Filing Receipt

Filing Date - 2024-11-12 02:56:41 PM

Control Number - 57115

Item Number - 171

SOAH DOCKET NO. 473-25-02531
PUC DOCKET NO. 57115

JOINT APPLICATION OF THE CITY OF SAN ANTONIO, ACTING BY AND THROUGH THE CITY PUBLIC SERVICE BOARD (CPS ENERGY), AND SOUTH TEXAS ELECTRIC COOPERATIVE, INC. (STEC) TO AMEND THEIR CERTIFICATES OF CONVENIENCE AND NECESSITY FOR THE PROPOSED HOWARD ROAD-TO-SAN MIGUEL 345-KV TRANSMISSION LINE IN BEXAR AND ATASCOSA COUNTIES	§	BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS

JON SPRINGER AND KELLY SPRINGER'S STATEMENT OF POSITION

TO THE HONORABLE JUDGE OF SAID COURT:

Intervenors Statement of Position

1. Intervenors, Kelly Springer and Jon Springer, own 2 parcels of property (63205 and 63207 in Atascosa County) affected by proposed Segment 66 (Routes B, D, E, F, J, and AH. Hereinafter referred to as "proposed Route 66 segments"). Route 66 crosses the Springer's residence (63205) and is close to their agricultural property (63207).

2. Under the "Land Use and Environmental Evaluation Criteria," the proposed Route 66 segments are unsuitable. Specifically, the proposed Route 66 segments are among the most expensive and longest options and contain a disproportionately large number of habitable structures within 500 feet of the centerline, when compared to alternative routes.

3. Intervenors Jon and Kelly Springer support Route U as the best option to address applicable rules and requirements.

4. In addition, Kelly and Jon Springer are opposed to any of the proposed Route 66 segments because use of either would harm protected wildlife on their property, reduce their property value, and diminish the natural beauty of their property.

Specific Benefits of NOT using Routes B, D, E, F, J, and AH (routes containing Segment 66):

1. Cost – Of the 34 potential routes identified, the routes containing Segment 66 are ranked as the #1, 2, 3, 4, 6, and 9 most expensive alternatives. See Attachment 1.

2. Overall length – The routes containing Segment 66 are the top 6 longest routes. *Id.*

3. Number of habitable structures within 500 ft of centerline – The routes containing Segment 66 are in the top 13 routes with the most structures. *Id.*

Jon Springer and Kelly Springer Statement of reasons they DO NOT want the selected route to include Segment 66:

4. "Our enjoyment of our land is based directly on the natural beauty and the diversity of species we see (and photograph) here. We purchased this property specifically because it was uncleared and has heavy growth. It is one of the few remaining like this in the area and acts as an oasis for wildlife. See Attachment 2.

5. Instead of running the transmission lines through many family's properties, in the back, with no road access or other development aside from cattle fences, we suggest a different path other than segment 66 that follows existing roads and/or existing infrastructure.

6. We have an agricultural use appraisal exemption for honeybees (Atascosa CAD property ID 63205) and are registered with Texas Apiary Inspection Service (TX-7-24-584). We have 12+ hives on the affected property. Power lines emit EMFs that interfere with a bee's ability to navigate and would likely jeopardize our agricultural use appraisal exemption. *Id.*

7. We regularly see and photograph multiple 'species of greatest conservation need'

    - Texas Tortoises – The majority of Texas Tortoises seen on our land were in the proposed location of a 'dead end pole' and transmission lines.
    - Texas Horned Lizards – We also see these in the location of the proposed pole/lines.
    - American Bumblebees – We see these nearly every day during the summer.
    - Monarch Butterflies are also seen frequently.

    (Note that EMFs also interfere with navigation of Bumblebees and Monarchs) *Id.*

8. Human Health Effects – Despite claims that studies have been inconclusive or inconsistent, the majority of independently funded studies show a link between power lines/EMFs and negative health effects, while studies funded by industry (with inherent conflict of interest) tend to conclude that there is no link or state that the results are inconclusive. *Id.*

9. Property Values - There is a document, "Valuation Guidelines for Properties with Electric Transmission Lines", available online (puc.sd.gov) which includes many studies and examples showing significant impacts of transmission lines on property values. *Id.*

Attachment 1:

Howard-San Miguel Project - High Voltage Transmission Lines

Benefits of NOT using Routes B, D, E, F, J, and AH (routes containing Segment 66)

Below are some of the reasons why it would make sense to select Route U or another proposed route that does not include Segment 66. (Information is from the project application https://interchange.puc.texas.gov/search/documents/?controlNumber=57115&itemNumber=2)

Cost

Of the 34 potential routes identified, the routes containing Segment 66 are ranked as the #1, 2, 3, 4, 6, and 9 most expensive alternatives. (Application pg. 498)

Overall length

The routes containing Segment 66 are the top 6 longest routes. (Application pg. 498)

Total number of habitable structures within 500 feet of the centerline

Number of habitable structures within 500 ft of centerline – The routes containing Segment 66 are in the top 13 routes with the most structures. (Application pg. 26)

COMPARISON OF ROUTES INCLUDING SEGMENT 66 WITH OTHER ROUTES

(Ranked Least to Most Desirable)

	Route	Estimated Total Cost
1	B	$390,539,000
2	J	$355,662,000
3	E	$338,936,000
4	D	$337,726,000
5	AE	$333,447,000
6	AH	$333,226,000
7	A	$329,450,000
8	G	$320,916,000
9	F	$317,709,000
10	AG	$316,754,000
11	H	$316,234,000
12	C	$312,318,000
13	AF	$310,425,000
14	X	$308,218,000
15	V	$304,289,000
16	P	$303,129,000
17	K	$302,761,000
18	S	$297,629,000
19	W	$295,819,000
20	I	$295,705,000
21	AA	$294,443,000
22	AD	$293,554,000
23	U	$293,356,000
24	O	$290,180,000
25	Y	$289,833,000
26	AC	$289,787,000
27	L	$289,764,000
28	Z	$287,300,000
29	Q	$286,928,000
30	AB	$285,232,000
31	T	$284,492,000
32	M	$276,258,000
33	R	$275,390,000
34	N	$274,601,000

	Route	Total Length (Miles)
1	J	58.92
2	B	56.67
3	AH	56.19
4	D	55.95
5	E	55.81
6	F	53.42
7	G	52.23
8	AE	51.03
9	X	50.85
10	I	50.8
11	C	50.7
12	AF	50.66
13	AG	50.64
14	P	50.48
15	V	50.47
16	H	50.05
17	AB	49.88
18	K	49.78
19	W	49.44
20	AA	49.34
21	U	49.15
22	S	49.05
23	Z	49.05
24	L	49.02
25	Y	48.87
26	AD	48.64
27	AC	48.35
28	Q	48.23
29	T	47.9
30	A	47.77
31	O	47.6
32	N	47.47
33	M	46.99
34	R	45.32

	Route	Total number of habitable structures within 500 feet of the Centerline
1	AF	179
2	AG	176
3	H	170
4	G	161
5	AE	158
6	F	153
7	B	150
8	D	144
9	E	144
10	AH	137
11	J	133
12	A	130
13	C	122
14	I	102
15	L	88
16	K	84
17	R	81
18	N	78
19	M	77
20	P	77
21	O	76
22	S	75
23	Q	73
24	T	68
25	AB	62
26	AC	53
27	U	50
28	Z	50
29	AD	44
30	V	41
31	W	41
32	AA	41
33	X	40
34	Y	40

Data from the project application: https://interchange.puc.texas.gov/search/documents/?controlNumber=57115&itemNumber=2

Attachment 2:

Howard-San Miguel Project - High Voltage Transmission Lines

Landowner Concerns

First let us say that we understand that this project is very important to the South Texas electrical grid. We were present during the infamous winter storm a few years ago when many of our neighbors went without power for days. We assume that this project will strengthen the electrical grid to hopefully prevent similar future occurrences.

Although we recognize the importance of the project, there are some concerns that we, and our neighbors, have. (For reference, our property is located along the route for segment 66 of the project. This includes proposed Routes B, D, E, F, J and AH)

Our concerns fall into 3 general categories: wildlife impacts, human health effects, and property values.

Wildlife Impacts

Bees – We are registered with the Texas Apiary Inspection Service (TX-7-24-584) and have an ag use appraisal exemption for honeybees. We have 12+ honeybee hives on the affected property and are concerned about the impact of induced EMFs from the transmission lines on our bees. Bees use the Earth's magnetic field to navigate, find their hive, etc.[1] Power lines emit EMFs that interfere with a bee's ability to navigate.

Viewing and photographing the variety of living things on our land is very important to us. We regularly photograph and post observations on iNaturalist and have to date posted 867 observations of 432 different species.[2] In 2019, we even purchased an additional adjacent 22 acre parcel (Atascosa ID 63207) of some of the last remaining uncleared/undeveloped tracts of land in the area to encourage and support wildlife and to allow native species to flourish.

Many wildlife species as well as domestic pets, cattle, etc. may be subject to similar effects as the human health impacts described below. In addition, many migratory birds and other animals use magnetic fields to navigate and therefore are negatively impacted by induced EMFs.

"All living things are vulnerable to EMFs"..."Just as EMFs affect our biology, they do the same to all life forms. EMFs affect the function of cell membranes and can lead to DNA dysfunction: they have an impact on anything with DNA. And that includes plants, animals, insects, and even microbes."... "Since living organisms do not have defenses against variations of greater than 20 percent of natural EMFs, it is realistic to expect that they do not have defenses against man-made EMFs, which vary unpredictably and at 100 percent or more from average intensity."[3]

Endangered and Threatened Species – We regularly see (and post on iNaturalist[2]) the following species, which are currently listed by TPWD as "species of greatest conservation need"[4], on the property affected by the transmission line project (please note that there have been many additional sightings that were not posted because we were without a camera or were unable to get clear enough photos):

- Texas Tortoise (*Gopherus berlandieri*)[5][6]. This species is listed as Threatened in the State of Texas. Note that as part of the project, and in addition to the transmission lines, a "dead end pole" is proposed in the location where we have seen the majority of Texas Tortoises on our land.
- Texas Horned Lizard (*Phrynosoma cornutum*)[7][8]. This species is also listed as Threatened in the State of Texas. We also see these lizards in the location of the proposed pole and lines.
- American Bumblebee (*Bombus pensylvanicus*)[9][10]. This species is on the Texas list of "species of greatest conservation need" and is currently being evaluated for Federal Endangered Species protection.[11] We see them nearly every day during the summer.
- We also regularly see and photograph endangered (per WWF) Monarch Butterflies (*Danaus plexippus*)[12][13].

It seems reasonable to expect that the navigation issue described above for bees would also be applicable to American Bumblebees and possibly the Monarch Butterflies, as well. Even if an environmental impact study is performed to evaluate the impact of the project on these species in general, we will be heartbroken if they disappear from our land.

Human Health Effects

Numerous studies have shown negative effects of Electromagnetic Fields (EMFs) on human health. We understand that not all of the studies performed show negative human health effects. However, considering the funding sources of the studies is illuminating. The majority of independently funded studies show a link between power lines/EMFs and negative health effects, while studies funded by industry (with inherent conflict of interest) tend to conclude that there is no link or state that the results are inconclusive.[14] We lend more credence to the independent studies and therefore believe that the power line generated EMFs are hazardous to human health.

Childhood Leukemia – The Bioinitiative Report[15] has compiled nearly 100 studies providing evidence of the link between EMF exposure and childhood leukemia.[16]

Adult Cancers – *"Based on pooled or meta-analyses as well as subsequent peer-reviewed studies there is strong evidence that excessive exposure to magnetic fields increases risk of adult leukemia, male and female breast cancer and brain cancer."*[14][3]

Neurological effects - The Bioinitiative Report has compiled over 300 studies, with 91% of the studies showing reported neurological effects (Alzheimer's, neuropsychiatric illnesses, sleep disturbances, headaches, fatigue, concentration/attention dysfunction, dizziness, memory issues, anxiety/agitation, irritability, etc.) of Extremely Low Frequency (ELF) EMFs.[17]

DNA damage - The Bioinitiative Report has compiled 67 studies, with 73% of the studies showing reported effects of ELF EMFs on DNA damage.[18]

Free radical (oxidative damage) effects - The Bioinitiative Report has compiled nearly 300 studies, with 90% of the studies showing reported free radical (oxidative damage) effects of ELF EMFs.[19]

Property Values

We are not sure what the actual impact of the project would be on the property values of land such as ours; however, we found the following estimate online:

..."*a property's value can lower by **30%** if it's located **near** power lines.*"[20]

This estimate seems reasonable to us. If we were looking to buy property and saw large power lines nearby, we would probably immediately eliminate that property from further consideration as would 100% of the people we have asked. We simply do not find "appraisal studies" showing no substantial impact to property values to be credible. There is also a document, "Valuation Guidelines for Properties with Electric Transmission Lines", available online[21] which includes many studies and examples showing significant impacts of transmission lines on property values.

Sources:
(1)https://physicsworld.com/a/honey-bees-navigate-using-magnetic-abdomens/
(2)https://www.inaturalist.org/observations?place_id=any&user_id=springercr303&verifiable=any
(3)Dr. Joseph Mercola, "EMF*d", Hay House, 2020, p11, 104, 133

(4)https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/tcap/media/2020_SGCN_allspecies_Final.xlsx
(5)https://tpwd.texas.gov/huntwild/wild/species/txtort/
(6)https://www.inaturalist.org/observations?place_id=any&q=texas%20tortoise&user_id=springercr303&verifiable=any
(7)https://tpwd.texas.gov/huntwild/wild/species/thlizard/
(8)https://www.inaturalist.org/observations?place_id=any&q=texas%20horned%20lizard&user_id=springercr303&verifiable=any
(9)https://en.wikipedia.org/wiki/Bombus_pensylvanicus
(10)https://www.inaturalist.org/observations?place_id=any&q=bumblebee&user_id=springercr303&verifiable=any
(11)https://www.federalregister.gov/documents/2021/09/29/2021-20963/endangered-andthreatened-wildlife-and-plants-90-day-findings-for-five-species
(12)https://www.worldwildlife.org/stories/migratory-monarch-butterfly-now-classified-as-endangered
(13)https://www.inaturalist.org/observations?place_id=any&q=monarch&user_id=springercr303&verifiable=any
(14)Carpenter, David "Extremely low frequency electromagnetic fields and cancer: How source of funding affects results", *Environmental Research*, Volume 178, November 2019, 108688
https://www.sciencedirect.com/science/article/abs/pii/S0013935119304852
(15)https://bioinitiative.org/
(16)https://bioinitiative.org/wpcontent/uploads/pdfs/sec12_2012_Evidence_%20Childhood_Cancers.pdf
(17)https://bioinitiative.org/wp-content/uploads/2022/06/ELF-EMF-Static-Field-Neurological-EffectsAbstracts-2022.pdf
(18)https://bioinitiative.org/wp-content/uploads/2020/09/5-Table-2-Static-Field_ELF-EMF-CometAssay-Studies-2020.pdf
(19)https://bioinitiative.org/wp-content/uploads/2022/06/ELF-EMF-Static-Field-Free-Radical-Oxidative-Damage-Abstracts-2022.pdf
(20)https://beatemf.com/minimum-safe-distance-from-power-lines/
(21)https://puc.sd.gov/commission/dockets/electric/2013/EL13-028/guidelines.pdf

Thank you for your consideration and allowing us to express our concerns regarding the project. We feel very strongly about this and sincerely hope that the selected transmission lines are routed far away from our property and neighborhood!

Respectfully,

Jon and Kelly Springer
3635 County Road 303
Jourdanton, TX 78026
(We also own 3755 County Road 303)
jlspringer@wyoming.com
kmspringer6@gmail.com
(Affected by transmission line segment 66)

TAIS 4/24 TX-7-24-584

Texas Apiary Inspection Service

Beekeeper Registration

Section 131.045

Name:	Jon & Kelly Springer						
Business Name:							
Mailing Address:	3635 County Road 303						
City:	Jourdanton	County:	Atascosa	State:	TX	Zip Code:	78026
Date Issued:	April 01, 2024		Date Void:	August 31, 2024			

County(ies) registered in:

Atascosa

Angela Steinhauer
Chief Apiary Inspector

Texas Apiary
Inspection Service

Office of the Chief Apiary Inspector
2475 TAMU
Janice and John G. Thomas '59 Honey Bee Facility
College Station, TX 77843-2475
Tel. 979.845.9713 | Fax. 979.845.0983
E-mail: tais@tamu.edu
http://txbeeinspection.tamu.edu

Texas Tortoise

Texas Tortoise (*Gopherus berlandieri*) VU Research Grade

Edit

springercr303
867 observations

Observed:
Jul 1, 2020 · 6:00 PM CDT

Submitted:
Jul 2, 2020 · 2:25 PM CDT

Jourdanton, TX 78026,... Show

Details

Media	Name	User	Observed	Place	Added
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 5	springercr303	Oct 20, 2023 11:19 AM CST	Texas, US	Oct 20, 2023 4:29 PM CST
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 6	springercr303	Sep 23, 2022 6:22 PM CST	Texas, US	Apr 21, 2023 5:40 PM CST
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 4	springercr303	May 28, 2022 9:10 AM CST	Texas, US	May 30, 2022 6:14 PM CST
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 3	springercr303	Nov 14, 2021 12:01 PM CST	Texas, US	Nov 21, 2021 11:58 AM CST
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 5	springercr303	Jul 30, 2021 10:33 AM CST	Texas, US	Jul 30, 2021 9:32 PM CST
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 5	springercr303	Aug 31, 2020 7:47 AM CDT	Texas, US	Aug 31, 2020 1:17 PM CDT
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 4	springercr303	Jul 1, 2020 6:00 PM CDT	Texas, US	Jul 2, 2020 2:25 PM CDT
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 3	springercr303	May 3, 2020 2:30 PM CDT	Texas, US	May 3, 2020 2:34 PM CDT
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 4	springercr303	May 26, 2019 9:59 AM CDT	Texas, US	Oct 20, 2019 6:37 PM CDT
	Texas Tortoise (*Gopherus berlandieri*) Research Grade 5	springercr303	Sep 29, 2019 10:02 AM CDT	Texas, US	Oct 18, 2019 8:52 PM CDT

Texas Horned Lizard

Texas Horned Lizard (*Phrynosoma cornutum*) VU Research Grade

Edit

springercr303
867 observations

Observed:
Apr 20, 2023 · 11:01 AM CDT

Submitted:
Apr 20, 2023 · 5:55 PM CDT

Jourdanton, TX 78026,... Show

Details

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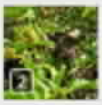
Media	Name	User	Observed	Place	Added
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 3	springercr303	Jul 12, 2023 11:10 AM CST	United States	Jul 13, 2023 7:02 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 3	springercr303	Jun 18, 2023 10:00 AM CST	Texas, US	Jun 18, 2023 5:14 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 3	springercr303	May 4, 2023 7:16 PM CST	United States	May 5, 2023 5:24 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 3 1	springercr303	May 1, 2023 1:39 PM CST	Texas, US	May 1, 2023 1:52 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 3	springercr303	Apr 20, 2023 11:01 AM CST	Texas, US	Apr 20, 2023 5:55 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 2	springercr303	Sep 13, 2022 10:59 AM CST	Texas, US	Sep 13, 2022 1:08 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 2	springercr303	Aug 29, 2022 11:01 AM CST	Texas, US	Aug 29, 2022 2:58 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 2	springercr303	Aug 4, 2022 9:29 AM CST	Texas, US	Aug 9, 2022 4:02 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 3	springercr303	Jul 3, 2022 10:04 AM CST	Texas, US	Jul 3, 2022 12:02 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 4	springercr303	Jun 10, 2022 8:31 AM CST	Texas, US	Jun 10, 2022 9:19 AM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade 2	springercr303	May 31, 2022 10:33 AM CST	Texas, US	May 31, 2022 12:46 PM CST

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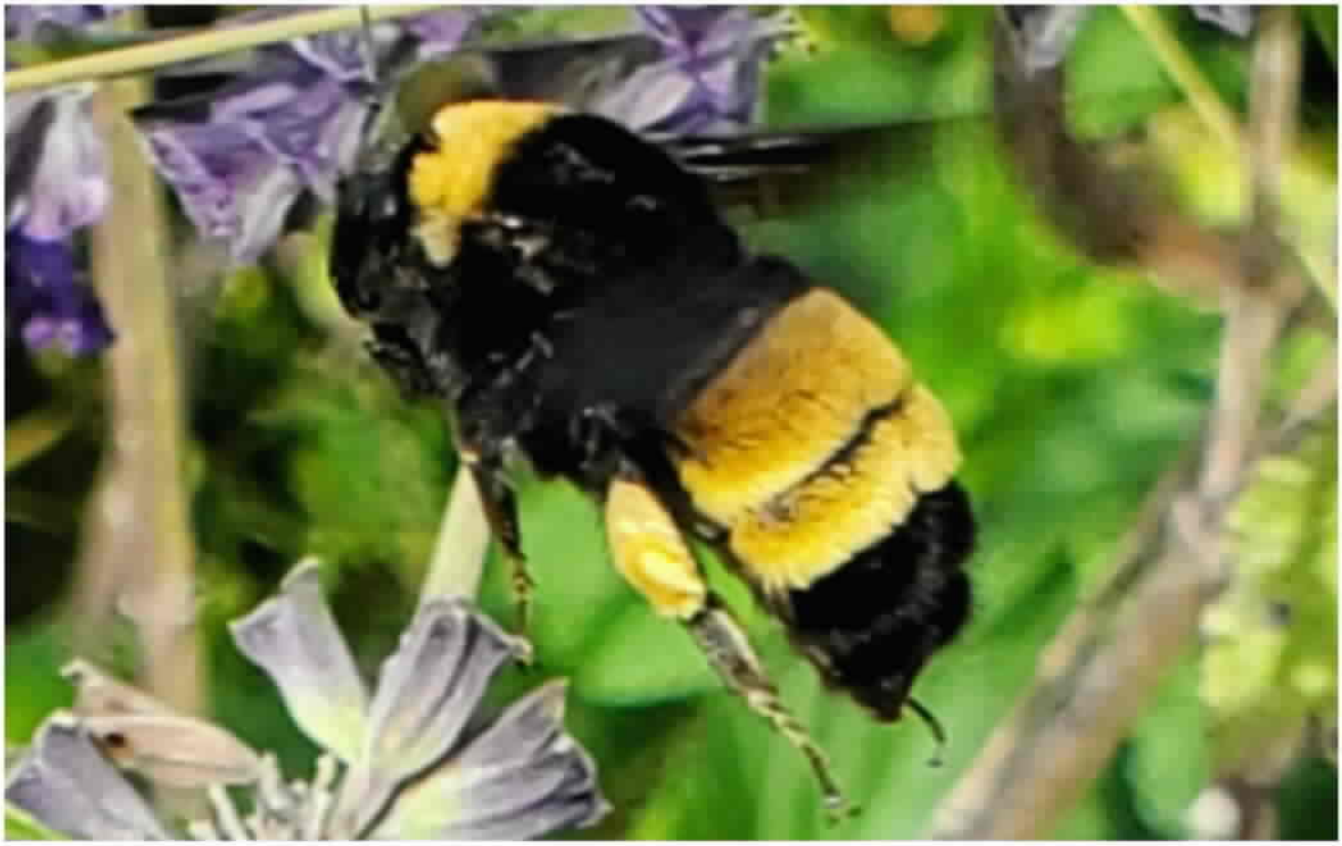
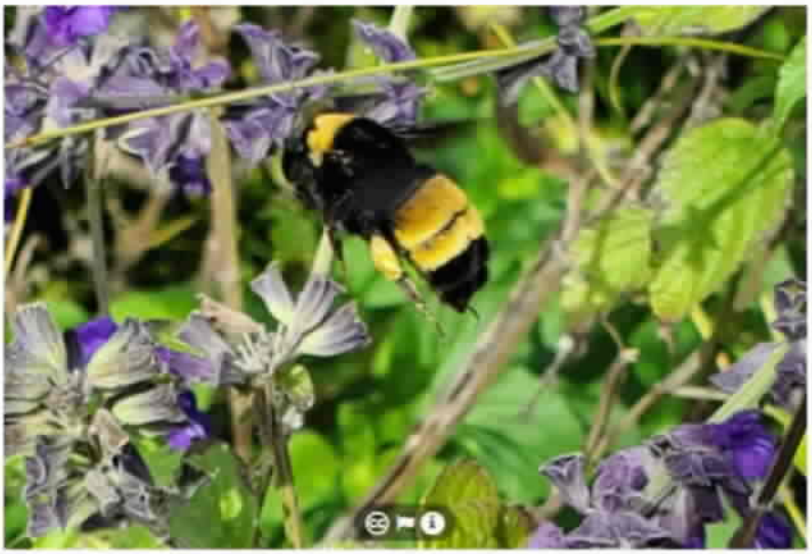
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 3	springercr303	Jun 29, 2021 11:16 AM CST	Texas, US	Jun 29, 2021 12:01 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 3	springercr303	Mar 25, 2021 11:06 AM CST	Texas, US	Mar 25, 2021 2:42 PM CST
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 3	springercr303	Jul 13, 2020 8:25 AM CDT	Texas, US	Jul 13, 2020 3:38 PM CDT
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 3	springercr303	Jun 20, 2020 11:42 AM CDT	Texas, US	Jun 20, 2020 5:07 PM CDT
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 4	springercr303	Jun 18, 2020 11:58 AM CDT	Texas, US	Jun 18, 2020 2:11 PM CDT
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 3	springercr303	Jun 15, 2020 10:39 AM CDT	Texas, US	Jun 15, 2020 2:32 PM CDT
	Texas Horned Lizard (*Phrynosoma cornutum*) Research Grade · 3	springercr303	Oct 28, 2019 5:37 PM CDT	Texas, US	Oct 28, 2019 7:23 PM CDT

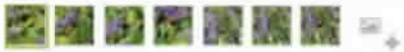
American Bumblebee



American Bumble Bee (*Bombus pensylvanicus*) VU Research Grade

Edit





springercr303

867 observations

Observed:
Nov 22, 2021 12:53 PM CST

Submitted:
Nov 22, 2021 3:51 PM CST

Jourdanton, TX 78026, USA

Details

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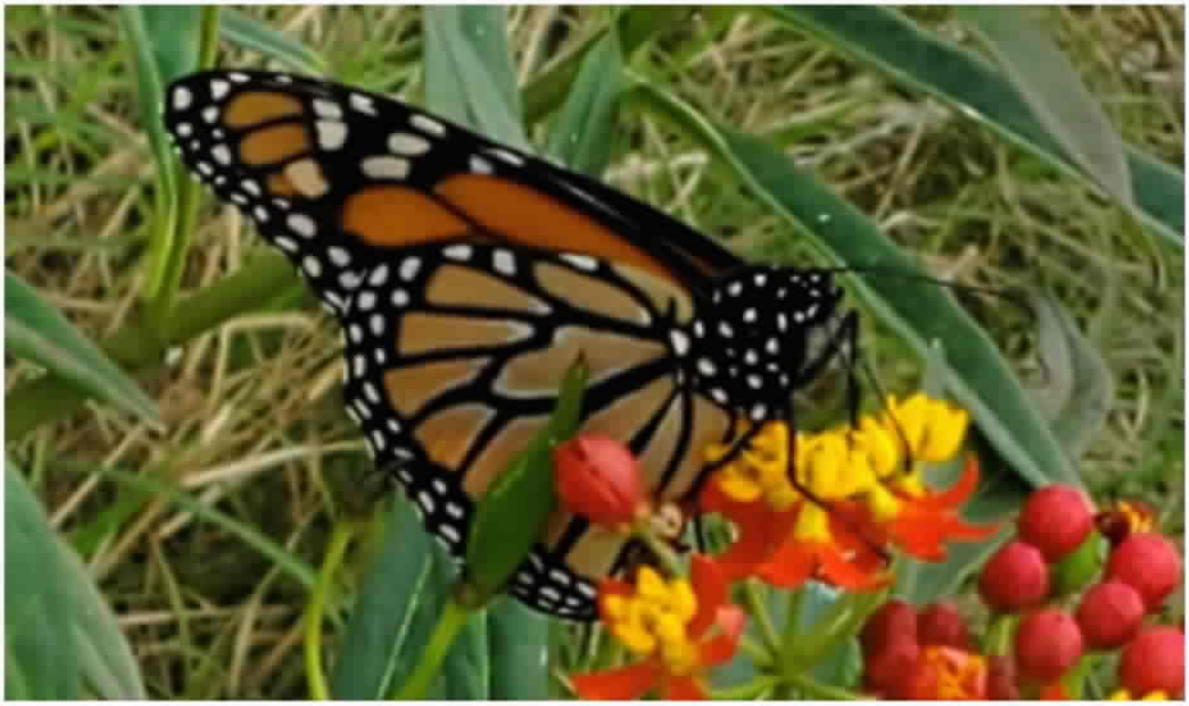
Media	Name	User	Observed	Place	Added
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 2	springercr303	Sep 27, 2023 8:22 AM CST	Jourdanton, TX 78026, USA	Sep 27, 2023 8:21 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 4	springercr303	Sep 3, 2023 9:02 AM CST	Jourdanton, TX 78026, USA	Sep 8, 2023 10:43 AM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 4	springercr303	Aug 2, 2023 10:04 AM CST	Jourdanton, TX 78026, USA	Aug 4, 2023 1:59 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 4	springercr303	Jul 19, 2023 12:00 PM CST	Jourdanton, TX 78026, USA	Jul 19, 2023 4:25 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 3	springercr303	Jul 28, 2022 9:48 AM CST	Jourdanton, TX 78026, USA	Jul 29, 2022 2:43 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 3	springercr303	May 22, 2022 11:55 AM CST	Jourdanton, TX 78026, USA	May 22, 2022 3:18 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 6	springercr303	Nov 22, 2021 12:53 PM CST	Jourdanton, TX 78026, USA	Nov 22, 2021 3:51 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 3	springercr303	Nov 8, 2021 12:02 PM CST	Jourdanton, TX 78026, USA	Nov 8, 2021 12:52 PM CST
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 3	springercr303	Jul 25, 2020 9:44 AM CDT	Jourdanton, TX 78026, USA	Jul 25, 2020 12:13 PM CDT
	American Bumble Bee (*Bombus pensylvanicus*) Research Grade 4	springercr303	Jul 21, 2020 11:17 AM CDT	Jourdanton, TX 78026, USA	Jul 21, 2020 4:40 PM CDT

Monarch



Monarch (*Danaus plexippus*) Research Grade

Edit

springercr303

867 observations

Observed:
Nov 27, 2020 · 11:58 AM CST

Submitted:
Nov 27, 2020 · 2:35 PM CST

Jourdanton, TX 78026, USA

Details

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Media	Name	User	Observed	Place	Added
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	Monarch (Danaus plexippus) Research Grade 3	springercr303	Nov 6, 2020 1:30 PM CST	Pleasanton, TX 78064, USA	Nov 6, 2020 5:12 PM CST
	Monarch (Danaus plexippus) Research Grade 3	springercr303	Nov 3, 2020 10:28 AM CST	Jourdanton, TX 78026, USA	Nov 3, 2020 12:37 PM CST
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ScienceDirect

Environmental Research
Volume , November ,

Review article

Extremely low frequency electromagnetic fields and cancer: How source of funding affects results

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Highlights

- Magnetic field exposure causes childhood leukemia in government-funded studies.
- Magnetic field exposure does not cause childhood leukemia in industry-funded studies.
- Magnetic field exposure increases risk of adult leukemia, brain and breast cancer.
- Steps should be taken to reduce human exposure to elevated magnetic fields.

Abstract

While there has been evidence indicating that excessive exposure to magnetic fields from 50 to 60 Hz electricity increases risk of cancer, many argue that the evidence is inconsistent and inconclusive. This is particularly the case regarding magnetic field exposure and childhood leukemia. A major goal of this study is to examine how source of funding influences the reported results and conclusions. Several meta-analyses dating from about 2000 all report significant associations between exposure and risk of leukemia. By examining subsequent reports on childhood leukemia

it is clear that almost all government or independent studies find either a statistically significant association between magnetic field exposure and childhood leukemia, or an elevated risk of at least OR = 1.5, while almost all industry supported studies fail to find any significant or even suggestive association. A secondary goal of this report is to examine the level of evidence for exposure and elevated risk of various adult cancers. Based on pooled or metaanalyses as well as subsequent peer-reviewed studies there is strong evidence that excessive exposure to magnetic fields increases risk of adult leukemia, male and female breast cancer and brain cancer. There is less convincing but suggestive evidence for elevations in several other cancer types. There is less clear evidence for bias based on source of funding in the adult cancer studies. There is also some evidence that both paternal and maternal prenatal exposure to magnetic fields results in an increased risk of leukemia and brain cancer in offspring.

When one allows for bias reflected in source of funding, the evidence that magnetic fields increase risk of cancer is neither inconsistent nor inconclusive. Furthermore adults are also at risk, not just children, and there is strong evidence for cancers in addition to leukemia, particularly brain and breast cancer.

Introduction

The first indication that extremely low frequency (ELF) electromagnetic fields (EMFs) coming from power lines and electricity could result in human disease was the report by Wertheimer and Leeper (1979) who found elevations in rates of childhood cancer in children living in homes in Denver, Colorado that were close to power lines which were presumed, based on a variety of considerations, to generate elevated magnetic fields within the home. While this conclusion was received skeptically, subsequent studies in several countries confirmed the observation. Four metaanalyses were published between 1998 and 2000 that concluded that there was a consistent and statistically significantly elevated risk of childhood leukemia in relation to residential proximity to elevated magnetic fields that could not be explained by random variation. Wartenberg (1998) considered 16 studies and reported an odds ratio (OR) of 1.44 (95%CL = 1.10–1.87) from studies that used indirect, wire-code analysis for exposure. Angelillo and Villari (1999) reported an OR = 1.46 (1.05–2.04) for six studies on wire code configuration and OR = 1.59 (1.14–2.22) for 4 studies with 24 h measured magnetic fields. Greenland et al. (2000) conducted their meta-analysis on 15 studies and found an OR = 1.52 (0.99–2.33) based on measured magnetic field for children living in homes with magnetic fields >0.3 μT as compared to 0.1–0.2 μT, and 1.65 (1.15–2.35) based on wire code comparing children in homes with very high current code as compared to ordinary low current code. Ahlbom et al. (2000) performed a pooled analysis of results of nine studies that included 3203 children with leukemia as compared to 10,338 controls. They found an OR = 2.00 (1.27–3.13) for increased risk of leukemia in children with a residential magnetic field >0.4 μT. Based primarily on the data included in these reviews the International Agency for Research on Cancer rated extra-low frequency electromagnetic fields (ELF-EMFs) as a Group 2b, possible human carcinogen (IARC , 2002).

In spite of this body of information, many have remained skeptical of the conclusion that exposure to power line magnetic fields really increases risk of childhood leukemia. There are several reasons for this, including the general problem that most animal exposure studies have not found increases in cancer, and uncertainty as to the mechanism(s) responsible. Comments are often made that there are a number of studies that do not report positive associations, and thus the conclusions are inconsistent. Therefore the question of whether or not magnetic fields associated with electricity pose hazards to human health has remained controversial. In addition to childhood leukemia, several other human diseases have been reported to be elevated among individuals with excessive exposure to magnetic fields. The

goal of this review is to summarize the results of more recent investigations into the magnetic fields and childhood leukemia but also review associations with other cancers. In addition the source of funding of studies will be identified.

The question of whether or not magnetic field exposure causes cancer is extremely important, because in our modern world each of us is continuously exposed. Since there is no one that is unexposed studies must compare individuals with more vs. less exposure. While the risk estimates reported above are not particularly high, when the whole society is exposed to a carcinogen the implication for public health may be large.

Section snippets

Materials and methods

This review has been limited to those experimental studies of human cancer in relation to exposure to magnetic fields from power lines or other sources of electricity. Searches were done on pubmed and Google Scholar using the terms magnetic fields, ELF-EMF, power lines or electricity and cancer, leukemia, breast cancer, or brain cancer. For each cancer under consideration the results of recently published pooled or meta-analyses have been accepted and only more recently published additional...

Results

Table 1 shows results of peer-reviewed publications published since 2000 that report statistically significant associations between exposure to magnetic fields, either indirectly measured by wire code configuration, distance from the center of the power line (as magnetic fields decline to background over a distance of about 300 m) or directly measured, and childhood leukemia. The table includes numbers of cases and controls and the source of funding. Of these positive studies only one for which ...

Childhood brain cancer

Kheifets et al. (2010b) performed a utility-funded pooled analysis of ELF-EMFs and childhood brain cancer in relation to measured magnetic fields. In relation to 0.1–0.2 μT, those exposed to >0.4 μT showed an OR = 1.14 (0.61–2.13). Other more recent reports were not found....

Adult cancers

The first publication reporting elevated rates of adult cancer in relation to magnetic field exposure was also by Wertheimer and Leeper (1982). They used a wire code to determine magnetic field exposure from neighborhood distribution lines but did not directly measure the magnetic fields: The wire code evaluated how close the line was to the home, how many wires were present, how thick the wires were (thicker wires indicating higher current flow) and how far the home was along the distribution...

Adult leukemia

There is a considerable body of evidence specifically on adult leukemia in relation to magnetic field exposure, a focus triggered by the studies of childhood leukemia. Feychting et al. (1997; government funded) studied adult leukemia in relation to both residential and occupational exposures. While neither alone showed significant results, when both sources of exposure were considered there was a significantly elevated risk of adult leukemia (OR = 3.7; 1.5–9.4). In a meta-analysis of data...

Discussion

It is remarkable that in the 40 years after Wertheimer and Leeper (1979) first reported an association between exposure to magnetic fields from residential power lines and elevated risk of childhood cancer, and the large number of subsequent investigations, that there is still controversy over the question "Does exposure to magnetic fields cause cancer?" One contributing cause of the confusion is clear from the analysis of the source of funding. When childhood leukemia studies are funded by...

Funding source

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors....

Recommended articles

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