

**United States Court of Appeals
for the District of Columbia Circuit**

Nos. 22-1337, (Consolidated with 23-1001)

THE INTERNATIONAL DARK-SKY ASSOCIATION, INC.,

Appellant,

v.

FEDERAL COMMUNICATIONS COMMISSION,

Appellee,

SPACE EXPLORATION HOLDINGS, LLC,

Intervenor for Respondent.

*On Appeal from the Federal Communications Commission
in Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818.*

BRIEF FOR APPELLANT

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April 14, 2023

CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

A. Parties and Amici

Appellants

The Appellants in this consolidated case are (1) The International Dark-Sky Association, Inc. (No. 22-1337) and (2) DISH Network Corporation and DISH Network LLC (No. 23-1001).

Appellees

The Appellee in this consolidated case is the Federal Communications Commission.

Intervenor

Space Exploration Holdings, LLC (“SpaceX”) is an intervenor in this consolidated case.

Amici

As of the date of filing, no Amici have filed an appearance in this consolidated case.

FCC Participants

The following are the individuals or entities that participated in the proceedings before the Federal Communications Commission in this matter:

AASLP

Amazon.com Services LLC | Kuiper Systems LLC

The Astronomical Society of Edinburgh

Astroscale U.S.

The Balance Group

Graeme Cuffy

DISH Network Corporation

EchoStar Satellite Services L.L.C. / Hughes Network Systems, LLC

Eutelsat S.A.

Sierra Solter Hunt

Kepler Communications, Inc.

Prof. Samantha Lawler

Prof. Andy Lawrence

LeoLabs

NTIA (along with NASA and NSF Comments)

Natural Resources Defense Council

Cameron Nelson

Prof. Carrie R. Nugent

Meredith L. Rawls, PhD

Royal Astronomical Society

RS Access, LLC

SES Americom, Inc. / O3b Limited

Melissa Shipp

Space Exploration Technologies Corp.

Prof. Roberto Trotta

Viasat, Inc.

WorldVu Satellites Limited

B. Rulings Under Review

The Appellants have sought review of the final order of the Federal Communications Commission (“FCC” or “Commission”) captioned as *In the Matter of Space Exploration Holdings, LLC Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, Order and Authorization, IBFS File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818, Call Sign S3069 (rel. Dec. 1, 2022) (DA/FCC # FCC-22-91) (“Order”).

The Order has not yet been published in the FCC Record.

C. Related Cases

The case on review was not previously before this court or any other court. Counsel is not aware of any other related cases currently pending in this court or in any other court, other than the consolidated case: *DISH Network Corp. v. FCC*, Case No. 23-1001.

Dated: April 14, 2023

Respectfully submitted,

/s/Charles Lee Mudd Jr.
Charles Lee Mudd Jr.

THE INTERNATIONAL DARK-SKY ASSOCIATION, INC.**CORPORATE DISCLOSURE STATEMENT**

Pursuant to Federal Rule of Appellate Procedure 26.1 and Circuit Rules 26.1 and 27(a)(4), 28(a)(1), The International Dark-Sky Association, Inc. states that it has no parent company and that no publicly held company has a 10% or greater ownership interest (such as stock or partnership shares) in The International Dark-Sky Association, Inc.

Dated: April 14, 2023

Respectfully submitted,

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GLOSSARY OF TERMS

APA	Administrative Procedure Act
Application	Application for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-LOA-20200526-00055 (filed May 26, 2020) (SpaceX Gen2 Application); Space Exploration Holdings, LLC, Amendment to Pending Application for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-AMD-20210818-00105 (dated Aug. 18, 2021) (SpaceX Gen2 Amendment)
CEQ	Council on Environmental Quality
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	European Space Agency
FAA	Federal Aviation Administration
FCC or Commission	Federal Communications Commission
IDA or Appellant	The International Dark-Sky Association, Inc.
NEPA	National Environmental Policy Act
Order	<i>In the Matter of Space Exploration Holdings, LLC Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System, Order and Authorization, IBFS File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818, Call Sign S3069 (rel. Dec. 1, 2022)</i>
SpaceX	Space Exploration Holdings, LLC

STATEMENT OF JURISDICTION

This Court has jurisdiction under 47 U.S.C. § 402(b)(6) because The International Dark-Sky Association, Inc. has been aggrieved “by an [] order of the Commission [entered on December 1, 2022] granting ... an [] application [and amendment thereto] described in” 47 U.S.C. § 402(b)(1)-(2) and filed by Space Exploration Holdings, LLC under 47 U.S.C. §§ 308-309 for authorization to launch and operate its second generation Starlink satellites.¹

STATEMENT OF THE ISSUES

1. Whether the Commission’s Order violates § 706(2)(A) of the Administrative Procedure Act (“APA”) as being arbitrary and capricious in its consideration of and conclusion with respect to allegations made by The International Dark-Sky Association, Inc. (“IDA” or “Appellant”) and others that the satellite authorization sought by Space Exploration Holdings, LLC (“SpaceX”) will have significant environmental effects on the general public, particularly

¹ See Space Exploration Holdings, LLC, Application for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-LOA-20200526-00055 (filed May 26, 2020) (SpaceX Gen2 Application); Space Exploration Holdings, LLC, Amendment to Pending Application for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-AMD-20210818-00105 (dated Aug. 18, 2021) (SpaceX Gen2 Amendment).

through (a) adverse aesthetic, social and cultural, and health effects; (b) adverse effects on diverse species; and, (c) adverse effects on Earth's atmosphere;²

2. As a subset of Issue 1, whether the Commission's Order violates § 706(2)(A) of the APA as being arbitrary and capricious in declining to consider in this particular licensing action, without any reasoning, the aggregate and cumulative effects of the satellite authorization sought by SpaceX in conjunction with the broader licensing actions of the Commission with respect to satellites of parties *other than* SpaceX;

3. Whether the Commission's Order violates § 706(2)(A) of the APA as being not in accordance with law in the denial of a requested programmatic Environmental Impact Statement ("EIS") without having conducted or required an Environmental Assessment ("EA");

4. Whether the Commission's Order violates § 706(2)(A) of the APA as being not in accordance with law in its interpretation and application of its own "may" standard under 47 C.F.R. § 1.1307(c), particularly with respect to the burden imposed on Appellant under such standard;

² In addition to the Administrative Procedure Act, each of these stated issues involve application of the National Environmental Policy Act ("NEPA"), the Council on Environmental Quality ("CEQ") regulations implementing NEPA ("CEQ Regulations"), and the Commission's own regulations implementing NEPA and the CEQ Regulations, whether specifically stated or not.

5. Whether the Commission's Order violates § 706(2)(A) of the APA as being not in accordance with law in its interpretation and application of its own "may" standard under 47 C.F.R. § 1.1307(c), particularly with respect to its decision to not determine whether the satellite authorization sought by SpaceX' may have an environmental impact on astronomy under the National Environmental Policy Act ("NEPA") and the Council on Environmental Quality ("CEQ") regulations implementing NEPA ("CEQ Regulations") because it had completed a separate "public interest" assessment;

6. As a subset of 4, whether the Commission can, initially, assume NEPA and the CEQ Regulations apply to satellite authorization for purposes of analysis and thereby decline to actually determine whether they do apply and then, later, decide that it does not need to complete a NEPA and CEQ analysis with respect to alleged significant environmental effects on astronomy thereby completely avoiding any NEPA and CEQ analysis on such significant environmental effects;

7. Whether the Commission's Order violates § 706(2)(A) of the APA as being not in accordance with law with respect to its conclusion that 47 C.F.R. § 1.1311(e) precludes the need for the Commission to conduct an environmental review of atmospheric effects from rocket launches where it relies upon environmental reports from the Federal Aviation Administration ("FAA"), despite

an absence of any agreement, coordination, or lead agency designation between the Commission and the FAA on such environmental review;

8. Whether, based on Issues 3-7 above, the Commission's Order violates § 706(2)(A) of the APA as being not in accordance with law in its consideration of and conclusion with respect to allegations made by the Appellant that the satellite authorization sought by SpaceX will have significant environmental effects; and,

9. Whether the Commission's Order violates § 706(2)(A) of the APA in granting SpaceX' application without requiring an Environmental Impact Statement or, at least, an Environmental Assessment.

RELEVANT STATUTORY AND REGULATORY PROVISIONS

The Statutes and Regulations Addendum filed separately contains the relevant statutory and regulatory provisions. ADD1 - ADD108. Additionally, the Addendum contains supporting declarations from The International Dark-Sky Association, Inc. members. ADD109 – ADD132.

STATEMENT OF THE CASE

In this Appeal, The International Dark-Sky Association, Inc. seeks judicial review of the final order entered and released by the Federal Communications Commission captioned as *In the Matter of Space Exploration Holdings, LLC Request for Orbital Deployment and Operating Authority for the SpaceX Gen2*

NGSO Satellite System, Order and Authorization, IBFS File Nos. SAT-LOA-20200526-00055 and SAT-AMD-20210818, Call Sign S3069 (rel. Dec. 1, 2022).

On May 26, 2020, SpaceX filed its Application for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-LOA-20200526-00055 (SpaceX Gen2 Application). It later filed an Amendment to Pending Application for the SpaceX Gen2 NGSO Satellite System, IBFS File No. SAT-AMD-20210818-00105 on Aug. 18, 2021 (SpaceX Gen2 Amendment). Prior to the Commission entering its Order, this Appellant and other diverse persons filed documents with the Commission arguing with supporting citations and documentation that the authorization of the SpaceX Gen2 Starlink satellites and their subsequent operation would cause significant environmental effects. *See, e.g.*, Comments of the Natural Resources Defense Counsel and International Dark Sky Association, IBFS File Nos. SAT-LOA-20200526-00055 and SATAMD-20210818-00105 (filed Sept. 7, 2022) (“*Comments of NRDC and IDA*”).

Despite these environmental effects, the Commission granted, in part and subject to certain conditions, the amended application of SpaceX “to construct, deploy, and operate a constellation of []³ non-geostationary orbit (NGSO)

³ SpaceX sought authorization for 29,988 satellites. The Commission authorized 7,500 satellites. Order ¶ 1.

satellites, to be known as its ‘second-generation’ Starlink constellation (“Gen2 Starlink”), using Ku-, Ka-, and E-band frequencies to provide fixed-satellite service (FSS).” Order ¶ 1. In doing so, it failed to apply reasoned analysis; misapplied applicable law, including its own “may” standard; and, misinterpreted its own rules. Consequently, the Commission failed to properly comply with the Administrative Procedure Act, 5 U.S.C. §§ 500, *et seq.*; the National Environmental Policy Act (“NEPA”), 42 U.S.C. §§ 4321, *et seq.* and NEPA’s implementing regulations promulgated by the Council on Environmental Quality (“CEQ”), 40 C.F.R. §§ 1500, *et seq.* (“CEQ Regulations”); and, its own regulations implementing NEPA and the CEQ Regulations, 47 C.F.R. §§ 1.1301, *et seq.*

On December 29, 2022, the Appellant filed a Notice of Appeal with this Court. Not. Appeal (Dec. 29, 2022) (Doc. #1979555). On December 30, 2022, the Clerk of this Court issued an order setting initial submission deadlines. Clerk’s Order (Dec. 30, 2022) (Doc. #1979564). On January 5, 2023, this Court consolidated this case with Case Number 23-1001. Clerk’s Order (Jan. 5, 2023) (Doc. #1980196). On January 1, 2023, SpaceX filed its motion for leave to intervene which, absent objection, the Court granted on February 2, 2023. Mot. to Intervene of Space Exploration Holdings, LLC (Jan. 1, 2023) (Doc. #1981274); Clerk’s Order (Feb. 2, 2023) (Doc. #1984293). On February 2, 2023, this Court also filed an order setting the briefing schedule following the parties’ joint motion

concerning briefing (Doc. #1983744) with the Appellants' briefs due April 14, 2023. Per Curiam Order (Feb. 2, 2023) (Doc. #1984379).

SUMMARY OF ARGUMENT

The Federal Communication Commission's approval of SpaceX' application for its second generation of satellites in the Order violates the Administrative Procedure Act ("APA"), 5 U.S.C. § 500, *et seq.* To begin with, the Commission failed to employ reasoned analysis on specific issues resulting in arbitrary and capricious conclusions in violation of the APA. Further, the Commission arrived at conclusions not in accordance with the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321, *et seq.*; NEPA's implementing regulations promulgated by the Council on Environmental Quality ("CEQ"), 40 C.F.R. §§ 1500, *et seq.* ("CEQ Regulations"); and, even its own regulations implementing NEPA and the CEQ Regulations, 47 C.F.R. §§ 1.1301, *et seq.* Consequently, the Commission's Order should be held unlawful and vacated with the proceeding remanded to the Commission for further action consistent with applicable law.

In the proceeding below, this Appellant and other diverse parties introduced evidence into the record demonstrating that the approval of SpaceX' application and thousands of additional satellites would have significant effects on the environment. To begin with, the satellites would contribute to light pollution that has already been demonstrated to adversely affect astronomy. Further, the

Appellant argued that the light pollution emanating from the satellites' solar reflectivity could also adversely affect human, animal, and plant health and activities. Of these, the Commission only referenced "general public" concerns it described as "adverse aesthetic, social and cultural, and health effects."

Additionally, this Appellant cited evidence relating to the significant effects reentry of the satellites could have on the atmosphere and environment.

Despite the record, the Commission failed to provide any reasoned analysis with respect to the environmental arguments and, where it did provide any analysis, the Commission did not do so in accordance with applicable law. In fact, the Commission misinterpreted its own regulations and misapplied its "may" standard, despite binding D.C. Circuit precedent previously correcting its misunderstanding. Indeed, the Commission sought certainty and, in its perceived absence, resolved any uncertainty in favor of SpaceX. In fact, the Commission relied heavily on SpaceX' self-serving representations that it has been and will continue to be a good citizen. It did not, however, thoroughly analyze SpaceX' representations, particularly with respect to its mitigation efforts. Although the Commission's paragraphs devoted to the environmental issues demonstrate a substantial record with arguments and evidence supporting a finding that, at least, there may be significant environmental effects, they proved to be no more than smoke and mirrors. The Commission's Order is unlawful and should be set aside.

STANDING

The International Dark-Sky Association, Inc. has Article III standing to challenge the Commission’s failure to comply with the APA and other applicable law. Article III standing requires (1) an “injury in fact,” (2) that is caused by the challenged conduct, and (3) that will likely be redressed by a favorable decision. *WildEarth Guardians v. Jewell*, 738 F.3d 298, 305 (D.C. Cir. 2013) (citing *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560-561 (1992)). In challenging an agency’s decision relating to NEPA and the CEQ Regulations, there must be a causal chain with two links: “one connecting the omitted [NEPA review] to some substantive government decision that may have been wrongly decided because of the lack of [adequate NEPA review] and one connecting that substantive decision to the plaintiff’s particularized injury.” *Id.* Redressability largely overlaps with causation: the challenger’s injury is redressable if the agency “could change its mind” if it “adequately consider[s] ... environmental concern[s].” *Id.*; *accord American Rivers v. FERC*, 895 F.3d 32, 42 (D.C. Cir. 2018).

Here, the Order inflicts “injury in fact” on The International Dark-Sky Association, Inc. and its members that could be redressed by a favorable decision. However, to bring suit on behalf of its members, IDA must also demonstrate that “(1) its members would otherwise have standing to sue in their own right; (2) the interests it seeks to protect are germane to the organization's purpose; and (3)

neither the claim asserted nor the relief requested requires the participation of individual members in the lawsuit.” *See Ctr. for Sustainable Econ. v. Jewell*, 779 F.3d 588, 596 (D.C. Cir. 2015) (quotation omitted). IDA can succeed on each of these elements.

1. IDA Members Would Otherwise Have Standing to Sue in Own Right

For the first element, IDA must show that the Commission’s alleged failings have “caused a traceable concrete and particularized harm to their members that is actual or imminent.” *American Petroleum Inst. v. EPA*, 216 F.3d 50, 63 (D.C. Cir. 2000) (quotations omitted). Here, the member declarations submitted by IDA, in particular the declarations of James D. Lowenthal, Ph.D. (“Lowenthal”) and Diana Umpierre (“Umpierre”), make clear that IDA members have experienced traceable, concrete, and particularized harm that is not only imminent but has already occurred due to the launch of SpaceX satellites and the presence of such satellites in Earth’s orbit. *See generally* Decl. James D. Lowenthal, Ph.D. (“Lowenthal Decl.”) (ADD113-127) and Decl. Diana Umpierre (“Umpierre Decl.”) (ADD128-132). As noted by Lowenthal, the Commission’s decision with respect to satellite constellation launches, operations, and orbits means that those activities can contribute directly to pollution of the night sky with no legal or regulatory constraints. Lowenthal Decl. ¶ 16. The sky is already becoming increasingly crowded with satellites. *Id.* This affects Lowenthal’s professional research, his

teaching, his outreach, and his personal experience and connection with the night sky. *Id.* ¶¶ 16-22. This harm will continue and worsen with the Commission’s authorization of additional satellites sought by SpaceX. *Id.*

2. The Interests IDA Seeks to Protect Are Germane to Its Purpose

The germaneness requirement mandates pertinence between litigation subject and organizational purpose. *Ctr. for Sustainable Econ*, 779 F.3d at 597. (quotation omitted). “Germaneness is required for ‘the modest yet important’ purpose of ‘preventing litigious organizations from forcing the federal courts to resolve numerous issues as to which the organizations themselves enjoy little expertise and about which few of their members demonstrably care.’” *Id.* (citations omitted). There exists no question that this action is significantly germane to IDA’s organizational purpose. In fact, at its heart, IDA’s purpose is to encourage communities, parks, and protected areas around the world to preserve and protect dark skies through responsible lighting practices and public education. Decl. of Ruskin Hartley (“Hartley Decl.”) (ADD109-112) ¶ 3. These protections are now at risk from the authorized satellites. *Id.* This risk is not speculative but present and imminent as members have already viewed and photographed the impact of the satellites previously launched by SpaceX and their impact on the viewable night sky from International Dark Sky Places. *See id.*; *see also* Umpierre Decl. ¶¶ 8-13. IDA and its purpose have existed since 1988, well before the existence of the

Applicant, SpaceX. Hartley Decl. ¶ 3. The launch of thousands of satellites threatens the darkness of the night sky and, thus, the observable night sky. *Id.* ¶ 4. As noted by IDA members themselves, current projections indicate that the night sky could become *several* times brighter than natural should the launch of all currently planned satellite constellations occur without any significant new mitigations being conceived, developed, and implemented. Lowenthal Decl. ¶ 21. The resulting diffuse glow would be the equivalent of ground-based light pollution from a medium-sized city, but it would appear everywhere – in even the most remote desert locations on Earth. *Id.* The increase in diffuse sky glow not only jeopardizes research astronomy and the cultural heritage of the stars and the Milky Way, it also threatens human health and all kinds of flora and fauna. *Id.*

IDA is comprised of many individuals not insignificant among those include astronomers and environmental conservationists. *See, e.g.*, Lowenthal Decl. and Umpierre Decl. Their expertise is not contrived only for this action but bears direct significance to both the purpose of IDA and to the reasoning that proper review under NEPA, the CEQ Regulations, and the Commission's rules implementing NEPA and the CEQ Regulations is necessary. The fundamental purpose of this litigation is to compel the Commission to perform the environmental analysis required by NEPA, the CEQ Regulations, and its own rules implementing NEPA—

a review that is directly impactful to the organizational purpose of IDA. As a result, IDA has met the germaneness element.

3. Neither Claim Nor Relief Require Individual Members' Participation

This appeal will be decided entirely on whether the Commission complied with its statutory and regulatory obligations. Further, the relief sought by the IDA seeks the reversal of the Commission's failure to perform such obligations. Consequently, neither the claims nor the relief sought by IDA require the participation of its members beyond their declarations to establish standing herein. *See Ctr. for Sustainable Econ.*, 779 F.3d at 597-98. Therefore, the IDA has established and met the third element to establish standing for purposes of bringing this appeal on behalf of its members. *See id.*

4. IDA has Article III Standing

Here, the Order inflicts injury-in-fact on Appellant and its members. As noted by IDA members, actual harm arising from satellites already launched by SpaceX has occurred. *See* Lowenthal Decl. ¶¶ 23-27; *see also* Umpierre Decl. ¶¶ 8-12. Further harm is imminent. *See* Lowenthal Decl. ¶¶ 28-30; *see also* Umpierre Decl. ¶ 10. Additionally, as noted above, the Commission's decision directly affects that injury. And finally, IDA's injury will be directly redressed by requiring the Commission to perform an adequate review under NEPA, the CEQ Regulations, and the Commission's own rules implementing NEPA and the CEQ

Regulations that complies with the requirements of the APA. As a result, IDA satisfies all three requirements for Article III standing. *See WildEarth Guardians*, 738 F.3d at 305.

ARGUMENT

The Federal Communication Commission (“FCC” or “Commission”) Order and Authorization released December 1, 2022 (“Order”) in which the Commission granted Space Exploration Holdings, LLC (“SpaceX”) limited authority with respect to its second generation satellites violates the Administrative Procedure Act (“APA”), 5 U.S.C. §§ 500, *et seq.*, which governs the actions of federal agencies. To begin with, the Commission acted in an arbitrary and capricious manner in addressing certain of The International Dark-Sky Association, Inc.’s (“IDA” or “Appellant”) environmental arguments. Additionally, the Commission’s treatment of Appellant’s environmental arguments are contrary to law. For these reasons and those argued below, this Court should hold the Order unlawful, vacate the Order, and remand for further proceedings consistent with the APA and applicable law.

STANDARD OF REVIEW

In reviewing challenges to an agency decision under the APA, a court should not “flyspeck’ an agency’s environmental analysis, looking for any deficiency no matter how minor.” *Nevada v. Dep’t of Energy*, 457 F.3d 78, 93 (D.C. Cir. 2006). However, a court should “ensure that the agency has adequately considered and

disclosed the environmental impact of its actions[,] that its decision is not arbitrary or capricious[,]" and is in accordance with law. *City of Olmsted Falls, Ohio v. FAA*, 292 F.3d 261, 269 (D.C. Cir. 2002) (citations omitted); 5 U.S.C. § 706(2)(A). Indeed, "an agency must take a 'hard look' at the environmental effects of its proposed action." *Theodore Roosevelt Conservation P'ship v. Salazar (Theodore Roosevelt II)*, 661 F.3d 66, 75 (D.C. Cir. 2011). Where this has not occurred, a reviewing court must hold such agency action, findings, and conclusions of law unlawful and set them aside. 5 U.S.C. § 706.

I. INTRODUCTION

In the Order, the Commission granted "SpaceX authority to construct, deploy, and operate up to 7,500 satellites operating at altitudes of 525, 530, and 535 km and inclinations of 53, 43, and 33 degrees, respectively, using frequencies in the Ku- and Ka-band." *In the Matter of Space Exploration Holdings, LLC Request for Orbital Deployment and Operating Authority for the SpaceX Gen2 NGSO Satellite System*, Order and Authorization ¶ 1 (December 1, 2022) ("Order"). The Commission declined to grant the full authorization SpaceX sought for nearly 30,000 satellites. *See generally id.* In fact, the Commission makes use of this limitation as demonstrative of its own restraint. *Id.* However, the authorization of 7,500 satellites should be placed into context. At the time SpaceX launched its first set of 60 Starlink satellites in May 2019, there existed approximately 5,500

total satellites orbiting Earth from all countries, companies, and, persons combined. Today, there exist approximately 7,500 total *active* satellites orbiting Earth.⁴ Of these, SpaceX operates approximately 4,000.⁵ As such, the number of satellites authorized by the Order for SpaceX alone has the potential to *double* the total number of active satellites orbiting Earth. Order ¶ 1; *supra* n. 4. Stated another way, this single Order authorizes doubling the total number of satellites orbiting Earth worldwide. *Id.* And, it represents the authorization of satellites from *one country* for only *one company*. *Id.* Although this appeal relates to that one company's *single* application, the broader impact of the Order's authorization on Earth's orbital environment – and particularly as appreciated from the United States - cannot be understated.

Indeed, Earth's orbital sphere necessarily constitutes an integral component of Earth's environment. And, given the use of this orbital space by humans, it constitutes an integral component of the human environment. The term "human environment" arises from the National Environmental Policy Act ("NEPA"), 42

⁴ As of April 12, 2023, the number of total satellites for which current TLE data exists at celestrak.org is 7,542. CELESTRAK, <https://celestrak.org/NORAD/elements/gp.php?GROUP=starlink&FORMAT=tle> (last visited April 12, 2023).

⁵ As of April 12, 2023, the number of Starlink satellites for which current TLE data exists at celestrak.org is 3,927. CELESTRAK, <https://celestrak.org/NORAD/elements/gp.php?GROUP=starlink&FORMAT=tle> (last visited April 12, 2023).

U.S.C. §§ 4321, *et seq.*, and its definition emanates from the Council on Environmental Quality's ("CEQ") regulations ("CEQ Regulations") implementing NEPA. The enactment of NEPA represented a bold policy of the United States to mitigate the "profound impact of man's activity on the interrelations of all components of the nature environment" through the use of "all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." 42 U.S.C. § 4331. This policy included the recognition that at any time the then current generation serves "as trustee of the environment for succeeding generations." *Id.* Additionally, it also sought to "assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings." *Id.* And thus, NEPA requires federal agencies to think about the effects of their decisions on the environment before acting. *See generally* 42 U.S.C. §§ 4321, *et seq.*

To implement NEPA, Congress created the CEQ that, in turn, promulgated the CEQ Regulations for such purpose. The CEQ Regulations define "human environment" as "comprehensively [including] the natural and physical environment and the relationship of people with that environment." 40 C.F.R. §

1508.14.⁶ NEPA, the CEQ Regulations, and the Commission's rules implementing them relate to the *effects* of actions on the human environment. Under the CEQ Regulations, "effects" include:

- (a) Direct effects, which are caused by the action and occur at the same time and place.
- (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in these regulations are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and

⁶ In 2020, the CEQ amended some of its regulations. However, in 2021, the CEQ issued an interim rule extending the deadline by which agencies needed to review, develop, or revise their regulations to comply with the procedural provisions of NEPA and the amended CEQ Regulations to September 2023. Deadline for Agencies To Propose Updates to National Environmental Policy Act Procedures, 86 Fed. Reg. 34154 (June 29, 2021) (to be codified at 40 C.F.R 1507). At the same time, the CEQ continued to review the 2020 amendments from the prior administration and, in 2022, the CEQ again amended some of its regulations to return to the version prior to the 2020 amendments. National Environmental Policy Act Implementing Regulations Revisions, 87 Fed. Reg. 23453 (May 20, 2022) (to be codified at 40 C.F.R. §§ 1502,1507, 1508). In any case, the Commission need not yet comply with the 2020 or 2022 amendments. For purposes of information, apart from being moved to 40 C.F.R. § 1508.1(m), the amended definition remains largely the same: "Human environment means comprehensively the natural and physical environment and the relationship of present and future generations of Americans with that environment."

detrimental effects even if on balance the agency believes that the effect will be beneficial.

40 C.F.R. § 1508.8.⁷ Under the CEQ Regulations, agencies may exclude any categories of actions that have been found not to have a significant effect, whether *individually or cumulatively*, on the human environment such that they do not require preparation of an environmental assessment or environmental impact

⁷ Again, the CEQ amended its regulations in 2020 and then again in 2022, but the FCC need not yet comply with the amended regulations. *See supra* n. 5. For purposes of information, however, the amendments moved “effects” to 40 C.F.R. § 1508.1(g) and expressly added a section on “cumulative effects”:

Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. § 1508.1(g) (2020). Clearly, under the amended § 1508.1(g), any agency must consider the cumulative effects of any specific action under review in context of all other “past, present, and reasonably foreseeable actions” by it, with respect to the same and other applicants and third parties, as well as all other agencies and their actions. *Id.* In this context, when § 1508.1(g) becomes effective for the Commission, the Commission would then certainly need to consider the satellites sought by any single application with *all* other existing satellites, all pending applications by any party, and “reasonably foreseeable” applications sought by any party – not just the applicant. *See id.* But again, as the Commission need not yet comply with the 2020 or 2022 amendments, the amended § 1508.1(g) does not form any part of the analysis herein. But, at the time of SpaceX’ application, the Order, and now, the Commission must still consider cumulative effects pursuant to 40 C.F.R. § 1508.4.

statement.⁸ 40 C.F.R. § 1508.4. At the same time, the agency must continue to provide “for extraordinary circumstances in which a normally excluded action may have a significant environmental effect.” *Id.*

In implementing NEPA and the CEQ Regulations, the Commission has generally excluded any satellite or space station activities licensed and regulated

⁸ In the 2020 amendments to the CEQ Regulations, the CEQ substantively amended its regulations, including 40 C.F.R. § 1508.4. It moved categorical exclusions to § 1501.4 and provided further guidance on NEPA review in 40 C.F.R. § 1501.3. However, as stated above, *supra* n. 5, the FCC need not yet comply with the amended CEQ Regulations. For purposes of information, however, the amended and “current” version of § 1501.3 reads:

1501.3 Determine the appropriate level of NEPA review.

- (a) In assessing the appropriate level of NEPA review, Federal agencies should determine whether the proposed action:
 - (1) Normally does not have significant effects and is categorically excluded (§ 1501.4);
 - (2) Is not likely to have significant effects or the significance of the effects is unknown and is therefore appropriate for an environmental assessment (§ 1501.5); or
 - (3) Is likely to have significant effects and is therefore appropriate for an environmental impact statement (part 1502 of this chapter).

40 C.F.R. § 1501.3. As can be observed, the new (2020) § 1501.3 makes clear that the only instance that will not require either an EA or EIS will be those actions that normally do not have significant effects and become categorically excluded. *Id.* Even where significant effects will be unlikely or unknown, an EA will be required. *Id.* But again, as the Commission has not yet become required to comply with this section, the amended § 1501.3 does not form any part of the analysis herein.

under its authority from its interpretation of the environment. In its regulations, the Commission notes that “any Commission action deemed to have a significant effect upon the quality of the human environment requires the preparation of a Draft Environmental Impact Statement (DEIS) and Final Environmental Impact Statement (FEIS) (collectively referred to as EISs).” 47 CFR § 1.1305. However, the Commission determined that it “reviewed representative actions and has found no common pattern which would enable it to specify actions that will this automatically require EISs.” *Id.* Moreover, it also specifically states that “any Commission action with respect to any new application . . . will be categorically excluded, provided such proposals do not” involve facilities or site locations specified under § 1.1307(a)(1)-(7), high intensity lighting as specified in § 1.1307(a)(8), or result in human exposure to radiofrequency radiation as addressed in § 1.1307(b). 47 C.F.R. § 1.1306. And thus, the Commission excludes any non-terrestrial impact of its actions from environmental consideration. *Id.*

In so doing, the Commission could be presumed to simply be ignorant of the extensive evidence demonstrating the intrinsic *environmental* relationship between Earth and its orbital space. Yet, the FCC’s efforts to control and regulate the orbital environment belies such an interpretation. Indeed, the Commission, in its licensing, oversight, and regulation of satellite operations, has imposed obligations on satellite designers, manufacturers, and operators to mitigate orbital debris in an

effort to sustain Earth’s orbital environment.⁹ Moreover, in prior and the instant proceedings, numerous parties filed arguments and evidence with the Commission articulating (if not demonstrating) how activities in Earth’s orbital space affect species on Earth, which necessarily include those in the United States. In other words, the Commission has clearly been aware that human activities in Earth’s orbit affect humans and other various species on Earth and, particularly, in the United States. Yet, when it comes to implementing environmental obligations imposed upon it, the Commission maintains a position that Earth’s orbital environment remains somehow divorced from the human environment.

On May 26, 2020, SpaceX sought authorization for its second generation of Starlink satellites using the FCC Main Form 312 (“Form 312”). “30k Constellation” FCC Main Form (May 26, 2020, File Number SAT-LOA-20200526-00055). SpaceX subsequently amended its application on August 18, 2021. “Gen2 Amendment” FCC Main Form (August 18, 2021, File Number SAT-AMD-20210818-00105). Form 312 asks any applicant whether “a

⁹ The Commission contends the necessary responsibility to do so arises under “the authority of the Communications Act of 1934, as amended.” *In the Matter of Mitigation of Orbital Debris in the New Space Age*, IB Docket No. 18-313, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 4156, ¶ 15 (2020). And, given the absence of any similar regulatory efforts by an agency or department of the United States Government (as opposed to adoption and/or advocacy of guidelines), the Commission should be applauded for doing so. Ironically, the Commission can easily use NEPA and the CEQ Regulations to easily support its authority to regulate orbital debris.

Commission grant of any proposal in [the] application or amendment [would] have a significant environmental impact as defined by 47 CFR 1.1307.” *Id.* Section 1.1307 is part of the Commission’s regulations implementing NEPA which must, in turn, also comply with the CEQ Regulations. Given § 1.1307 limits the actions that may significantly affect the environment to those that involve facilities or site locations specified under § 1.1307(a)(1)-(7), high intensity lighting as specified in § 1.1307(a)(8), or result in human exposure to radiofrequency radiation as addressed in § 1.1307(b), and further states that all other actions “are deemed individually and cumulatively to have no significant effect on the quality of the human environment and are categorically excluded,” Order ¶ 104, it comes as no surprise that, in both the “30k Constellation” and “Gen2 Amendment,” SpaceX answered “No” to the very narrow § 1.1307 question. Thus, SpaceX did not prepare an environmental assessment required under § 1.1308 “for actions that may have a significant environmental impact.” 47 CFR § 1.1308.

However, where the Commission determines that a proposed action otherwise categorically excluded may have a significant environmental impact, the Commission on its own motion must require an EA of the applicant. 47 C.F.R. § 1.1307(d). Additionally, where an interested person contends that a categorically excluded action by the Commission “will have a significant environmental effect,” the Commission established a provision for an interested person to allege that an

otherwise categorically excluded action will have a significant environmental effect under § 1.1307(c). 47 C.F.R. § 1.307(c).¹⁰ The Commission must then review the petition and “consider the environmental concerns that have been raised.” *Id.* If the Commission determines that the action *may* have a significant environmental impact, it “will require the applicant to prepare an EA.” *Id.*

In response to SpaceX’ application, numerous parties filed objections and petitions with the Commission pursuant to § 1.1307(c), including the Appellant, arguing that authorization of SpaceX’ second generation satellites had and would continue to significantly affect the environment.¹¹ *See infra.* Despite this, the Commission granted SpaceX’ application. *See generally* Order. In doing so, the Commission failed to adequately address the environmental arguments. At times, it provided no reasoned analysis resulting in an arbitrary and capricious treatment of issues. At other times, it acted contrary to law. Consequently, the Order violates the APA, and the Appellant filed this appeal.

II. Arbitrary and Capricious Treatment Violates APA

In the Order, the Commission failed to provide any reasoned analysis of certain environmental arguments and evidence resulting in an arbitrary and

¹⁰ The Commission’s rules allow objections based on environmental considerations to be filed for license applications subject to 47 U.S.C. § 309(b). 47 CFR § 1.1313.

¹¹ The Commission treated the Appellant’s filing as a petition under 47 C.F.R. 1.1307(c). Order ¶ 103, n. 381.

capricious treatment in violation of the APA. Section 706(2)(A) of the APA prohibits agencies from acting in an arbitrary and capricious manner in their decision making. 5 U.S.C. § 706(2)(A). Rather, agencies must employ reasoned analysis. *Am. Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 233 (D.C. Cir. 2008). Indeed, agency actions must be reasonable - and reasonably explained - such that “the agency has acted within a zone of reasonableness and, in particular, that the agency has reasonably considered the relevant issues and reasonably explained the decision.” *FCC v. Prometheus Radio Project*, 141 S. Ct. 1150, 1158 (2021) (citations omitted). “[T]he agency must examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made.'" *Motor Vehicle Mfrs. Ass'n of the U.S. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (quoting *Burlington Truck Lines v. United States*, 371 U.S. 156, 168 (1962)). Conclusory statements do not suffice. *Am. Radio Relay League, Inc.*, 524 F.3d at 241; *Am. Horse Protection Ass'n. v. Lyng*, 812 F.2d 1, 6 (D.C. Cir. 1987). This “arbitrary and capricious” standard governs “review of all proceedings that are subject to challenge under the APA.” *Eagle Broad. Group, Ltd. v. FCC*, 563 F.3d 543, 551 (D.C. Cir. 2009) (citation omitted). This applies to an agency’s licensing decisions. *NRDC v. United States NRC*, 823 F.3d 641, 648-649 (D.C. Cir. 2016) (APA “governs our review of an agency’s rule or licensing decision”). As argued in greater detail below, the

Commission acted in an arbitrary and capricious manner in addressing the Appellant's environmental arguments with respect to adverse effects on the general public and the atmosphere. Consequently, the Order must be vacated.

A. Adverse Effects on "General Public"

In response to arguments that satellite reflectivity from SpaceX satellites will impact the general public through adverse aesthetic, social and cultural, and health effects, the Commission states in a conclusory manner that it finds the record does not show that effects on "the general public, plants, and animals may be significant" and does not require an EA. Order ¶ 123. It does so despite the Appellant addressing the satellites' adverse effects on the atmosphere¹² and light pollution from solar reflectivity and sky glow. *Comments of NRDC and IDA*, pp. 7-11; *see also infra* II.B. With respect to the latter, the Appellant referenced studies that addressed the effects of light pollution on human health as well as plant and animal life. *Id.*, p. 9. The Appellant also referenced arguments raised by Viasat, Inc. in its petition. *Id.*, p. 7 (citing *Viasat Petition to Deny or Hold in Abeyance* (Feb. 8, 2022), at 58-59). In fact, the Commission acknowledged that:

. . . the Astronomical Society of Edinburgh argues deployment of 30,000 additional satellites will completely ruin the night sky, costing humanity "too much of our natural heritage and beauty of the night sky." *See* The Astronomical Society of Edinburgh September 23, 2022 Letter, at 1. NRDC/IDA argues the sunlight reflection caused by SpaceX satellites will impact human health including disruptions to

¹² *See Comments of NRDC and IDA*, pp. 7-8; *infra* II.B.

humans' circadian rhythms and stimulation of neuroendocrine and neurobehavioral responses. *See* NRDC/IDA Comments at 9 (citing United Nations Office for Outer Space Affairs, et al, Dark and Quiet Skies for Science and Society: Report and Recommendations (2020) <https://www.iau.org/static/publications/dqskies-book-29-12-20.pdf>). NRDC/IDA also argues the increased light pollution will cause significant harm to plants and animals, which humans value for food, quality of life, income from tourism, and religious and cultural reasons. *Id.* (citing Wright, K.P. Jr, McHill, A.W., Birks, B.R., Griffin, B.R., Rusterholz, T. & Chinoy, E.D. 2013; Entrainment of the human circadian clock to the natural light-dark cycle. *Curr. Biol.* 23:1554-8; Evans, J.A. & Davidson, A.J. 2013, Health consequences of circadian disruption in humans and animal models. *Prog Mol Biol Transl Sci.* 119:283-323). Sierra Solter Hunt also states that the “constant reentry burning of satellites may cause global light pollution due to innumerable reflective satellite particles left in orbit,” and light pollution is linked to increased cancer risk, *see* Sierra Solter Hunt September 23, 2022 Letter at 1, and Professor Andy Lawrence further argues the SpaceX Gen2 Starlink constellation will impact casual stargazers and indigenous communities, who value the night sky for religious activities and who also live in the darkest areas where reflected sunlight from Starlink satellites will be most noticeable, *see* Andy Lawrence September 23, 2022 Letter at 3. Additionally, NRDC/IDA states that the increased “light pollution” from SpaceX satellites will harm “the wilderness experience NRDC members and others value for the solitude and escape from technology and urbanization it provides.” NRDC/IDA Comments at 10. NRDC/IDA states, “American Psychological Association has linked hiking in the wilderness and other exposure to a host of health benefits, including improved attention, lower stress, better mood, and reduced risk of psychiatric disorders. The light of passing satellites compromises the wilderness experience and its benefits in the same way that ‘pinging of a cellphone’ does. The ‘untrammelled’ nature promised by the 1964 Wilderness Act is lost.” *Id.*

Order, pp. 64-65, n. 476. And yet, the Commission failed to provide, much less develop, any arguments or say much more. *Id.* At best, the Commission echoes SpaceX' self-serving representations that it *expects* its second generation satellites

will be darker than the first generation and *hopes* them to be invisible to the naked eye. *Id.* This non-existent treatment of these substantive issues does not constitute the reasoned analysis required by the APA. *See Am. Radio*, 524 F.3d at 241; *Am. Horse*, 812 F.2d at 6. Consequently, the Commission has violated the APA by reaching its conclusion in an arbitrary and capricious manner. *See id.* Therefore, the Order should be vacated and remanded with an instruction to the Commission to conduct reasoned analysis on these issues presented by the Appellant and other parties. *See id.*; *Am. Bird Conservancy, Inc. v. FCC*, 516 F.3d 1027, 1035 (D.C. Cir. 2008).

B. Adverse Effects on Atmosphere

Although the Commission provides a lengthier response to the effects of satellites re-entering Earth's atmosphere on humans and, particularly, citizens of the United States, this does not say much about the substance of the response. At its essence, the Commission's treatment of atmospheric effects suffers some of the same deficiencies as those in Section II.A. immediately above. Indeed, the Commission cites the Parties' arguments without substantively addressing the core issues. For example, it dismisses the estimated amounts of alumina contained in the record given that the Commission has only authorized a fraction of the satellites sought by SpaceX in the Application. Order ¶ 117. Apart from an implicit reliance on math (and presumption of a simple, linear relationship), it does not

explain the calculation and resulting conclusion that the amounts attributed to the authorized satellites may *not* comprise a significant environmental impact. *Id.* The Commission fails to even consider that the number of satellites it authorizes in the Order doubles the *total* number of active satellites orbiting Earth. *See generally* Order.

Then, at the same time it relies on SpaceX’ “good citizen” representations, it also acknowledges the nascent nature of current scientific understanding on the effects of satellites on the atmosphere and climate change. *Id.* Despite referencing numerous studies cited by the Appellant and others, it relies on an ESA slide report and a report summary from the European Space Agency (“ESA”) as being the most relevant evidence.¹³ Yet, the ESA slide report cited by SpaceX demonstrates that the “[m]aterial model is very important” (comparing various models of aluminum and other metals) and reflects ozone loss would occur and scale more or less with re-entry mass, among other findings. Order ¶ 116, n. 448 (citing Slimane Bekki et al., *Environmental impacts of atmospheric emissions from spacecraft re-entry demise*, Eur. Space Agency, at 10, 13 (Sept. 21, 2021),

<https://indico.esa.int/event/321/contributions/6403/attachments/4335/6538/esa->

¹³ In so doing, the Commission moves from conclusory reliance on the decisions of a federal agency to that of a foreign entity, the European Space Agency. This does not mean to suggest that the contents of an ESA report should be dismissed, however it does not warrant the same deference as that of a federal agency.

csid-21- bekki.pdf). The ESA report summarizing two limited studies employing modeling *predictions* stated:

while both studies agree that the atmospheric impact of spacecraft reentries is relatively low, there are still high-level uncertainties on aerothermodynamics and atmospheric chemistry-transport modelling and a lack of observational (in-situ) data to evaluate assumptions and models. Further detailed assessments on first reentry plumes should also be made, with a greater emphasis on local and regional scales, especially in the polar region, to better quantify atmospheric impacts.

Id. (citing *On the Atmospheric Impact of Demise Upon Reentry*, The Clean Space Blog, ESA (Aug. 11, 2022), <https://blogs.esa.int/cleanspace/2022/08/11/on-the-atmospheric-impact-of-spacecraft-demise-upon-reentry/>)). In short, the ESA report states that not enough data exists to evaluate the assumptions and models. *Id.* Indeed, more analysis is needed. *Id.*

Despite this, the Commission concludes without an argument as to why (apart from merely repeating citations) that there cannot be a significant environmental impact associated with the authorized action. Order ¶ 118. In essence, the Commission does nothing more than rely on SpaceX’ “good citizen” representations and the lack of scientific certainty. Such a treatment does not constitute the reasoned analysis required by the APA. As such, the Commission’s arbitrary and capricious treatment violates the APA. *See Am. Radio*, 524 F.3d at 241; *Am. Horse*, 812 F.2d at 6. Therefore, the Order should be vacated and

remanded for reasoned analysis on the issue of adverse effects on the atmosphere.

See id.; Am. Bird Conservancy, Inc., 516 F.3d at 1035.

III. Order Violates APA as Not in Accordance With Law

Beyond being arbitrary and capricious, the Commission's Order also violates the APA in employing analysis and reaching conclusions not in accordance with law. These analyses all relate to NEPA, the CEQ Regulations, and the Commission's implementation of NEPA/CEQ. In particular, the Commission too quickly dismisses the need for a programmatic Environmental Impact Statement ("EIS") and does so without conducting an Environmental Assessment ("EA"). Further, the Commission misinterprets the Applicant's burden under its own "may" standard. Finally, it misapplies its own regulations. In each instance, the Commission acted in a manner not in accordance with law which § 706(2)(A) of the APA prohibits. 5 U.S.C. § 706(2)(A). Consequently, the Court should vacate the Order as being contrary to law with respect to these sections. *See id.*

A. Commission Erred in Denying Request for a Programmatic EIS

The Commission erred in dismissing the requests by Appellant and others for a programmatic EIS. In the Order, the Commission declined the opportunity to conduct a programmatic EIS as simply being "outside the scope of this licensing proceeding" and "more squarely presented within the context of [its] overall

regulatory framework.” Order ¶ 108. Without more,¹⁴ the reasons stated cannot support the Commission’s decision not to proceed with a programmatic EIS. *See Am. Bird Conservancy, Inc.*, 516 F.3d at 1033. Indeed, the licensing of satellites and space stations across applicants would seem to be the very “connected”, “cumulative”, and “similar” agency actions the CEQ Regulations warrant conducting a programmatic and single environmental impact statement. *See id.* at 1032 (citing 40 C.F.R. § 1508.25(a)). At the very minimum, the Commission cannot decline proceeding with a programmatic EIS without “first requiring the preparation of an EA.” *Id.* at 1033. And, this it did not do. Order ¶ 108. Consequently, the Commission failed to comply with its responsibilities under NEPA.¹⁵ *See id.* Therefore, the Order should be vacated and remanded. *See id.*

B. Improper Burden on Appellant

Here, the Appellant filed a petition pursuant to § 1.1307(c) and alleged that the proposed licensure of SpaceX “30k Application” would cause significant environmental effects related to the launch, operation, and disposal of satellites. *See generally Comments of NRDC and IDA.* Specifically, the Appellant raised

¹⁴ Arguably, the absence of reasoned analysis also constitutes “arbitrary and capricious” decision making in violation of the APA. *See* 5 U.S.C. § 706(2)(A).

¹⁵ Absent a programmatic EIS or an assessment of the aggregate and cumulative effects of all applications for satellites, the Commission’s singular focus on each application with blinders to its broader licensing activity will foreclose any real assessment by the Commission of the environmental effects from satellites before it’s too late.

significant environmental effects related to light pollution and climate change. *Id.* These allegations invoked an obligation on the Commission to review and consider the environmental concerns raised. *See* 47 C.F.R. § 1.1307(c); *Am. Bird Conservancy, Inc.*, 516 F.3d at 1033. Moreover, should the Commission “determine that the action may have a significant environmental impact,” it must require the preparation of an EA. *Id.* In reviewing the alleged significant environmental effects, the Commission concluded that complainants had not demonstrated that potentially significant environmental impacts may occur and did not require an EA. *See generally* Order. However, in reaching its conclusions with respect to the environmental effects, the Commission failed to employ the proper analysis under its “may” standard and imposed a burden on Appellant not in accordance with law.

1. Light Pollution

The Appellant alleged that approval of the 30k Application could result in light pollution that can have “significant and adverse aesthetic, scientific, social and cultural, and health effects on the human environment on Earth.” *Comments of NRDC and IDA*, p. 8. In addressing these allegations, the Commission separated them into issues relating to the “General Public” and “Astronomy.”

a. General Public

With respect to issues relating to what the Commission grouped together as

the “General Public,”¹⁶ the Appellant stated that numerous “studies show the negative impacts that night pollution can have on human health.” *Comments of NRDC and IDA*, p. 9. In doing so, it cited the United Nations Office for Outer Space Affairs (“UNOOSA”) 2020 “Dark and Quiet Skies for Science and Society: Report and Recommendations.” *Id.* (citing Connie Walker et al, *Dark and Quiet Skies for Science and Society: Report and recommendations*, U.N. OFFICE FOR OUTER SPACE AFFAIRS, 92-102, <https://www.iau.org/static/publications/dqskies-book-29-12-20.pdf> (2020) (hereafter “UNOOSA Report and Recommendations”) (analyzes results of numerous studies). Despite the possibility that the light pollution emanating from satellites may have a significant environmental effect, the Commission simply stated that “the record does not show that potential effects on the general public, plants, and animals may be significant.” Order ¶ 123. Given the effects that had been raised, and in the absence of any critical assessment of the Appellant’s arguments and cited authority, the Commission appears to have required “definitive evidence of significant effects,” a requirement that “plainly contravenes the ‘may’ standard.” *See Am. Bird Conservancy, Inc.*, 516 F.3d at 1033. For, NEPA does not require certainty in raising issues related to future harm.

¹⁶ The Commission described this as “impacts on the general public, including human health, enjoyment of nature, and the cultural and religious practices of indigenous communities.” Order ¶ 120. In so doing, however, the Order completely omits reference to effects that the solar reflectivity and resulting light pollution would have on other diverse species raised by the Appellant. *Id.*

Id. Too often the perception of NEPA compliance focuses on what *is known* at a particular point in time as opposed to acknowledging the *unknown*.¹⁷ In fact:

[a]s the court has admonished, "[i]t must be remembered that the basic thrust of the agency's responsibilities under NEPA is to predict the environmental effects of a proposed action before the action is taken and those effects fully known." *Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1091-92 (D.C. Cir. 1973). A precondition of certainty before initiating NEPA procedures would jeopardize NEPA's purpose to ensure that agencies consider environmental impacts *before they act* rather than wait until it is too late.

Id.

Apart from its conclusory dismissal of the arguments, evidence, and studies

¹⁷ NEPA's legislative history reflects this. In October 1968, the Congress issued a white paper on "A National Policy for the Environment" in which it cited a National Academy of Sciences report that stated:

We live in a period of social and technological revolution in which man's ability to manipulate the processes of nature for his own economic and social purposes is increasing at a rate which his forbears would find frightening . . . [t]he patterns of society are being rapidly rearranged, and new sets of aspirations, new evaluations of what constitutes a resource, and new requirements in both types and quantities of resources are resulting. The effects on man himself of the changes he has wrought in the balance of great natural forces . . . are but dimly perceived and not at all well understood . . . If divergent lines of progress are seen to give rise to ever-greater stresses and strains too fast to be resolve after they have risen and been perceived, then obviously the intelligent and rational thing to do is to learn to anticipate those untoward developments before they arise.

COMM. ON SCI. AND ASTRONAUTICS, A NATIONAL POLICY FOR THE ENVIRONMENT (Comm. Print 1968) <https://ceq.doe.gov/docs/laws-regulations/Congress-White-Paper.pdf>).

in the record, the only articulated grounds for its decision relating to these effects relied only on SpaceX' *expectation* that "Gen2 Starlink satellites will be darker than the first generation satellites" and SpaceX' *goal* "to make "Gen2 Starlink 'satellites invisible to the naked eye." Order ¶ 96. Then, at the same time it flatly dismissed the possibility of significant effects, the Commission implicitly recognized there *existed* effects to be mitigated when it stated that the conditions adopted to "reduce effects on astronomy services will also address these other satellite sunlight reflectivity concerns involving the general public." Order ¶ 123.

When considering that the Appellant need only have shown that significant effects *may* occur, the Commission's decision imposed a burden on the Appellant contrary to its own rules. *See Am. Bird Conservancy, Inc.*, 516 F.3d at 1033. There need not be definitive evidence or certainty. *Id.* Given all that Appellant and others submitted to the Commission, they clearly demonstrated that significant effects *may* occur as a result of SpaceX satellites with respect to the general public and "aesthetic, scientific, social and cultural, and health" concerns thereby meeting the § 1.1307(c) standard. *See Id.* at 1033-1034 ("the *Order's* emphasis on 'conflicting studies' and 'sharply divergent views' . . . confirms, rather than refutes" that the action "may have the requisite effect"). Thus, with respect to these "General Public" environmental concerns, the Order is not in accordance with NEPA, the CEQ Regulations, or the Commission's own regulations. *See Am. Bird*

Conservancy, Inc., 516 F.3d at 1033-1034. Moreover, as the “may” standard had been met, the Commission’s own regulations “mandate at least the completion of an EA.” 47 C.F.R. § 1.1307(c). Yet, the Commission did not require this. *See generally* Order. Therefore, the Order should be vacated and remanded for proceedings consistent with its regulations and NEPA. *See id.; Am. Bird Conservancy, Inc.*, 516 F.3d at 1033-1034.

b. Astronomy

For the same reasons, the Commission also insufficiently addressed the significant effects of the proposed SpaceX satellites on astronomy. To be sure, the Commission did not state anywhere that the Appellant and other parties failed to demonstrate significant effects. In fact, it identified an American Astronomical Society study cited in the record that “found an increase in the number of astronomical images affected by Starlink.” Order ¶ 121. The Commission also noted the Appellant’s reference to comments by NASA in the proceeding relating to the “impact of these satellites on its missions tracking near earth objects which could strike the Earth.” *Id.* Further, the Commission noted disagreements between the parties on certain issues (“[t]he parties argue the vast increase in the number of satellites SpaceX proposes, along with their larger size, will dramatically worsen these impacts, which, they contend, are already being experienced today with SpaceX’ partially deployed Gen1 Starlink system, and therefore the Commission

must conduct environmental review under NEPA.”). *Id.* ¶ 120. Despite these references, the Commission failed to anywhere address whether the Appellant had sufficiently demonstrated that significant effects “may” occur. Order ¶¶ 120-123.

Rather, the Commission deviously concluded that it need not conduct an environmental review because it had addressed the issues under its “obligation to ensure grant of [SpaceX] application is in the public interest” and the conditions imposed upon SpaceX in granting the application. Order ¶ 122. Devious because, in so doing, the Commission avoids a NEPA analysis despite having previously suggested it would do so. Earlier in its Order, the Commission stated it would not address “head on” the applicability of NEPA to the orbital environment¹⁸ or address the validity of its categorical exclusion of, essentially, nearly all of its actions because it intended to address NEPA and the CEQ Regulations despite the disputed arguments on these points. Order ¶ 109. Indeed, the Commission stated that it would “assume, without deciding, that NEPA applies.” *Id.* If NEPA applies, the Commission cannot circumvent the appropriate NEPA review because it examined some of the issues based on what it determined might be in the public interest. Yet, without citing any authority, the Commission does exactly that by

¹⁸ When and if the amended CEQ Regulations come into effect with respect to the Commission in their current form, the Commission will be hard pressed to make a persuasive argument that regulation of the orbital environment can escape NEPA and the CEQ Regulations.

stating “it is not necessary for us to conduct environmental review under NEPA on this issue.” Order ¶ 122. And, thus, the Commission avoids not only conducting an environmental review under NEPA and the need to apply its own 1.1307(c) “may” standard to the significant environmental effects on astronomy, but also quietly avoids addressing the applicability of NEPA and whether it can abrogate such obligations. It cannot “have its cake and eat it too,” so to speak. If NEPA applies (and it does), the Commission must complete a review under NEPA, the CEQ Regulations, and § 1.1307(c). *See Am. Bird Conservancy, Inc.*, 516 F.3d at 1033-1034.

Based on the foregoing, absent a determination that actions relating to satellites and space stations have no significant environmental impact (they do), or a determination that NEPA does not apply to Earth’s orbital environment (it does), the Commission must conduct a reasoned analysis under NEPA, the CEQ Regulations, and its own implementation of them (particularly, the “may” standard in § 1.1307) to fully address the issues before it. By its failure to do any of these with respect to the alleged significant environmental effects related to astronomy, the Commission’s Order is not in accordance with law.

Returning to the “may” standard, the Commission at the very least failed to apply the proper interpretation – or any interpretation - of its own standard to the analysis of the significant effects on astronomy. Given that the Appellant (and

others) demonstrated that significant effects may occur with respect to astronomy, the Commission's own regulations "mandate at least the completion of an EA." *See Am. Bird Conservancy, Inc.*, 516 F.3d at 1034. Thus, with respect to the astronomy environmental concerns, the Order is not in accordance with NEPA, the CEQ Regulations, or the Commission's own regulations implementing them. *See id.* Therefore, the Order should be vacated and remanded for proceedings consistent with its regulations and NEPA. *See id.* at 1033-1034.

2. Atmospheric Effects

The Commission also inadequately addressed the significant effects on the environment caused by satellites re-entering Earth's atmosphere. Order ¶¶ 116-119. Again, the Commission noted the parties' disagreement on the amount and impacts of the alumina. *Id.* ¶ 116. After repeating the parties' arguments, the Commission explained that, by authorizing a subset of the proposed satellites, the "Parties' estimated amount of alumina that could be introduced into the atmosphere will not come to pass from [its] action today." *Id.* ¶ 117. It concludes that the record does not convince it that the re-entering satellites "may have a significant environmental impact" relying upon an ESA study above all others in the record. *Id.* Despite noting that the ESA study qualified its conclusions with "uncertainties" and the need for more observational data (similar to the GAO report referencing the nascent understanding), the Commission held that

uncertainties do not require the preparation of an EA. *Id.* Said another way, the Commission's reasoning could be interpreted to implicitly demand certainty before requiring an EA. This would again constitute a failure of the Commission to apply its own standard to the analysis. *See supra; Am. Bird Conservancy, Inc.*, 516 F.3d at 1033. The "may" standard does not require definitive evidence of significant effects. *Id.* It also does not require consensus among scientists. *Id.* Given that significant effects may occur with respect to reentry of satellites into the Earth's atmosphere, the Commission's own regulations "mandate at least the completion of an EA." *Id.* at 1034. Thus, with respect to the atmospheric effects, the Order is not in accordance with NEPA, the CEQ Regulations, or the Commission's own regulations implementing them. *Id.* Therefore, on this basis as well, it should be vacated and remanded for proceedings consistent with its regulations and NEPA. *See Id.* at 1033-1034.

C. Interpretation of 47 C.F.R. § 1.1311(e)

In its Order and consideration of the instant circumstances, the Commission erroneously concluded that it did not need to conduct an environmental review of atmospheric effects from rocket launches because the Federal Aviation Administration ("FAA") had done so. Order ¶ 115. To support its reasoning, the Commission cited § 1.1311(e) of its own regulations implementing NEPA. *Id.* Section 1.1311(e) states:

§ 1.1311 Environmental information to be included in the environmental assessment (EA).

* * * * *

(e) An EA need not be submitted to the Commission if another agency of the Federal Government has assumed responsibility for determining whether [sic] of the facilities in question will have a significant effect on the quality of the human environment and, if it will, for invoking the environmental impact statement process.

47 C.F.R. § 1.1311(e). To begin with, § 1.1311(e) applies to submissions by an applicant. 47 C.F.R. § 1.1311. Additionally, the regulation implies that there has been an explicit assumption of responsibility by another agency.¹⁹ *Id.* Elsewhere in the Commission's rules, 47 C.F.R. § 17.4 specifically calls out the need for a written agreement in relation to § 1.1311 and antennas:

§ 17.4 Antenna structure registration.

* * * * *

(c) Each prospective applicant must complete the environmental notification process described in this paragraph, except as specified in paragraph (c)(1) of this section.

* * * * *

(vi) For construction, modification, or replacement of an antenna structure on Federal land where another Federal agency has assumed responsibility for evaluating the potentially significant environmental effect of the proposed antenna structure on the quality of the human environment and for invoking any required environmental impact statement process, or for any other structure where another Federal

¹⁹ There appears to be no cases specifically addressing 47 C.F.R. § 1.1311(e).

agency has assumed such responsibilities pursuant to a written agreement with the Commission (*see* § 1.1311(e) of this chapter);

Moreover, the Commission itself has previously explained:

CEQ regulations provide for the designation of a lead agency and one or more cooperating agencies when more than one Federal agency is involved in a proposed action. *See* 40 CFR 1508.16 (lead agency) and 40 CFR 1508.5 (cooperating agency). Consistent with these regulations, Section 1.1311(e) of the Commission's rules provides that an EA need not be submitted to the Commission if another Federal agency has assumed responsibility for determining whether the facility will have a significant environmental effect and, if it will, for invoking the EIS process. For example, if a proposed facility that requires registration in the ASR system is to be located on Federal land, the landholding agency ordinarily functions as the lead agency and the Commission does not perform an environmental review except as necessary to ensure that the EA prepared by the lead agency satisfies the Commission's responsibility. The Commission cautions that the exemption is limited in scope only to towers located on Federal land, for which the landholding agency routinely assumes lead agency responsibilities. The exemption will not routinely apply in other situations where proposed antenna structures must secure environmental clearance from other Federal agencies. In those circumstances, the Commission *cannot assume the other agency to be the lead agency*. Rather, as part of the process of reviewing a Request filed in response to the pre-application public notice, the Commission will consider whether ongoing NEPA review of the proposed antenna structure by another Federal agency relieves the applicant of having to submit an EA to the Commission under Section 1.1311(e). The Commission delegates to the Wireless Telecommunications Bureau authority to enter into agreements with other Federal agencies that would designate the other agency as the lead agency for specified categories of actions and thereby obviate the need for the Commission's environmental notification process.

Effects of Communications Towers on Migratory Birds, 77 Fed. Reg 3935 ¶ 57

(January 26, 2012); *see also* 40 C.F.R. § 1501.5 (“Lead agencies,” pre-2020

amendments). Thus, the Commission cannot *assume* the FAA to be the lead agency in relation to atmospheric effects from launches. *See id.* This must be affirmatively agreed upon. *See id.* Moreover, the Commission should not be permitted *nunc pro tunc* to identify the FAA as a lead agency or an agency that has addressed environmental effects of an action. *See id.*; 47 C.F.R. § 1.1311(e). Even with its after the fact analysis, the Commission did not adequately or sufficiently demonstrate that the FAA addressed all of the specific concerns raised by the Appellant and others. Order ¶¶ 113-115. Consequently, the Commission erroneously applied 47 C.F.R. § 1.1311(e) to the circumstances before it in the Order. *See* 47 C.F.R. § 1.1311(e). Thus, with respect to the atmospheric effects from launches, the Order is not in accordance with NEPA, the CEQ Regulations, or the Commission's own regulations implementing them. *Id.* Therefore, on this basis as well, it should be vacated and remanded for proceedings consistent with its regulations and NEPA. *See Am. Bird Conservancy, Inc.*, 516 F.3d at 1033-1034.

D. The Order is Not in Accordance With Law

Based on the foregoing, the Order is not in accordance with law and should be vacated and remanded.

CONCLUSION

This Court should hold that the Commission's Order violates the APA with respect to the environmental issues raised by Appellant by being (a) arbitrary and capricious and (b) not in accordance with law, particularly NEPA, the CEQ Regulations, and the Commission's rules implementing them; further hold that NEPA requires at least an environmental assessment with respect to SpaceX' Application; vacate the Commission's Order and approval of SpaceX' Application; and, remand to the Commission for proceedings compliant with NEPA, the CEQ Regulations, the Commission's rules, and this Court's ruling.

Dated: April 14, 2023

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CERTIFICATE OF COMPLIANCE

This brief complies with the type-volume limitation of Federal Rule of Appellate Procedure 32(a)(7) and this Court's February 2, 2023 Order as it contains 10,778 words, excluding the parts of the brief exempted by Federal Rule of Appellate Procedure 32(f) and D.C. Circuit Rule 32(e)(1). This brief complies with the typeface requirements of Federal Rule of Appellate Procedure 32(a)(5) and the type style requirements of Federal Rule of Appellate Procedure 32(a)(6), as it has been prepared in a proportionally spaced typeface, 14-point Times New Roman font, using Microsoft Word for Mac.

Dated: April 14, 2023

Respectfully submitted,

/s/Charles Lee Mudd Jr.

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CERTIFICATE OF SERVICE

I hereby certify I have electronically filed this APPELLANT’S BRIEF with the United States Court of Appeals for the D.C. Circuit on April 14, 2023 using its Electronic Case Filing (“ECF”) system. Consequently, service shall be automatically accomplished through the ECF system as to ECF Users on the 14th day of April 2023. Additionally, copies of the APPELLANT’S BRIEF shall be sent by First Class Mail to any non-ECF parties having filed appearances listed in the Service List below (if any).

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All parties in this matter are represented by counsel who are ECF users.