

## Application for Major Modification

**(SAT-MOD-20200417-00037)**  
**(CALL SIGNS: S2983/3018)**

**OPPOSITION TO SPACEX APPLICATION FOR MAJOR MODIFICATION; AND  
MOTION FOR CONSULTATION WITH AFFECTED AGENCIES; MOTION FOR  
DISCLOSURE; MOTION FOR CERTIFICATION OF SUITABLY COMPREHENSIVE  
INSURANCE COVERAGE; MOTION FOR CERTIFICATION OF INDEMNITY AND  
MOTION TO SUSPEND OR REVOKE LICENSES**

by the **BALANCE GROUP**

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## SUMMARY

In the instant proceeding Space Exploration Holdings, LLC (SpaceX) seeks to modify its Ku/Ka-band Non-Geostationary Orbiting (NGSO) license to relocate 100 percent of its NGSO satellites currently authorized to “operate at altitudes from 1,110 km to 1,325 km down to altitudes ranging from 540 km to 570 km, and to make related changes.”<sup>1</sup>

Under 47 CFR, especially but not limited to Parts 1 and 25, and the powers delegated to the International Bureau, it is now apparent that the SpaceX Major Modification application evidences a *prima facie* case requiring that the major modification not be granted, and calling into question the project’s core propositional integrity and planning. SpaceX and the International Bureau need to divulge critical and material information missing from the record. Proof that the SpaceX system carries adequate insurance against numerous reasonably foreseeable systemic and catastrophic failures needs to be provided. Proof that the citizens and the government of the United States are indemnified against any material systemic or catastrophic failures caused by the SpaceX system as proposed for modification is necessary. Over a dozen impacted federal agencies must be forthwith contacted and effectively consulted with in their impacted areas of expertise and jurisdiction. The SpaceX launches must be immediately suspended along with a suspension or revocation of Call Signs S2983 and S3109, until and if baseline, material licensure and operational requirements are certified as satisfied by the appropriate authorities of jurisdiction in a manner keeping with U.S. Law and Treaty Obligations.

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<sup>1</sup> See: APPLICATION FOR MODIFICATION OF AUTHORIZATION FOR THE SPACEX NGSO SATELLITE SYSTEM, SAT-MOD-20200417-000037, Call Signs S2983/3018, (SpaceX Major Modification Application) (dated April 17, 2020), Space Exploration Holdings, LLC.

The SpaceX network, as approved and as planned, is designed as the largest satellite system in the Earth's history, as measured by publicly available records. In fact, if the current authorizations are fully deployed, SpaceX's systems will consist of five times the number of satellites than all the world's currently operational networks (domestic and international) combined.<sup>2</sup> As such, the regulatory agencies overseeing the potential impacts of approving or assessing the deployment, hold a heightened duty of care and vigilance, pursuant to domestically and internationally recognized precautionary principles. The BALANCE GROUP<sup>3</sup> Opposition and motions listed herein are meant to be useful to the Federal Communications Commission, SpaceX, the public, and the public's additional representatives in assessing material issues of security, health, safety and welfare, related to approving, funding, insuring, constructing, and operating the proposed network, or similar networks.

Critical information is missing. The missing information includes and is not limited to matters of: national security; environmental impacts; proof that suitable insurance and indemnification exists against a number of material and readily-identifiable systemic and catastrophic harms; evidence that minimally acceptable confirmed coordination, written assessments, and permissions were secured with other federal agencies that have subject matter jurisdiction — not to mention a variety of other requirements on the face of the license.

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<sup>2</sup> In 2004, all the world's satellite systems combined totaled 800 satellites in operations, and by April 2020, there were approximately 2,200 satellites in orbit, according to the April 23, 2020, Statement of FCC Commissioner Rosenworcel, (*Mitigation of Orbital Debris in the New Space Age*, Report & Order and Further Notice of Proposed Rulemaking, IB Docket No. 18-313). The combined SpaceX satellite authorizations permit deployment of 11,927 satellites during the course of their license terms (4,409 satellites through Call Sign S2983/S3018 and 7,518 satellites through Call Sign S2992).

<sup>3</sup> The BALANCE GROUP is designed to provide counsel and technical systems and solutions to individuals, non-profits, corporations, and governments. Its mission is to ensure that satellite and terrestrial broadband and other radio-frequency transmission networks and technologies are proven, through peer-reviewed science, to not pose a material risk of systemic harm to human beings or the environment both prior to being approved for deployment and also during their operational and post-operational ("space debris") phases.

I. Background & Scope:

The Commission authorized SpaceX in 2018 to construct, deploy, and operate an NGSO constellation consisting of 4,425 satellites operating in 83 orbital planes at five different altitudes, using Ku- and Ka-band spectrum, under Call Signs S2983 and S3018.<sup>4</sup> The Commission granted SpaceX a modification of that authorization in April 2019 to relocate 1,584 satellites previously authorized to operate at an altitude of 1,150 km to an altitude of 550 km.<sup>5</sup> It also granted a slight reduction of total satellites to 4,409.

Now SpaceX seeks:

“...authorization to relocate the rest of its satellites to operate in altitudes with the same benefits as those used for its initial deployment. Specifically, SpaceX seeks to relocate 2,824 satellites that were previously authorized for operation at altitudes ranging from 1,100 km to 1,330 km to new altitudes ranging from 540 km to 570 km. Because of the increased atmospheric drag at this lower altitude, this relocation will significantly enhance space safety by ensuring that any orbital debris will quickly re-enter and demise in the atmosphere. And because of its closer proximity to consumers on Earth, this modification will allow SpaceX’s system to provide low-latency broadband to unserved and underserved Americans that is on par with service previously only available in urban areas.”<sup>6</sup>

SpaceX also seeks to reduce the number of satellites under Call Signs S2983/S3018 by one to 4,408.<sup>7</sup> The standard for determining whether such a modification would serve the public interest: “If the proposed modification does not present any significant interference problems and is otherwise consistent with Commission policies, it is generally granted.”<sup>8</sup>

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<sup>4</sup> See Space Exploration Holdings, LLC, 33 FCC Rcd. 3391, ¶ 11 (2018).

<sup>5</sup> Order & Authorization, Space Exploration Holdings, LLC, Request for Modification of the Authorization for SpaceX NGSO Satellite System (IBFS File No. SAT-MOD-20190830-00087) (Released: December 19, 2019) (“Smaller Modification”),

<sup>6</sup> SpaceX Major Modification Application.

<sup>7</sup> Ibid at p.9.

<sup>8</sup> See Space Exploration Holdings, LLC, 34 FCC Rcd. 2526 (IB 2019) (“SpaceX Modification”), ¶ 9 (quoting Teledesic LLC, 14 FCC Rcd. 2261, ¶ 5 (IB 1999)).

The SpaceX Major Modification was apparently inadvertently and prematurely granted almost immediately after it was filed.<sup>9</sup> Upon inquiry, a Correction was subsequently issued, removing the errored grant.<sup>10</sup>

As a general matter, there is a process for granting major modifications to a satellite network license. Certain modest or even somewhat material evolutions in already FCC approved network designs indeed have a place in the major modification application process. This occurs as advancements and new opportunities present themselves for optimization of a network. Moreover, “the emerging generation of spacecraft and systems reflect a more flexible and responsive design, manufacturing, and deployment structure that allows iteration and improvement, as expressed in periodic modifications.”<sup>11</sup> But the present situation is radically different. The largest satellite network in human history, whose size and scope exceeds the operations of all currently operational satellite systems on earth, cannot simply and massively alter one hundred percent of its satellite elevations in a sweeping manner, while skipping major and minor licensure and operational requirements, let alone national security and public health, safety and welfare matters, and notice and comment requirements alike.

The following documents are incorporated into this Opposition and its associated Modification requests as the issues herein are inextricably intertwined: (1) Application for Review submitted by Healthy Heavens Trust, Julie Levine, Lisa Aileen Cianci, Diane Craig, Miriam Lindbeck, Carey McCarthy, Susan Busen in File Number: SES-LIC-20190211-00151

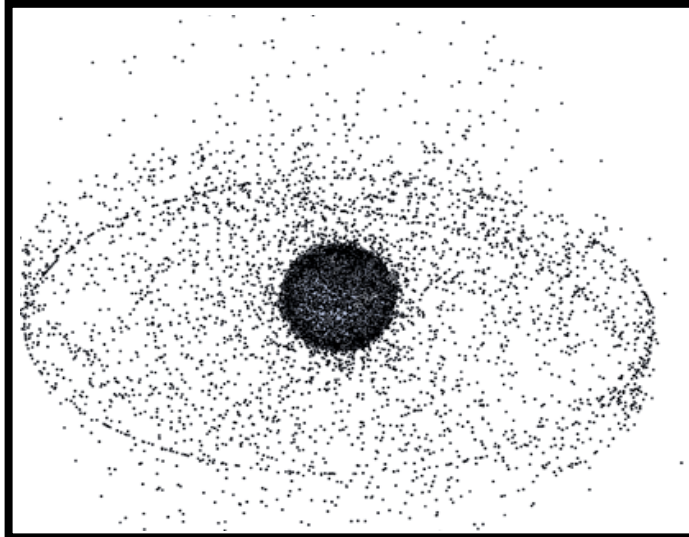
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<sup>9</sup> See, Public Notice, Federal Communications Commission, Satellite Policy Branch Information, Actions Taken, Report No. SAT-01462, Grant, April 24, 2020.

<sup>10</sup> See, Public Notice, Federal Communications Commission, Satellite Policy Branch Information, Actions Taken, Report No. SAT-01463, Corrections, May 1, 2020.

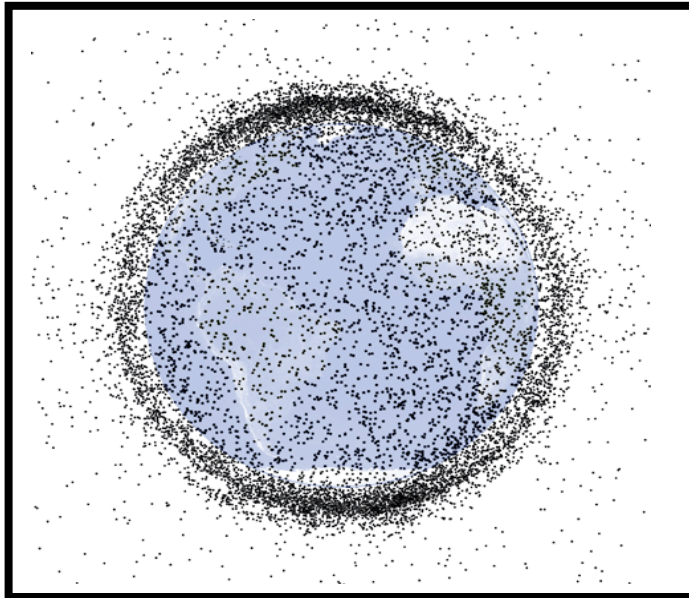
<sup>11</sup> See CONSOLIDATED OPPOSITION TO PETITIONS OF SPACE EXPLORATION HOLDINGS, LLC re: Application of SPACE EXPLORATION HOLDINGS, LLC, For Modification of Authorization (IBFS File Nos. SAT-MOD-20181108-00083; SAT-MOD-20190830-00087 Call Signs: S2983 and S3018) (October 30, 2019).

(filed April 15, 2020)<sup>12</sup>, and the related (2) Petitioners’ Reply to Opposition of Space Services, Inc. to Application for Review (filed May 15, 2020)<sup>13</sup>.



**Images 1 & 2:** Hundreds of thousands of manmade objects—99% of them “space junk”—occupy low Earth orbit. The dots represent functioning satellites, inactive satellites, or debris.

**SOURCE:** NASA, Astromaterials Research & Exploration Science ORBITAL DEBRIS PROGRAM OFFICE, (NASA illustration courtesy [Orbital Debris Program Office](#).)



<sup>12</sup> See [Application for Review](#) filed April 15, 2020, In the Matter of SpaceX Services Corporation, File Number: SES-LIC-20190211-00151, Blanket License Granted to SpaceX Services Corporation on March 13, 2020 by the International Bureau, Satellite Division hereby incorporated in full by reference.

<sup>13</sup> See [Petitioners’ Reply](#) filed May 15, 2020, to Opposition of SpaceX Services, Inc. To Application For Review, hereby incorporated in full by reference.

# Satellite Elevation Categories

SpaceX Major Modification Proposes Low Earth Orbits (LEO), 570km and below



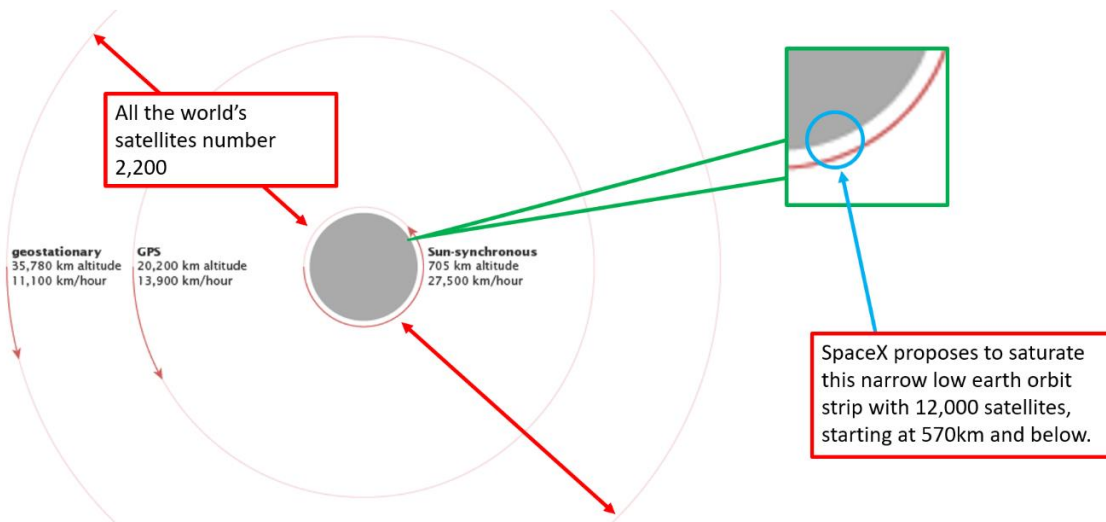
One way of classifying orbits is by altitude. Low Earth orbit (LEO) starts just above the top of the atmosphere, while high Earth orbit begins about one tenth of the way to the moon. (NASA illustration by Robert Simmon)

5/26/2020 Comments by TDSI to "Catalog of Earth Satellite Orbits." NASA, Riebeek, Holli. September 4, 2009. <https://earthobservatory.nasa.gov/features/OrbitsCatalog>

Image 3<sup>14</sup>

## Today: 2,200 operational satellites globally

Proposed Satellite Industry designs are pointing towards reaching 50,000 satellites



5/26/2020 Comments by TDSI to "Catalog of Earth Satellite Orbits." NASA, Riebeek, Holli. September 4, 2009. <https://earthobservatory.nasa.gov/features/OrbitsCatalog>

Image 4<sup>15</sup>

<sup>14</sup> Comments by TDSI to "Catalog of Earth Satellite Orbits." NASA, Riebeek, Holli. September 4, 2009. <https://earthobservatory.nasa.gov/features/OrbitsCatalog>

<sup>15</sup> Ibid.



Image 4 <sup>16</sup> SpaceX Current Authorization					
Orbital Plane	72	32	8	5	6
Satellite per Plane	22	50	50	75	75
Altitude	550 km	1,110 km	1,130 km	1,275 km	1,325 km
Inclination	53°	53.8°	74°	81°	70°

Table 1. Summary of Currently Authorized NGSO Constellations

SpaceX Proposed Modification					
Orbital Plane	72	72	36	6	4
Satellite per Plane	22	22	20	58	43
Altitude	550 km	540 km	570 km	560 km	560 km
Inclination	53°	53.2°	70°	97.6°	97.6°

Table 2. Summary of Proposed Modification<sup>17</sup>

## II. Missing Data, Unanswered Questions & Process Issues:

SpaceX states that once fully deployed its system “will provide full time coverage to virtually the entire planet.”<sup>18</sup>

### A. Systemic Harm Evaluation and Guarantee is Missing: The SpaceX Major

Modification Application fails to note whether any guarantee exists that the massively changed network it seeks to deploy will not cause systemic material harm to the public. It raises the question whether the original grant contains any such guarantee. If such an evaluation and guarantee exist in the Major Modification Application or in the original grant, it must be produced. The FCC’s statutory authority, as enumerated under the Communications Act of 1934, the Telecommunications Act of 1996, and as

<sup>16</sup> Comments by TDSI to “Catalog of Earth Satellite Orbits.” NASA, Riebeek, Holli. September 4, 2009.

<https://earthobservatory.nasa.gov/features/OrbitsCatalog>

<sup>17</sup> Source: SpaceX Major Modification Application

<sup>18</sup> See Space Exploration Holdings, LLC, 33 FCC Rcd. 3391, ¶ 33 (2018). MEMORANDUM OPINION, ORDER AND AUTHORIZATION, Space Exploration Holdings, LLC. Application For Approval for Orbital Deployment and Operating Authority for the SpaceX NGSO Satellite System and Application For Approval For Orbital Deployment And Operating Authority for the SpaceX NGSO Satellite System Supplement, IBFS File No. SAT-LOA-20161115-00118 (Call Sign S2983); SAT-LOA-20170726-00110; (Call Sign S3018) (Adopted: March 28, 2018 Released: March 29, 2018).

explained in such seminal cases as the Modified Final Judgement breaking up AT&T (among others)<sup>19</sup>, requires the diligent avoidance of systemic harm to the public.

Title 47 of the Code of Federal Regulations also embodies the FCC's diligence in matters of homeland security<sup>20</sup>, the national defense<sup>21</sup>, and other equally weighty issues, especially when such potential harms are foreseeable and have been clearly communicated to the FCC.

- B. National Security Impact on the World's Largest Ships and other Related Sufficient Federal Agency Night-Sky Pollution and Light-Exposure Studies Are Missing: The SpaceX record appears to omit stating whether *peer-reviewed* studies have been completed to assess the impact of light pollution.



Image 5<sup>22</sup>

For example, the largest ships on the planet (those over 500 GT) deploy an *Officer In Charge of Navigation Watch* (OICNW). That officer's training includes *Standards of*

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<sup>19</sup> Fn. 24, *infra*.

<sup>20</sup> See generally, 47 CFR Section 0.392.

<sup>21</sup> See generally, 47 CFR Sections 0.381, 0.383, and 0.387.

<sup>22</sup> Chesapeake Marine Training Institute. "Celestial Navigation (Master 500/1600 GT) / Oceans Navigation (OICNW)." Chesapeake Marine Training Institute. 2020. <https://www.chesapeakemarineinst.com/cmty-course/celestial-navigation/>

*Training, Certification and Watchkeeping* (STCW), which include specific celestial navigation training and competence. Such competence is especially critical when it is needed most, i.e., during the failure of other navigational systems. See the requirements of 46 CFR Section 11.309(a)(4)(viii).<sup>23</sup> What effect will deploying far more satellites than ever operated in the history of mankind, especially at such low elevations of around 540-570 km as proposed in the SpaceX Modification application, have on the night sky, and thus also to celestial navigation capabilities? Indeed, what will deploying the satellites, even around 1,110-1,325 km elevation, do to celestial navigation capabilities? Where is the information on the record that celestial navigation and the world's largest ships, let alone other vessels, will not be impacted? If such information exists, is it in the form of peer-reviewed studies; and also have relevant agencies of jurisdiction provided written consultation and approvals to the FCC?<sup>24</sup>

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<sup>23</sup> See: "§ 11.309 Requirements to qualify for an [STCW endorsement](#) as [Officer in charge of a navigational watch \(OICNW\)](#) of vessels of 500 GT or more (operational level)." See also, "The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (or STCW), sets qualification standards for personnel on seagoing ships. These requirements have been incorporated into U.S. [Regulation and Policy](#) for certain personnel. See U.S. Regulation, Policy, and STCW [FAQs](#) for more details about applicability, qualification, transition, and underlying national endorsement requirements." National Maritime Center, <https://www.dco.uscg.mil/nmc/stcw/>; See also: 46 CFR Sections 10.107 and 10.109. "STCW endorsement means an annotation on an MMC [Merchant Mariner Credential] that allows a mariner to serve in those capacities under 10.109 of this subpart. The STCW endorsement serves as evidence that a mariner has met the requirements of the STCW Convention."

<sup>24</sup> When faced with resolving difficult questions about highly scalable systems, the public interest is best served by best-in-class studies and resources. Cases as varied as the Modified Final Judgement (concerning the breakup of AT&T), NRDC v. FCC (regarding NEPA) and many others often are materially reliant on peer-reviewed science or the input of other expert agencies, or both. See generally, (1) AT&T Modified Final Judgement, 552 F. Supp. 131 (D. D.C. 1982); (2) UNITED KEETOOWAH BAND OF CHEROKEE INDIANS IN OKLAHOMA, INDIVIDUALLY AND ON BEHALF OF ALL OTHER NATIVE AMERICAN INDIAN TRIBES AND TRIBAL ORGANIZATIONS, ET AL., PETITIONERS v. FEDERAL COMMUNICATIONS COMMISSION AND UNITED STATES OF AMERICA. United States Court of Appeals FOR THE DISTRICT OF COLUMBIA CIRCUIT. December 9, 2019. [https://www.cadc.uscourts.gov/internet/opinions.nsf/4001BED4E8A6A29685258451005085C7/\\$file/18-1129-1801375.pdf](https://www.cadc.uscourts.gov/internet/opinions.nsf/4001BED4E8A6A29685258451005085C7/$file/18-1129-1801375.pdf); (3) AT&T ALASCOM and Ward North America, Inc., Appellants, v. John ORCHITT; and The State of Alaska, Department of Labor and Workforce Development, Division of Workers' Compensation, Appellees. No. S-12058. Supreme Court of Alaska. July 6, 2007. <https://law.justia.com/cases/alaska/supreme-court/2007/s-12058-1.html>; (4) In the Matter of the Claim of Antoinette Yannon, Respondent, v. New York Telephone Company, Appellant. Workers' Compensation Board, Respondent. Appellate Division of the Supreme Court of the State of New York, Third Department. May 6, 1982. <https://www.leagle.com/decision/198232786ad2d2411289>

There are many measures for assessing light pollution and its impact.<sup>25</sup> One such measure is the Kelvin Temperature Scale.<sup>26</sup> What is the Kelvin Temperature Scale change to the night-sky and the daytime sky caused by the SpaceX Major Modification Application if granted? What is the Kelvin Temperature Scale change to the night sky if the SpaceX network is built as currently authorized? Does this information exist on the record? If so, has it been peer-reviewed and have the necessary federal agencies of expertise provided their review and approvals?

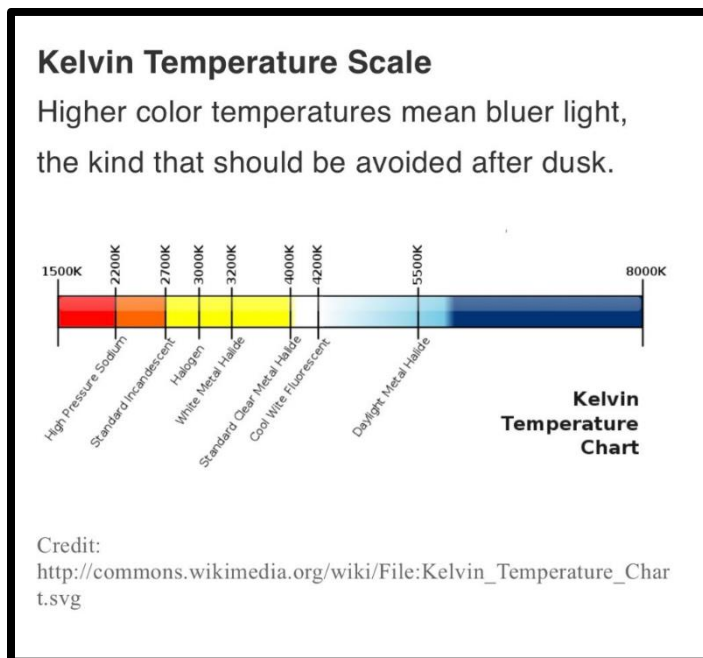


Image 6

What are the estimated other impacts, including and not limited to night-sky light pollution, ground-level light pollution, impacts to humans and other flora and fauna

<sup>25</sup> See *Dark Sky Assessment Guide*, <https://www.darksky.org/wp-content/uploads/bsk-pdf-manager/2019/06/Dark-Sky-Assessment-Guide-Update-6-11-19.pdf>. See also, The International Dark Sky Association, <https://www.darksky.org/>.

<sup>26</sup> See, International Dark Sky Association: Human Health, <https://www.darksky.org/light-pollution/human-health/> See also, *Seeing Blue*, [https://www.darksky.org/wp-content/uploads/bsk-pdf-manager/29\\_SEEINGBLUE\(1\).PDF](https://www.darksky.org/wp-content/uploads/bsk-pdf-manager/29_SEEINGBLUE(1).PDF)

caused by the proposed SpaceX network<sup>27</sup>? Have these been reviewed by the National Science Foundation, the National Fish & Wildlife Service and all other agencies of jurisdiction related to the environment, and to flora and fauna health? What is the impact on bird migration, on turtle migration, on salmon and whale and dolphin migration and spawning, both specifically and generally? The FCC holds requirements under the Administrative Procedures Act (APA), National Environmental Policy Act (NEPA), Radiation Hazard Report (RHR) obligations, Regulatory Flexibility Act (RFA), Secure 5G and Beyond Act, the Constitution and Convention of the International Telecommunications Union (ITU CSCV), and other similarly situated cross-agency and cross-government obligations, to conduct a detailed review of a modification request that is this massive in scope.

What is the impact of the proposed modification on stargazing sites, and what is the assessment of the National Park Service (NPS), which manages many of the nation's most valuable dark sky locations? What is the authority and expertise of the FCC and the International Bureau in assessing whether and how to degrade and pollute night sky locations? Does that authority supersede the authority of all the other relevant federal agencies to the extent that those agencies are not reasonably consulted, and if so, from where is that authority derived? What jurisdiction and rights do the state, local and tribal authorities possess in this context? What about the risk of other countries suing the US government, based on violations of US global treaty obligations or other requirements, for invading their night skies, especially now with the proposed reduced elevation? What are the rights of individual property owners, domestic and international,

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<sup>27</sup> See, Large Biocular Telescope (LBT) research at Mount Graham, Arizona, Declaration of Stefano Galozzi, Astronomical Observatory of Rome, Exhibit 6 to Application for Review, as cited in fn. 12.

especially those whose property purchases were substantially tied to the quiet enjoyment of unobscured night skies?

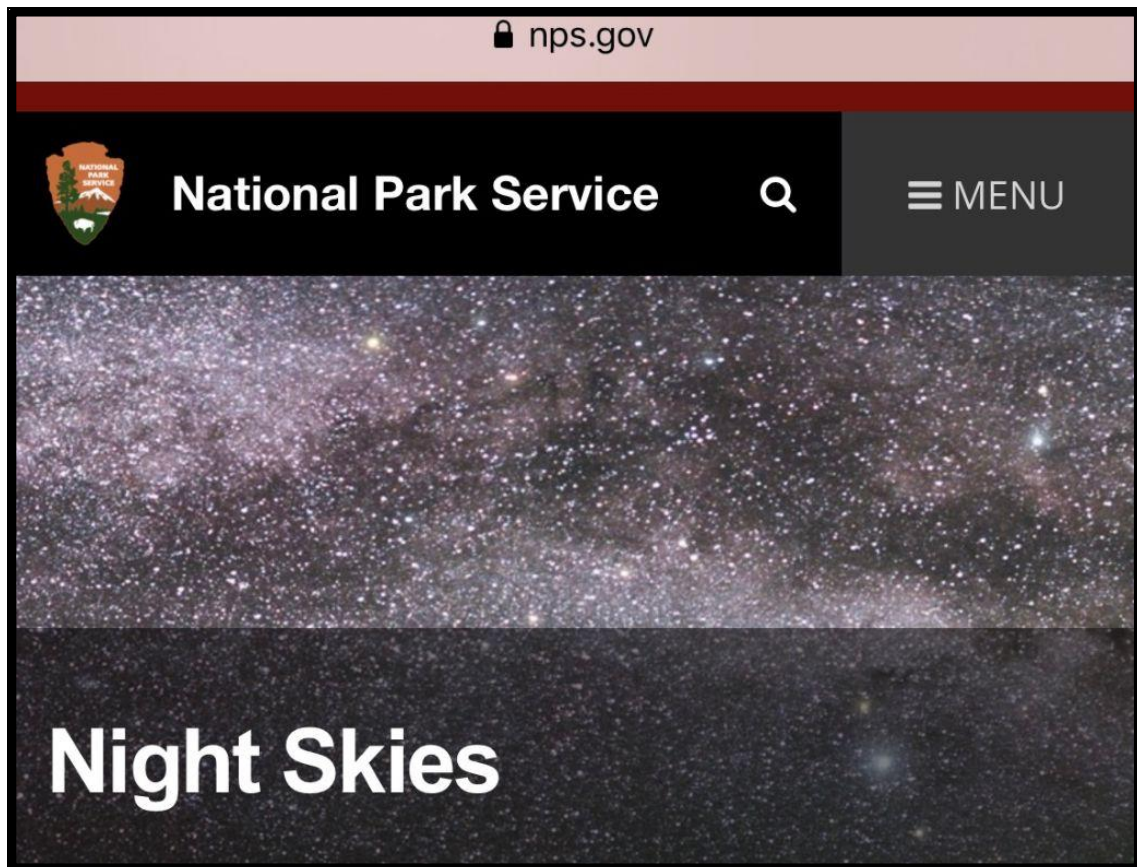


Image 7<sup>28</sup>

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<sup>28</sup> National Park Service. "Night Skies." National Park Service. 2020.  
<https://www.nps.gov/subjects/nightskies/index.htm>





*The natural light of the Milky Way and  
constellations stand out against a dark sky over  
Maroon Bells, Colorado*

*© Jeremy White*

Image 8<sup>29</sup>

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<sup>29</sup> National Park Service. "Night Skies." National Park Service. 2020.  
<https://npgallery.nps.gov/SearchResults/albumid/e1125326-66c0-4849-83d6-cfdd46aa03d3>

What elements of the National Environmental Policy Act (NEPA) have been reviewed in context of this Major Modification Application and the overall SpaceX network as authorized? The required impact assessment on humans, flora and fauna appears impermissibly weak if not outright missing.<sup>30</sup>

C. National Space Council (NSC) Coordination appears to be weak or missing: The SpaceX Major Modification Application and the underlying SpaceX record, do not appear to evidence effective and detailed input from the National Space Council (NSC) about the wisdom and efficacy of the major modification and the underlying network goals. Do studies exist to validate the wisdom of having the largest planned satellite network in history effectively sandwiched between critical GPS satellite networks, let alone other mission-critical satellite systems and planet Earth? Have space debris rules about insurance and indemnification even been firmly established and reviewed by all the major players? The NSC “efforts encompass everything from streamlining licenses to reforming export controls to protecting airwaves facilitating space activities. Its membership spans the civil, military, and commercial sectors, including the Secretary of State, Secretary of Defense, Secretary of Transportation, Secretary of Homeland Security, and Director of National Intelligence. Representatives from the Office of Management and Budget, National Aeronautics and Space Administration, and the Joint Chiefs of Staff, among others, also serve on this council.”<sup>31</sup> Where is the evidence that these critically important organizations have provided input and guidance as to the wisdom of

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<sup>30</sup> See NRDC v. FCC (August 2019).

<sup>31</sup> See Space Exploration Holdings, LLC, 33 FCC Rcd. 3391, p.20, (2018).



deploying the world's largest satellite network as designed, let alone as proposed for major modification? What about the FCC's multiple legal obligations to consult?<sup>32</sup>

D. Sufficiently Comprehensive Insurance Declaration is Missing: The SpaceX major modification application and its underlying authority appear to omit any statement that its proposed satellite network or other network equipment is insured against a series of readily identifiable systemic catastrophic failure risks. The SpaceX record appears to omit any mention of whether it secured any insurance against multiple forms of catastrophic failure, or whether it sought such insurance and was denied, and if it was denied, what were the reasons. If such information exists, it should be produced. If such information does not exist, it is fatal to the project for obvious systemic risk reasons noted herein.

E. Sufficient Indemnification Protection for the U.S. Government and for its Citizens Appears Unmet. At the April 23, 2020, the Open Commission Meeting, a Report & Order and Further Notice of Proposed Rulemaking (FNPRM) concerning space debris was adopted. Statements were made by International Bureau staff and FCC Commissioners that the lack of sufficient indemnification protections existed for satellite systems. Such concerns were manifested also in the FNPRM.<sup>33</sup>

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<sup>32</sup> The FCC holds requirements under the Administrative Procedures Act (APA), National Environmental Policy Act (NEPA), Radiation Hazard Report (RHR) obligations, Regulatory Flexibility Act (RFA), Secure 5G and Beyond Act, the Constitution and Convention of the International Telecommunications Union (ITU CSCV), and other similarly situated cross-agency and cross-government obligations, to conduct a detailed review of a modification request that is this massive in scope.

<sup>33</sup> See: "*Mitigation of Orbital Debris in the New Space Age*. IB Docket No. 18-313." REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING. Adopted: April 23, 2020, at Paragraph 135: "In the Notice, the Commission sought comment on whether Commission space station licensees should indemnify the United States against any costs associated with a claim brought against the United States related to the authorized facilities under international law, specifically the Outer Space Treaties. Almost all commenters addressing the proposed indemnification requirement raised concerns, and several argued the proposal should be examined further before it is adopted. We conclude that further development of the record on this topic is warranted and we address this topic in the Further Notice below."

Accordingly, who would be liable if the SpaceX Major Modification is granted and some portion of that network is subsequently implicated in a systemic failure of that network or of another space-born system? What happens if the systemic failure is traced to a subsequent catastrophic failure of an earth-born system, such as a train collision or truck collision or a large cargo ship containing a volatile chemical or other hazardous substance? What if the scale of such a disaster is on the scale of the Bhopal gas catastrophe?<sup>34</sup> Is the United States Government liable? Are the people of the United States liable? Should these questions be safely covered and answered *prior* to approving the SpaceX Major Modification or continuing with its underlying authorities?

- F. Certified Spectrum Management Operations & Management Declaration appears to be Missing: The SpaceX record omits stating whether it engaged a trained and certified Spectrum Manager to routinely, if not daily, assess power levels, radio-frequency (RF) radiation, and spectrum interference mitigation techniques and made those reports available and open for transparent review. It is standard industry practice to engage professional frequency management and coordination services, and the FCC itself certifies spectrum management professionals and organizations for a variety of modes of spectrum-based communications, including satellite.<sup>35</sup>
- G. Federal Agency RF Studies in their respective areas of expertise is Missing: The SpaceX record appears to omit stating whether peer-reviewed studies been completed to assess the impact of radio-frequency exposure caused by the proposed SpaceX network. What is the RF impact on humans, flora, and fauna, as assessed by expert agencies including and

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<sup>34</sup> [https://en.wikipedia.org/wiki/Bhopal\\_disaster](https://en.wikipedia.org/wiki/Bhopal_disaster)

<sup>35</sup> See FCC International Bureau webpage at: <http://licensing.fcc.gov/myibfs/ibfsresources.do?resource=coordinationresources>. See generally, for other services: CFR 47, Section 90.175. See also, [www.NSMA.org](http://www.NSMA.org)

not limited to the National Institutes of Health (NIH), the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), the Center for Disease Control (CDC), and the National Oceanic & Atmospheric Administration (NOAA)? What is the expert opinion and obligation for all other federal human and environmental health agencies whose statutory missions are implicated or potentially implicated by the potential national and global impact of the SpaceX network? Were they given a reasonable opportunity to conduct peer-reviewed studies reasonably necessary to make an informed contribution?

- H. Notice to Individual Contractors and Small Businesses is Missing: The SpaceX application and record appears to omit a guarantee that effective and reasonable notice has been provided to individual contractors and small businesses of their Regulatory Flexibility Act (RFA) rights in the context of the unprecedented proposed modification. The historic and global scale of the SpaceX application, and its value-proposition, and also its potential risks related to security, economic impact, surveillance and privacy vulnerability, radiofrequency exposure, light pollution, or environmental impacts, are all implicated.<sup>36</sup>
- I. Federal Agency food production and food security studies in their respective areas of expertise is missing: The SpaceX application and the underlying record appears to omit stating whether peer-reviewed studies been conducted that established a radiofrequency (including and not limited to thermal, electromagnetic and non-ionizing) exposure standard for assessing the potential harm to U.S. food production (including and not limited to meat, dairy, vegetable, fruit and nut, honey). Also omitted was whether the

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<sup>36</sup> See Generally, U.S. Small Business Administration, Office of Advocacy, <https://advocacy.sba.gov/resources/the-regulatory-flexibility-act/> [website accessed, May 26, 2020].

relevant U.S. agencies such as, and not limited to, the USDA, CDC, EPA, FDA, Department of Energy and Department of Education were notified to assess these matters in relation to their statutory duties, and if so, whether they agreed that the SpaceX network as proposed for modification, or as previously authorized, is safe or otherwise materially impacts their statutory duties.<sup>37</sup>

- J. Peer-Reviewed Impact Assessment, and Relevant U.S. Agency Permissions, Regarding U.S. National Astronomy Systems Appears to Be Missing. The SpaceX application and record appears to omit (i) peer-reviewed studies, and (ii) written declarations from impacted federal, state, international and independent astronomy facilities, that show there will not be systemic damage to those facilities' capabilities. If that information exists, please cite to it. If it does not exist, why not? SpaceX holds an affirmative obligation to meet all requirements for a major modification application.

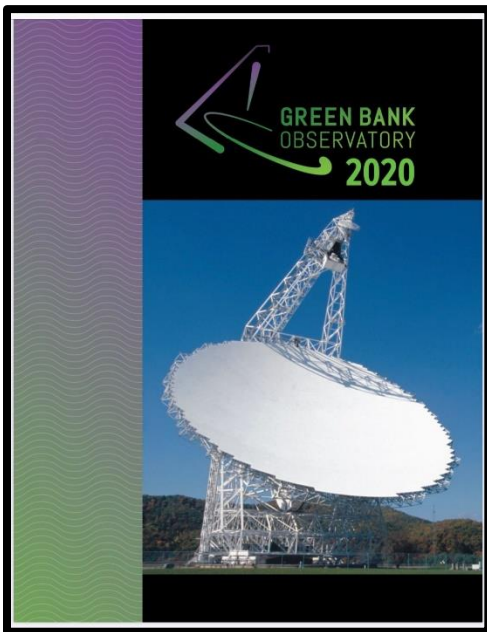


Image 9<sup>38</sup>

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<sup>37</sup> See fn. 32 for some of the FCC interagency consultation requirements.

<sup>38</sup> The National Radio Quiet Zone covers portions of West Virginia, Virginia and Maryland. Sources: Green Bank Observatory, and Wikipedia.

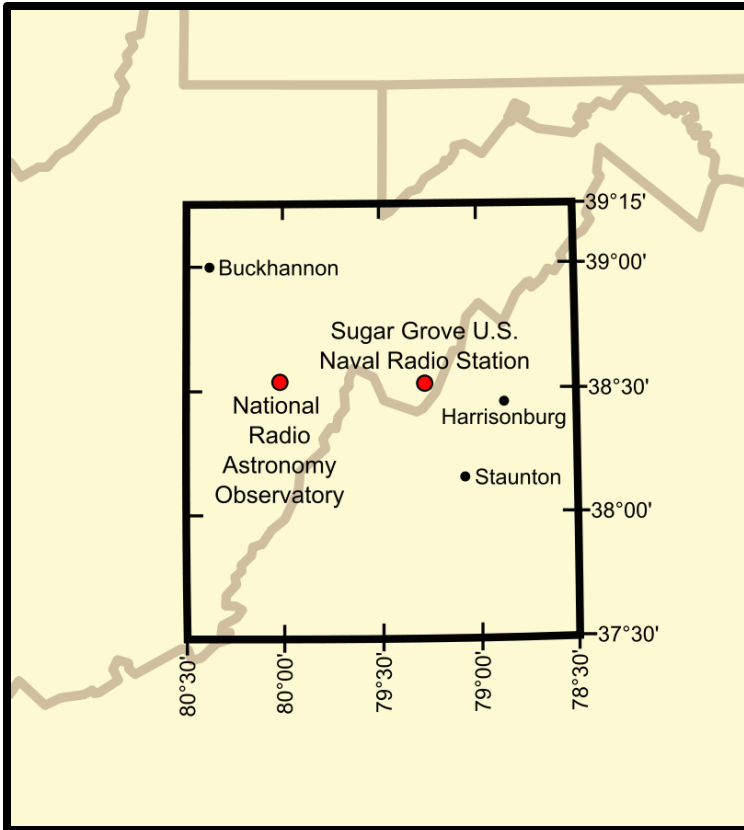


Image 10<sup>39</sup>

K. Does the SpaceX Modification as Proposed Acknowledge The Differences in People, and in other Living Things? People are not all the same. Some people want and can tolerate being exposed to artificially generated pulsed radiation as a tradeoff to enjoy broadband connectivity. Some people cannot get enough connectivity and will be unsatisfied with even the speeds and coverage that SpaceX is proposing in the instant modification. Other people feel they are fine in their homes and places of business, and do not desire additional connectivity options. Finally, some people feel they are already overwhelmed with the amount of RF radiation and light-pollution that is intruding on their property and person, and they want it to stop.

<sup>39</sup> The National Radio Quiet Zone covers portions of West Virginia, Virginia and Maryland. Sources: Green Bank Observatory, and Wikipedia.

## Four Consumer Constituencies

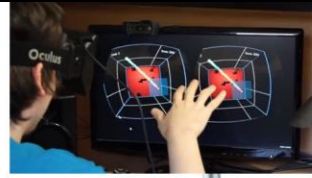
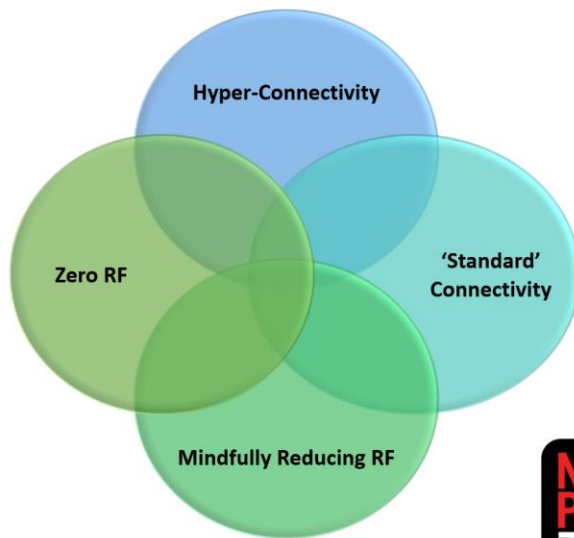


Image 11<sup>40</sup>

## Many Different Groups Need Spectrum Management data & guidance

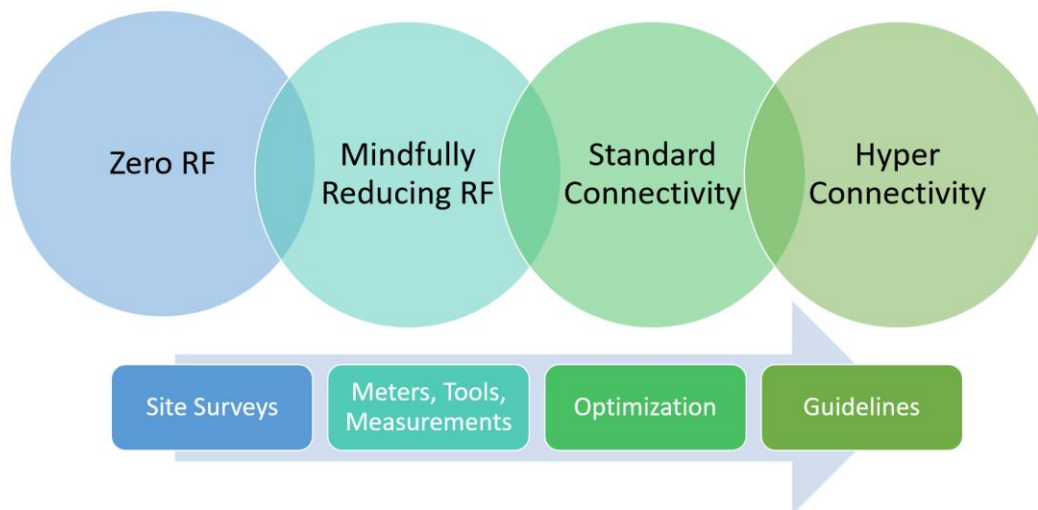


Image 12<sup>41</sup>

<sup>40</sup> "5G & Green Earth Initiatives: New Opportunities in Spectrum Management." National Spectrum Management Association Annual Conference. Sandri, Joseph M. May 15, 2019. <https://nsma.org/wp-content/uploads/2019/05/5g-and-green-earth-initiatives.pdf>

<sup>41</sup> Ibid.

By authorizing the changes outlined in this application, including lowering 2,824 satellites to altitudes ranging from 540 km to 570 km, the Commission can harm the orbital environment, take the choice of quiet enjoyment away from American consumers, and accelerate the initiation of RF exposure and light pollution in Polar regions, perhaps forever altering peoples, cultures and the environment for the worse with unseen and unstudied consequences. Do not act with haste. Tread lightly and listen carefully. Conduct peer-reviewed studies. Moreover, discern what is the primary goal and can it be achieved without any material negative impact on others.

## CONCLUSION

As amply demonstrated herein, the SpaceX application for modification represents a massive redesign and must be denied and is evidence that the “ready, fire, aim” approach is not wise, especially when planning the largest network in human history. There is a dire need for numerous expert U.S. agencies, and in many cases, their international counterparts, to assess the world’s largest ever attempted satellite network as licensed, let alone as proposed for modification. Therefore, the Motion for Consultation with Affected Agencies must be granted. A list of agencies suggested for consultation is provided as ATTACHMENT A.

Many SpaceX documents regarding the status of its design assessments, the nature of its insurability and other critical matters remain hidden from view. The public interest requires that those documents be provided on the record, and thus the Motion for Disclosure of those documents and studies as described herein must be granted, including and not limited to: (1) information from potential insurers and indemnifiers as to the scope and concerns about providing suitably broad protections to match the historic size, scope and duration of the network as proposed for modification, (2) statements about why the design continues to be so wildly

fluid, (3) whether the satellites as designed have ever been tested in the real-world to entirely burn upon re-entry into the atmosphere, (4) environmental impact assessments concerning and not limited to chemical and metals and persistent liquids pollution, and radio frequency hazards to humans and flora and fauna, and night sky pollution.

As SpaceX's own documents and modification amendment admit, SpaceX has dramatically swung its design as originally licensed from five (5) orbital elevation locations now to a proposal to radically drop one hundred percent of the 4,409 satellites authorized under call signs S2983/S3018 down to nearly 540-570 km, yet they provide no NEPA review, no proof that there will be no systemic harm to a baffling array of national security, business and human and environmental health sectors, no proof of insurance against systemic failure, no proof of sufficient indemnity, no proof that the systems will operate as advertised and provide a stunning lack of peer-reviewed studies or coordination with over a dozen heavily-impacted federal agencies. Therefore, the Motion to Suspend Additional Launches or Alternatively Revoke Licenses until and if baseline safety and licensure and operational conditions are met, must be granted.

The SpaceX network, as approved and as planned and as proposed for modification, will be the largest in the earth's history, dwarfing all currently operating systems combined as measured by publicly available records. As such, the regulatory agencies overseeing the potential impacts of approving the deployment, hold a heightened duty of care and persistent vigilance. The questions listed herein, and the cited apparent omissions in the SpaceX Major Modification Application and the associated SpaceX materials in the record, are meant to be useful to the FCC, SpaceX, the public and the public's representatives in assessing material issues related to approving, funding, constructing, and safely operating the proposed network, or similar networks.



Respectfully submitted,

THE BALANCE GROUP

By: /s/

/s/ Joseph M. Sandri

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May 26, 2020

## **CERTIFICATE OF SERVICE**

I hereby certify that, on this 26th day of May, 2020, a copy of the foregoing pleading was served via First Class mail upon:

William M. Wiltshire  
Paul Caritj  
Colleen Sechrest  
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Director of Satellite Policy  
SPACE EXPLORATION TECHNOLOGIES CORP.  
1155 F Street, N.W. Suite 475  
Washington, DC 20004

/s/ James McPherson  
James McPherson

## DECLARATION

### Qualifications

Mr. Sandri has over three decades of experience in the telecommunications industry and in environmental matters, in legal and executive roles. His biography is posted on the following sites (in alphabetical order):

Archangel Ancient Tree Archive:

<https://www.ancienttreearchive.org/about-us/our-board/>

National Spectrum Management Association:

<https://nsma.org/about-us/nsma-officers/>

Thought Delivery Systems, Inc.:

<http://www.thoughtdelivery.com/about.html>

I declare under penalty of perjury that the factual statements contained herein are true and correct, to the best of my knowledge.

Executed on May 26, 2020.

/s/ Joseph M. Sandri

Joseph M. Sandri

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## ATTACHMENT A – Sample List of Subject Matter Jurisdiction Federal Agencies

FEDERAL AGENCIES <sup>42</sup>	Commissioner/ Chairman/ General Counsel	Address & email
Dept. of Agriculture	Secretary: Sonny Perdue	U.S. Department of Agriculture 1400 Independence Ave., SW Washington, DC 20250 General inquiries: askusda@usda.gov
<i>National Arboretum</i>	Dr. Richard T. Olsen, Director	501 New York Avenue NE Washington, DC 20002 richard.olsen@usda.gov
<i>Forest Service</i>	Chief: Vicki Christiansen	1400 Independence Ave., SW Washington, D.C. 20250-0003 Victoria.Christiansen@usda.gov
<i>Rural Utilities Service</i>	Chad Rupe, Administrator	USDA Rural Development Rural Utilities Service STOP 1510, Rm 5135 1400 Independence Ave., SW Washington, DC 20250-1510 Chad.rupe@usda.gov
Dept. of Commerce	Secretary: Wilbur Ross	U.S. Department of Commerce 1401 Constitution Ave NW Washington, DC 20230 WLRoss@doc.gov
<i>NOAA</i>	Acting Under Secretary: Neil Jacobs	National Oceanic and Atmospheric Administration 1401 Constitution Avenue NW, Room 5128 Washington, DC 20230 neil.jacobs@noaa.gov
<i>NTIA</i>	Assistant Secretary: Douglas Kinkoph	National Telecommunications and Information Administration 1401 Constitution Ave., NW Washington, DC 20230 DKinkoph@ntia.gov
Department of Energy	Secretary: Dan Brouillette	U.S. Department of Energy Office of NEPA Policy and Compliance (GC-54) 1000 Independence Avenue, S.W. Washington, DC 20585
Department of Health & Human Services	Secretary: Alex Azar	U.S. Department of Health & Human Services 200 Independence Avenue, S.W. Washington, D.C. 20201 Secretary@HHS.gov

<sup>42</sup> Subset Agencies are in Italics

<i>NIH</i>	Director: Francis Collins	National Institutes of Health (NIH) 9000 Rockville Pike Bethesda, Maryland 20892 francis.collins@nih.gov
<i>CDC</i>	Director: Robert Redfield	U.S. Department of Health & Human Services 200 Independence Avenue, S.W. • Washington, D.C. 20201 olx1@cdc.gov
<b>Dept. of Homeland Security</b>	Acting Secretary: Chad Wolf	Department of Homeland Security 2707 Martin Luther King Jr Ave SE Washington, DC 20528-0525 See <a href="#">here</a> for specific Mail Stops
<b>Dept. of Housing and Urban Development</b>	Secretary: Ben Carson	U.S. Department of Housing and Urban Development 451 7th Street S.W., Washington, DC 20410
<b>Dept. of Interior</b>	Secretary: David Bernhardt	Department of the Interior 1849 C Street, N.W. Washington DC 20240 feedback@ios.doi.gov
<i>National Park Service</i>	Acting Director: David Vela	National Park Service 1849 C Street NW, Washington, D.C. 20240
<b>Dept. of Justice</b>	Secretary: William Barr Head of Civil Rights Division: Eric Dreiband	Department of Justice 950 Pennsylvania Ave., N.W. Washington DC 20530
<b>Dept. of Labor</b>	Secretary: Eugene Scalia	U.S. Department of Labor 200 Constitution Ave NW Washington, DC 20210
<b>Dept. of State</b>	Secretary: Michael Pompeo	
<b>Dept. of Transportation</b>	Secretary: Elaine Chao	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590
<b>Dept. of Treasury</b>	Secretary: Steven Mnuchin	Department of the Treasury 1500 Pennsylvania Avenue, NW Washington, D.C. 20220
<b>Dept. of Veterans Affairs</b>	Secretary: Robert Wilkie	

<b>Environmental Protection Agency</b>	Administrator: Andrew Wheeler	Environmental Protection Agency 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 <u>Mail Codes</u>
<b>Food and Drug Administration</b>	Commissioner: Stephen Hahn	Food and Drug Administration 10903 New Hampshire Ave Silver Spring, MD 20993-0002