requirement in Section 25.283(c) came into effect. As described in more detail in the attached Technical Appendix, the Spacebus 3000B3 has three helium tanks that were sealed following completion of the launch phase and will therefore retain residual pressure at end of life. Given the spacecraft design, it is physically impossible for SES Americom to vent these tanks in order to comply with Section 25.283(c).

Under Commission precedent, grant of a waiver is warranted. In a number of cases involving various spacecraft models with similar limitations, the Commission has waived Section 25.283(c) to permit 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.[10] In the case of AMC-9, which was

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[8] *PanAmSat Licensee Corp.*, 17 FCC Rcd 10483, 10492 (Sat. Div. 2002) (footnotes omitted).

[9] Section 25.283(c) contains the substantive venting requirement, and Section 25.114(d)(14)(ii) requires applicants to submit information that addresses "whether stored energy will be removed at the spacecraft's end of life." 47 C.F.R. § 25.114(d)(14)(ii).

[10] *See, e.g.*, *DIRECTV Enterprises LLC*, File No. SAT-LOA-20090807-00086, Call Sign S2797, grant-stamped Dec. 15, 2009, Attachment at ¶ 4 (granting a partial waiver of Section 25.283(c) for DIRECTV 12, a Boeing 702 model spacecraft, on grounds that requiring modification of satellite would present an undue hardship); *PanAmSat Licensee Corp.*, File Nos. SAT-MOD-20070207-00027, SAT-AMD-20070716-00102, Call Sign S2237, grant-stamped Oct. 4, 2007, Attachment at ¶ 7 (granting a partial waiver of Section 25.283(c) for Intelsat 11 on grounds of undue hardship).

launched and operational before the venting requirements came into effect, there is no question 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 Americom AMC-5 satellite, which like AMC-9 was launched before Section 25.283(c) took effect, the Commission waived the rule on its own motion, observing that venting the spacecraft's sealed helium tanks "would require direct retrieval of the spacecraft."[11]

The same practical obstacle is present here. Because AMC-9 is already in orbit, SES Americom can do nothing to enable full venting of residual pressure in the helium tanks. Given this reality, waiver is clearly warranted; there is no possible public interest benefit in requiring strict adherence to a rule with which the licensee is incapable of complying.

The inability to vent all residual helium will not compromise safe disposal of the spacecraft. The pressure remaining in the tanks will be well below their tolerances, and the residual helium is inert, posing no risk of chemical energy release. Under these circumstances, grant of any necessary waiver of Section 25.283(c) is warranted.

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[11] File No. SAT-MOD-20100706-00154, Call Sign S2156, grant-stamped Jan. 20, 2011, Attachment at ¶ 4. *See also XM Radio Inc.*, File No. SAT-MOD-20100722-00165, Call Sign S2616, grant-stamped Oct. 14, 2010, Attachment at ¶ 2 (waiving Section 25.283(c) for XM-4, 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").

CONCLUSION

For the foregoing reasons, SES Americom respectfully requests modification of the AMC-9 license to reflect repointing of the C-band reflector as described herein.

Respectfully submitted,

SES AMERICOM, INC.

By: */s/ Daniel C.H. Mah*

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TECHNICAL APPENDIX

1. Introduction

This technical appendix is submitted in support of the application of SES Americom, Inc. ("SES Americom") for a modification of its license for the AMC-9 spacecraft at 83° W.L. to reflect a slightly altered C-band coverage pattern than what was originally authorized for the satellite at this orbital location. SES Americom incorporates by reference herein the technical information it has already provided with respect to AMC-9,[1] and provides here technical information that is changing as a result of the proposed modification.

2. Gain Contours

SES Americom is attaching contour maps (Figures 1 to 4) showing the revised C-band EIRP and G/T patterns for typical horizontally and vertically polarized transponders of AMC-9 at 83° W.L.[2]

3. Link Budgets and Interference Analysis

An interference analysis was submitted to the Commission in connection with the initial operation of AMC-9 at 83° W.L. demonstrating that operation of AMC-9 was compatible with adjacent satellites and with the Commission's two-degree spacing requirements.[3] The analysis herein shows that the revised pointing of the AMC-9 C-band antenna has a negligible impact on the interference environment for adjacent satellites.

The C-band EIRP for AMC-9 over Mexico with the original pointing ranged from 36 to 40 dBW; with the revised pointing the range is 38 to 40.9 dBW. As a result, AMC-9's C-band EIRP over Mexico increased by a typical value of 1 dB, with an increase of 2 dB at the edge of Mexican coverage (from 36 to 38 dBW). To determine the effect of this 2 dB increase in the EIRP at the edge of coverage we have computed the C/I in a non-SES carrier from an orbital location that is two degrees away from 83° W.L., serving Mexico. The C/I computation is based on the following parameters:

a) EIRP of the wanted (i.e., non-SES) satellite: 37 dBW
b) EIRP of the interfering (SES) satellite: 36 dBW with original configuration of AMC-9, and 38 dBW with repointing
c) Receiver earth station diameter: 4.5 m
d) Wanted carrier threshold C/N: 8 dB
e) C/I in the victim carrier with interference from AMC-9 current configuration: 23.1 dB

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[1] *See* File Nos. SAT-LOA-20020114-00008; SAT-AMD-20030722-00133; SAT-AMD-20040319-00041; & SAT-AMD-20040421-00084.

[2] As discussed above, no change is proposed in the AMC-9 Ku-band coverage pattern.

[3] *See* Call Sign S2434, File No. SAT-AMD-20040421-00084, Technical Appendix, Attachment B.

f) C/I in the victim carrier with interference from AMC-9 after repointing: 21.1 dB
g) C/N in victim carrier with interference from AMC-9 with original configuration: 7.87 dB
h) C/N in victim carrier with interference from AMC-9 with re-pointing: 7.79 dB

The increase in the victim's system noise temperature due to AMC-9 with the original configuration is 0.13 dB, or 3%. With the revised pointing, the noise temperature increase is slightly degraded to 0.21 dB, or 5%. In both of these cases, the system noise temperature increase is less than the 6% Delta T/T ITU coordination trigger criteria; *i.e.*, internationally, if a 6% increase in noise temperature is not exceeded, then coordination is not needed between the concerned networks.

As discussed above in the narrative, the closest adjacent C-band satellites to 83° W.L. are the Brazilian-licensed Brasilsat B4 spacecraft at 84° W.L. and Intelsat 3R, which has been authorized by the Commission to operate temporarily at 81° W.L. pursuant to the ITU filings of the Administration of Argentina. Operation of AMC-9 with the repointing discussed herein is consistent with the terms of the existing coordination agreements applicable to operation of AMC-9 and the Brazilian and Argentinean networks.

4. Schedule S

As discussed above, the proposed modification of the AMC-9 license will not result in any material changes to the spacecraft's operating characteristics or to the interference environment. As a result, the information requested in Schedule S duplicates information that is already on file with the Commission concerning the technical parameters of AMC-9's operation. In similar cases involving requests for minor operational changes, such as slight offsets from the nominal orbital position, the Satellite Division has not required the submission of a new Schedule S.[4] Accordingly, SES Americom is not filing a new Schedule S with this application. SES Americom will nevertheless prepare and submit a Schedule S if requested to do so by the Satellite Division.

5. Orbital Debris Mitigation Statement

This section provides the information required under Section 25.114(d)(14) of the Commission's Rules.

§25.114(d)(14)(i): SES Americom has assessed and limited the amount of debris released in a planned manner during normal operations of AMC-9. No debris is generated during normal on-station operations, and the spacecraft will be in a stable configuration. On-station operations require stationkeeping within the +/- 0.05 degree N-S and E-W control box, thereby ensuring adequate collision avoidance distance from other satellites in geosynchronous orbit. In the event that co-location of this and another satellite is required, use of the proven Inclination-Eccentricity (I-E) separation

[4] *See, e.g.*, File No. SAT-MOD-20040405-00076 (PanAmSat request for authority to operate SBS-6 at 74.05° W.L. rather than 74.0° W.L.).

method can be employed. This strategy is presently in use by SES to ensure proper operation and safety of multiple satellites within one orbital box..

SES Americom has also assessed and limited the probability of the space station becoming a source of orbital debris by collisions with small debris or meteoroids that could cause loss of control and prevent post-mission disposal. The design of AMC-9 locates all sources of stored energy within the body of the structure, which provides protection from small orbital debris. SES Americom requires that spacecraft manufacturers assess the probability of micrometeorite damage that can cause any loss of functionality. This probability is then factored into the ultimate spacecraft probability of success. Any significant probability of damage would need to be mitigated in order for the spacecraft design to meet SES Americom's required probability of success of the mission. SES Americom has taken steps to limit the effects of any collisions through shielding, the placement of components, and the use of redundant systems.

§25.114(d)(14)(ii): SES Americom has assessed and limited the probability of accidental explosions during and after completion of mission operations. As part of the Safety Data Package submission for SES Americom spacecraft, an extensive analysis is completed by the spacecraft manufacturer, reviewing each potential hazard relating to accidental explosions. A matrix is generated indicating the worst-case effect, the hazard cause, and the hazard controls available to minimize the severity and the probability of occurrence. Each subsystem is analyzed for potential hazards, and the Safety Design Package is provided for each phase of the program running from design phase, qualification, manufacturing and operational phase of the spacecraft. Also, the spacecraft manufacturer generates a Failure Mode Effects and Criticality Analysis for the spacecraft to identify all potential mission failures. The risk of accidental explosion is included as part of this analysis. This analysis indicates failure modes, possible causes, methods of detection, and compensating features of the spacecraft design.

The design of the AMC-9 spacecraft is such that the risk of explosion is minimized both during and after mission operations. In designing and building the spacecraft, the manufacturer took steps to ensure that debris generation will not result from the conversion of energy sources on board the satellite into energy that fragments the satellite. All propulsion subsystem pressure vessels, which have high margins of safety at launch, have even higher margins in orbit, since use of propellants and pressurants during launch decreases the propulsion system pressure. Burst tests are performed on all pressure vessels during qualification testing to demonstrate a margin of safety against burst. Bipropellant mixing is prevented by the use of valves that prevent backwards flow in propellant and pressurization lines. All pressures, including those of the batteries, are monitored by telemetry.

At the end of operational life, after the satellite has reached its final disposal orbit, onboard sources of stored energy will be depleted or secured, and the batteries will be discharged. However, at the end of AMC-9's operational life, there will be helium remaining in the tanks that cannot be vented. Following insertion of the spacecraft into

orbit, the spacecraft manufacturer permanently sealed the helium tanks by firing pyrotechnic valves. Information regarding the residual helium in the tanks is as follows:

Tank	Volume [l]	pressure [bar]	temp. [deg C]	Helium mass [kg]
He1	51.6	64.4	12	0.54
He2	51.6	64.4	12	0.54
He3	51.7	64.4	12	0.55

The residual helium is inert, posing no risk of chemical energy release. Furthermore, the tanks are well shielded, and the residual pressure in the tanks will be well below their maximum rating. In the narrative portion of this application, SES Americom requests any necessary waiver of Sections 25.114(d)(14)(ii) and 25.283(c) in connection with the residual helium that will remain in these tanks at the end of the satellite's life.

§25.114(d)(14)(iii): SES Americom 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. Specifically, SES Americom has assessed the possibility of collision with satellites located at, or reasonably expected to be located at, the requested orbital location or assigned in the vicinity of that location.

Regarding avoidance of collisions with controlled objects, in general, if a geosynchronous satellite is controlled within its specified longitude and latitude stationkeeping limits, collision with another controlled object (excluding where the satellite is collocated with another object) is the direct result of that object entering the allocated space.

The instant application seeks authority for continued operation of AMC-9 at the 83° W.L. orbital location. SES Americom is not aware of any other FCC- or non-FCC licensed spacecraft that are operational or planned to be deployed at 83° W.L. or to nearby orbital locations such that there would be an overlap with the requested stationkeeping volume of AMC-9.

SES Americom uses the Space Data Center ("SDC") system from the Space Data Association to monitor the risk of close approach of its satellites with other objects. Any close encounters (separation of less than 10 km) are flagged and investigated in more detail. If required, avoidance maneuvers are performed to eliminate the possibility of collisions.

During any relocation, the moving spacecraft is maneuvered such that it is at least 30 km away from the synchronous radius at all times. In most cases, much larger deviation from the synchronous radius is used. In addition, the SDC system is used to ensure no close encounter occurs during the move. When de-orbit of a spacecraft is

required, the initial phase is treated as a satellite move, and the same precautions are used to ensure collision avoidance.

§25.114(d)(14)(iv): Post-mission disposal of the satellite from operational orbit will be accomplished by carrying out maneuvers to a higher orbit. The upper stage engine remains part of the satellite, and there is no re-entry phase for either component. The fuel budget for elevating the satellite to a disposal orbit is included in the satellite design. SES Americom plans to maneuver AMC-9 to a disposal orbit at end of life with a minimum perigee of 294.8 km above the normal operational altitude. The proposed disposal orbit altitude complies with the altitude resulting from application of the IADC formula based on the following calculation:

Area of the satellite (average aspect area): 68 m^2
Mass of the spacecraft: 1705.7 kg
CR (solar radiation pressure coefficient): 1.5

Therefore the minimum disposal orbit perigee altitude as calculated under the IADC formula is:
36,021 km + (1000 x CR x A/m) = 36080.8 km, or 294.8 km above the GSO arc (35,786 km).

SES Americom intends to reserve 42.7 kg of fuel in order to account for post-mission disposal of AMC-9. SES Americom has assessed fuel-gauging uncertainty and has provided an adequate margin of fuel reserve to address the assessed uncertainty.

CONTOUR MAPS FOR PROPOSED REORIENTATION OF C-BAND ANTENNA ON AMC-9 SPACECRAFT AT 83° W.L.

Figure 1: EIRP contour (dBW) for typical transponder with vertical downlink polarization

Figure 2: G/T contour (dB/K) for typical transponder with horizontal uplink polarization

Figure 3: EIRP contour (dBW) for typical transponder with horizontal downlink polarization

Figure 4: G/T contour (dB/K) for typical transponder with vertical uplink polarization

Figure 1

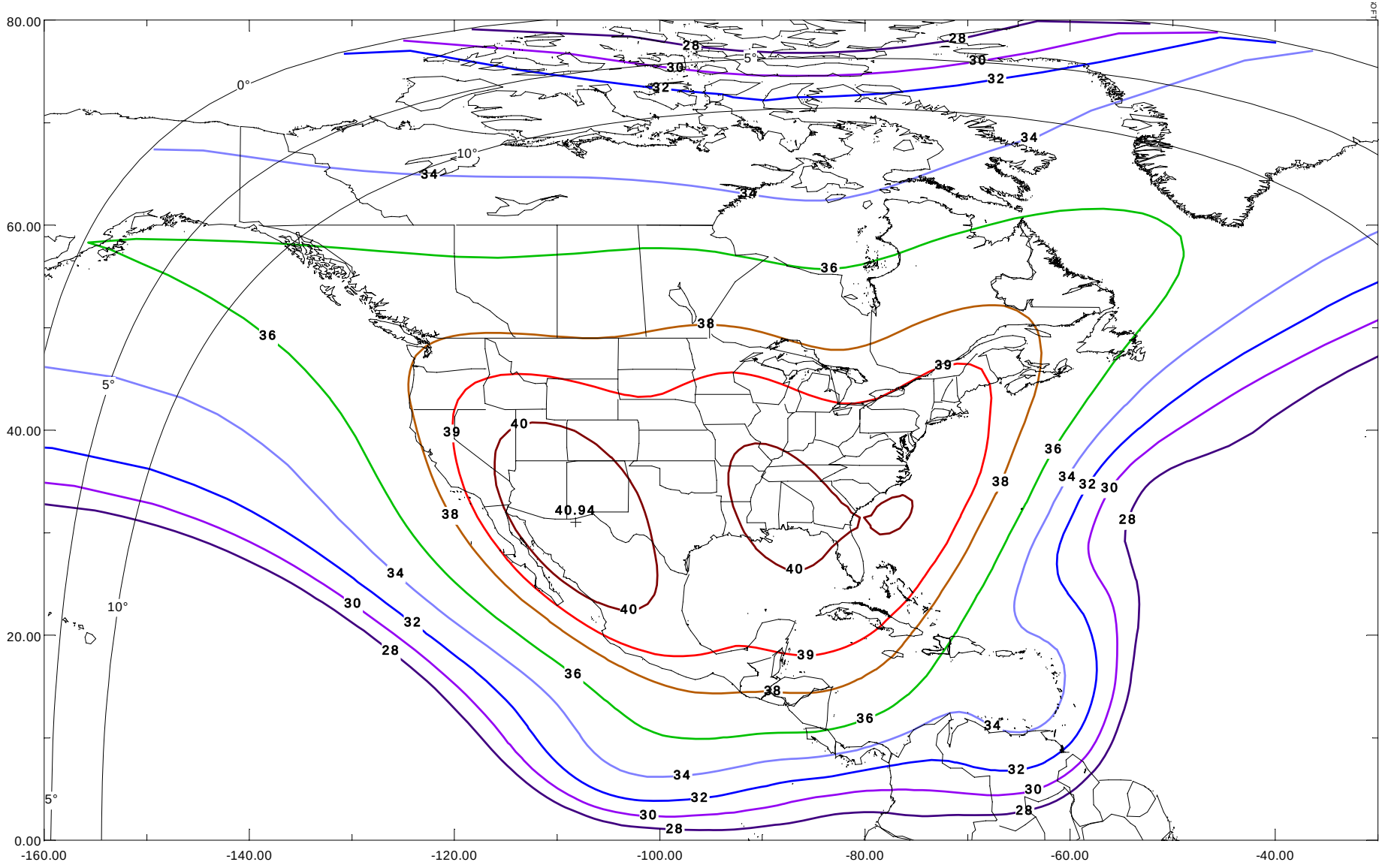
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Figure 2

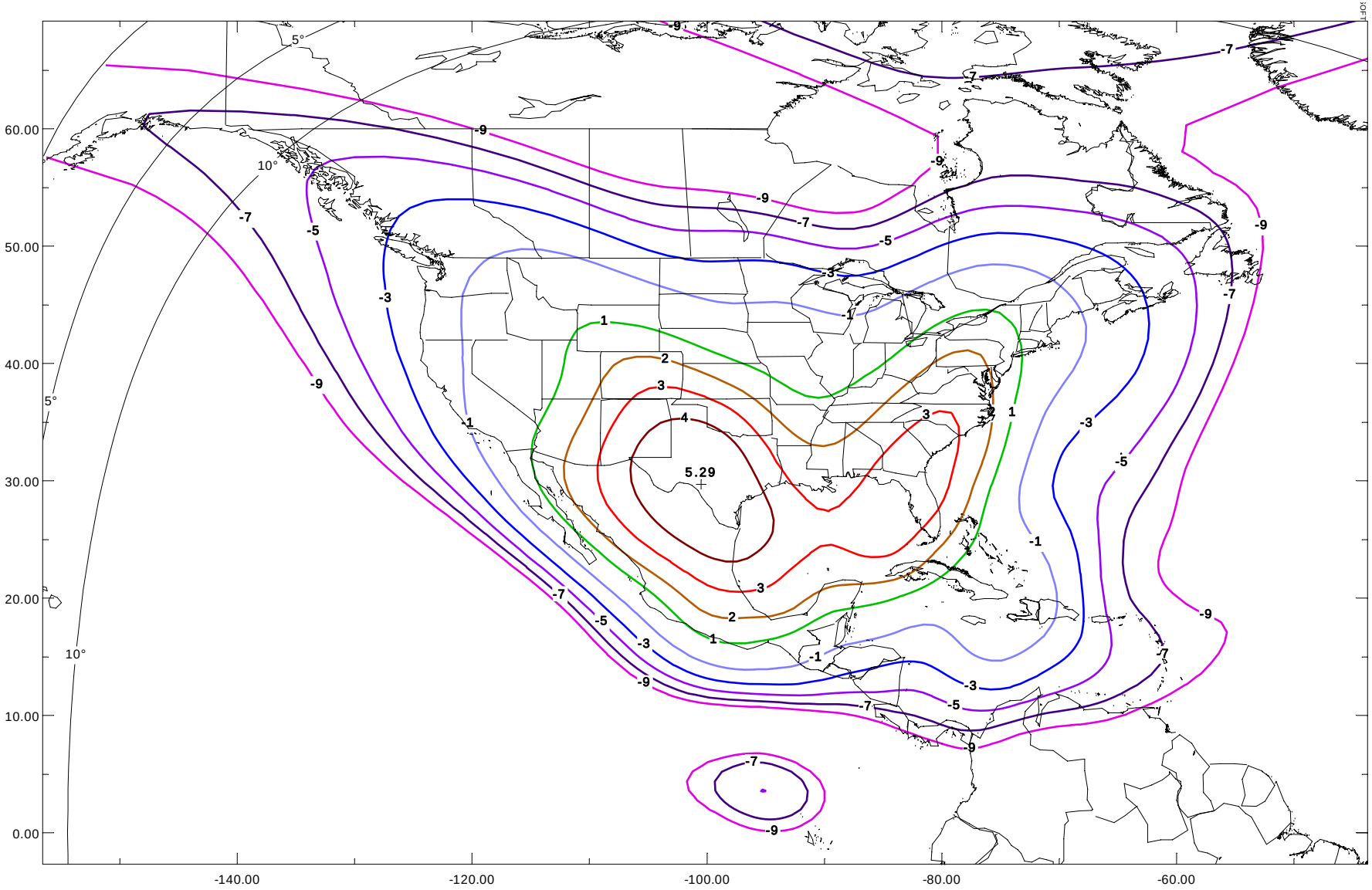
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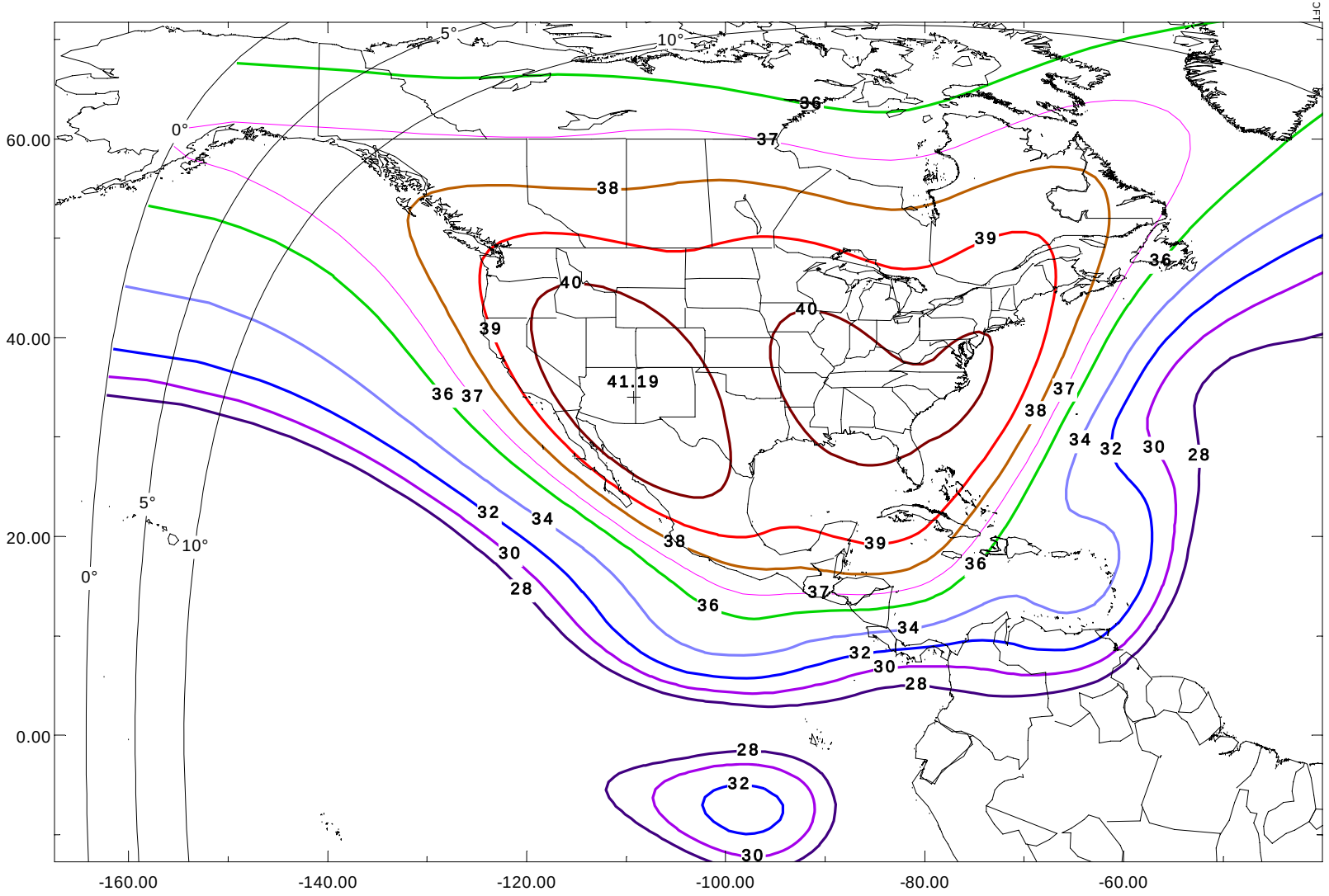
Figure 3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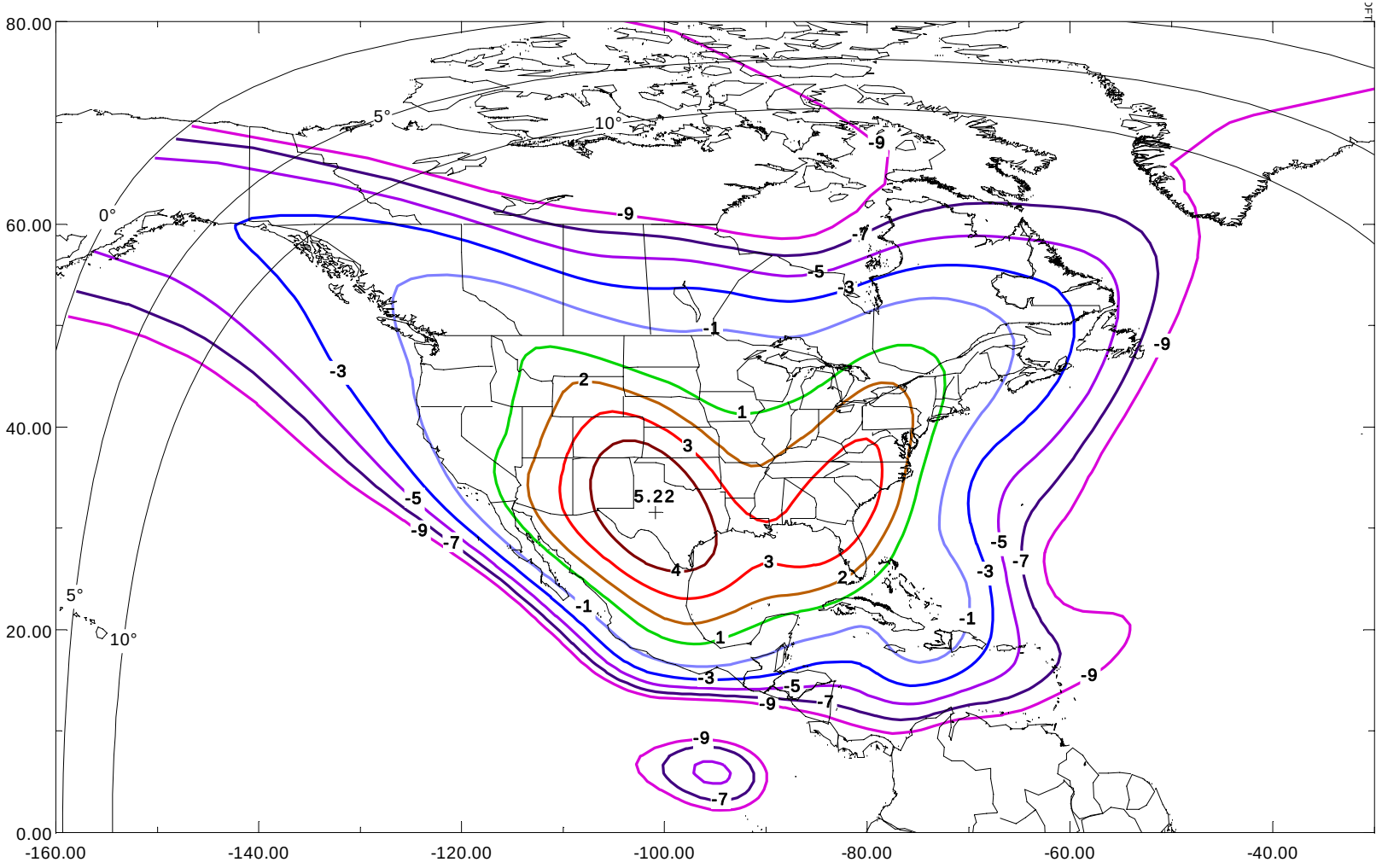
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DECLARATION OF KRISH JONNALAGADDA

I, Krish Jonnalagadda, hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the technical information contained in the foregoing exhibit; that I am familiar with the technical requirements of Part 25; and that I either prepared or reviewed the technical information contained in the exhibit and that it is complete and accurate to the best of my knowledge, information and belief.

/s/ Krish Jonnalagadda
SES Americom, Inc.

Dated: June 20, 2011