Item #5: IS/MND/MMRP and Route Approval for the SVP 115kV Transmission Line from NRS to KRS

RTC 24-1040

November 12, 2024

Key Items For Discussion

Agenda – Per October 8 and October 22 Council Meetings

- Introductions
- Project Need
- Summary of Routes
- Residential along Route C
- Preliminary EMF results on Route C
- EMF Presentation

Introductions

- SVP Staff
- ECI Staff – Engineers and EMF modeling
  - Oliver Beres, Associate Engineer
- Aspen Staff – Environmental Consultants
  - Hedy Koczwara, Vice President/Senior Environmental Scientist
  - Chuck Williams, Principal/Transmission Engineer
- Exponent – EMF Presentation
  - Gary Johnson Ph.D.
    - Ph.D., Electrical Engineering, University of Illinois, Urbana-Champaign, 1979
    - M.S., Physics, University of Illinois, Urbana-Champaign, 1976
    - B.S., Engineering Physics, University of Illinois, Urbana-Champaign, 1974
  - Gabor Mezei M.D., Ph.D.
    - Ph.D., Epidemiology, University of California, Los Angeles (UCLA), 1995
    - M.D., Medicine, Semmelweis University of Medicine, 1990
    - Multidisciplinary scientific research program at the Electric Power Research Institute (EPRI) for health effects associated with exposure to power frequency and radiofrequency EMF

115kV Transmission Line
Northern to Kifer Receiving Station

- **Project Scope:** Construct a new 115kV overhead transmission line of approximately 2.24 miles between Northern Receiving Station and Kifer Receiving Station.
- Needed to accommodate approved and under construction load growth and reliability
  - Transfer additional power and redistribute loads
  - System Operating Limit will be limited to ~819MW if transmission line is not constructed
    - System Operating Limit with it ~ 1300MW
  - Key Items: schedule, constructability, and power delivery
- Construction is estimated to take approximately 14 months and be completed by early 2028.

Project Need

- Recorded a new peak load of 705MW in July 2024 and again 718MW and 720MW in October 2024
- 5 Key projects all with 2028 Completion dates:
  - Kifer Receiving Station (KRS) Rebuild
  - Scott Receiving Station (SRS) Rebuild
  - Northern Receiving Station (NRS) Upgrades
  - LS Power Transmission Line (CAISO Project)
  - 115 kV Transmission Line
- Needed to accommodate approved and under construction load growth and reliability
  - Includes large industrial users such as data centers and corporate headquarters
  - Includes large residential
  - With 115 kV line ~ capacity 1300 MW
  - Without 115 kV line ~ capacity 819MW
  - Approximately $500 million in sales annually
  - $25 million General Fund annually

115 kV - Three Routes Considered

- Council Information Session March 2024
- An assessment was prepared to determine the preferred route for the Proposed Project.
- **Route B** (considered and eliminated)
  - UPRR right of way is too narrow (concerns with inductive interference on the rail lines and additional permitting and design review)
  - Properties surrounding UPPR do not have sufficient space to place structures
  - Require extensive easement costs and coordination
  - UPRR permits
  - Even if it was feasible, it would not meet 2028 schedule

Three Routes Considered

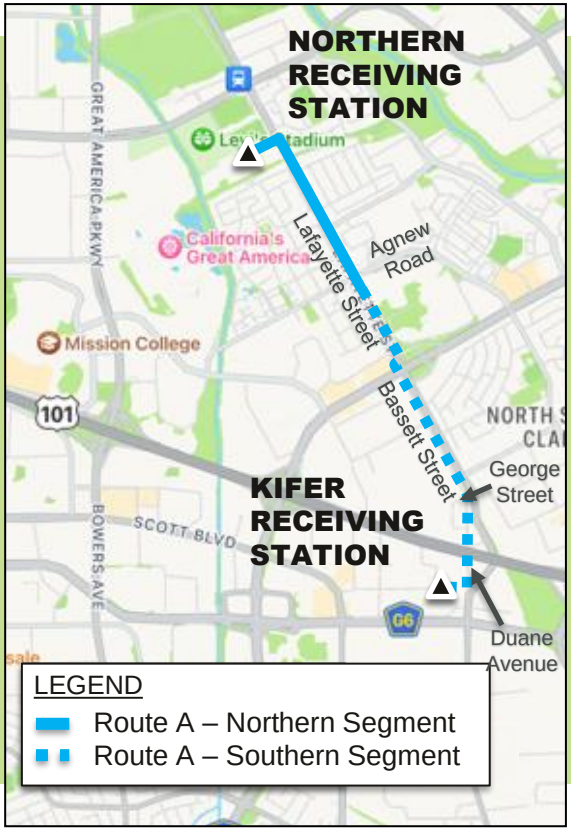
- **Route C** (considered and eliminated)
  - Majority within Creek boundaries
  - Replace existing 60kV line where available
  - Easements and permitting - unknown if permits would even be feasible and if feasible would not meet schedule due to extensive permitting schedules
  - Longest route
  - Would not meet 2028 schedule
- **Route A** (Proposed Project) – Analyzed in IS/MND

Three Routes Considered

Route A (Underground Option for Northern Segment)

- Constraints with constructability, schedule, and power deliverability
  - 25 existing utilities crossing or conflicts with underground alignment in Lafayette
  - High water table and may require excavations greater than 20’ deep
  - Utility spacing requirements may not be met
  - Requires relocation of 300 feet of two transmission gas mains for PG&E and DVR
  - The DVR shutdown scheduled twice a year
  - Will require extensive PG&E construction activities, on PG&E schedule, and will not meet 2028 schedule

Route A (Proposed Project) – Analyzed in IS/MND



Comparison of Northern Segment

Overhead	Underground
Ability to meet 2028 schedule.	Can not meet 2028 schedule • Relying on PG&E for utility relocation • DVR shut-down
Maximum transmission capacity	Reduced transmission capacity
Ability to accommodate future growth	Lack of provisions for future growth
Reduces construction disruption to the public	Extended construction timelines with extended lane closures and traffic control
Ease of maintaining the system	Longer restoration times in emergency situations
Northern Segment Costs: ~$9.5 Million Total Project Costs: ~$36 Million	Northern Segment Costs: ~$19 Million Total Project Costs: ~$45.5 Million

Lafayette Street Renderings

Facing North near Eisenhower Drive

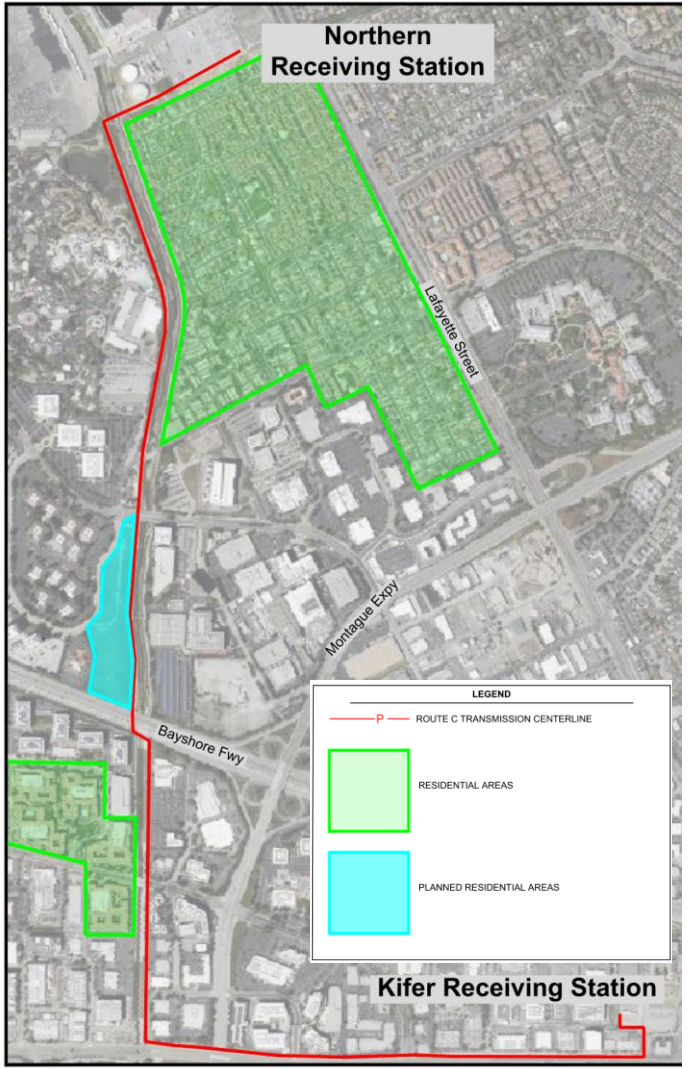
Facing South near Hope Drive

Residential Considerations

Residential Addresses within 450 ft of New Transmission Line	
	Total Addresses
Route C	653
Route A	1,000

Route C – Would also expect similar feedback

- Assumes construction on farthest side of the creek - residential numbers on Route C would increase
- Route C numbers do not include the planned residential development for Freedom Circle



Route C Preliminary EMF Study

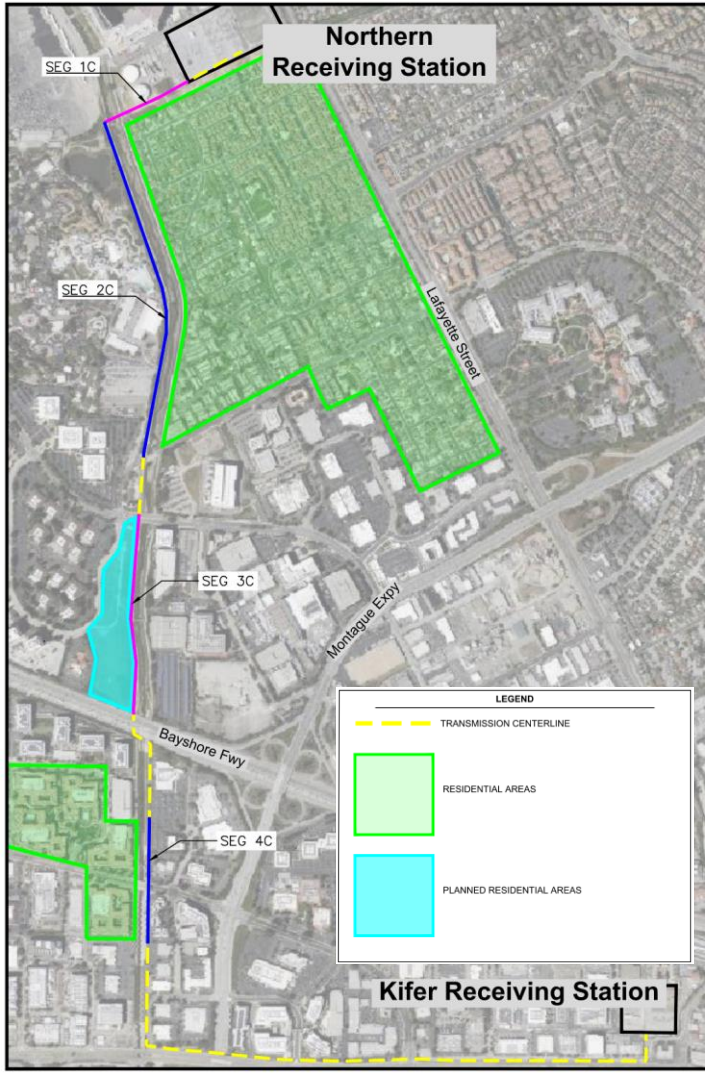
Route C

Residential		Existing 2024	Future 2028
Segment	Approx. Distance (ft) *	Normal – Peak Load (mG)	Normal – Peak Load (mG)
1C	100-110	0.0 – 1.4	5.9 – 8.7
2C	210-220	21.2 – 31.9	21.6 – 32.4
3C	40-50	4.9 – 12.8	18.0 – 29.1
4C	170-180	0.0 – 0.9	2.1 – 2.9

Route A

Residential		Existing 2024	Future 2028
Segment	Approx. Distance (ft) *	Normal – Peak Load (mG)	Normal – Peak Load (mG)
2	60	6.4 – 8.0	14.3 – 17.9
3	60	0.9 – 1.1	14.2 – 17.7

- Approximate distance to nearest residential building
- Values would increase if constructed on opposite side of creek



Schedule

Task	Timeframe
Design	Feb. 2023 – May 2026
Easement Acquisition	Jan. 2024 – May 2026
CEQA Process	
Identify Project Need	Jan. 2024
Preparation of conceptual design and start of CEQA	Jan. 2024 – Mar. 2024
CEQA Community Outreach (Scoping)	April 8 – May 29, 2024
Publication of Draft IS/MND and 30-day Public Review Period	July 31, 2024 – August 30, 2024
Publish Final IS/MND	September 24, 2024
City Council Consideration	October 8, 2024, November 12, 2024
Permits	Feb. 2024 – Nov. 2025
Material Procurements	Oct. 2024 – Nov. 2026
Anticipated Construction	Nov. 2026 – Mar. 2028

Overview of Electric and Magnetic Fields (EMF)

Gary Johnson, Ph.D.
Gabor Mezei, M.D., Ph.D.

November 12, 2024

Speakers

Gary Johnson, Ph.D.

Senior Managing Scientist

Electrical Engineer & Computer Science Practice

Gabor Mezei, M.D., Ph.D.

Principal Scientist

Health Science Practice

Who We Are

Exponent is a multi-disciplinary engineering and scientific firm dedicated to solving important science, engineering, and regulatory issues for clients.

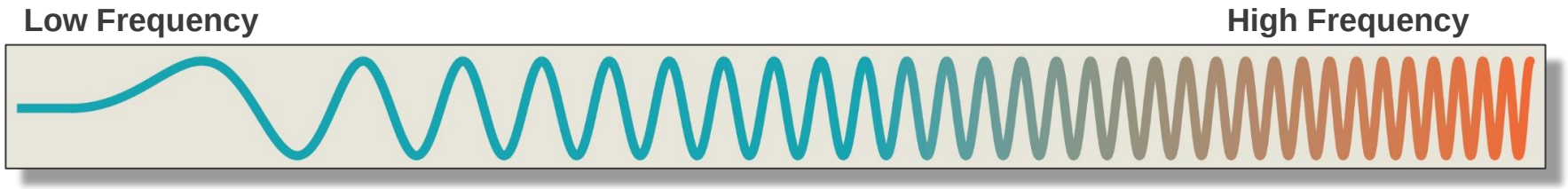
Nature and Sources of EMF

What are Electric and Magnetic Fields

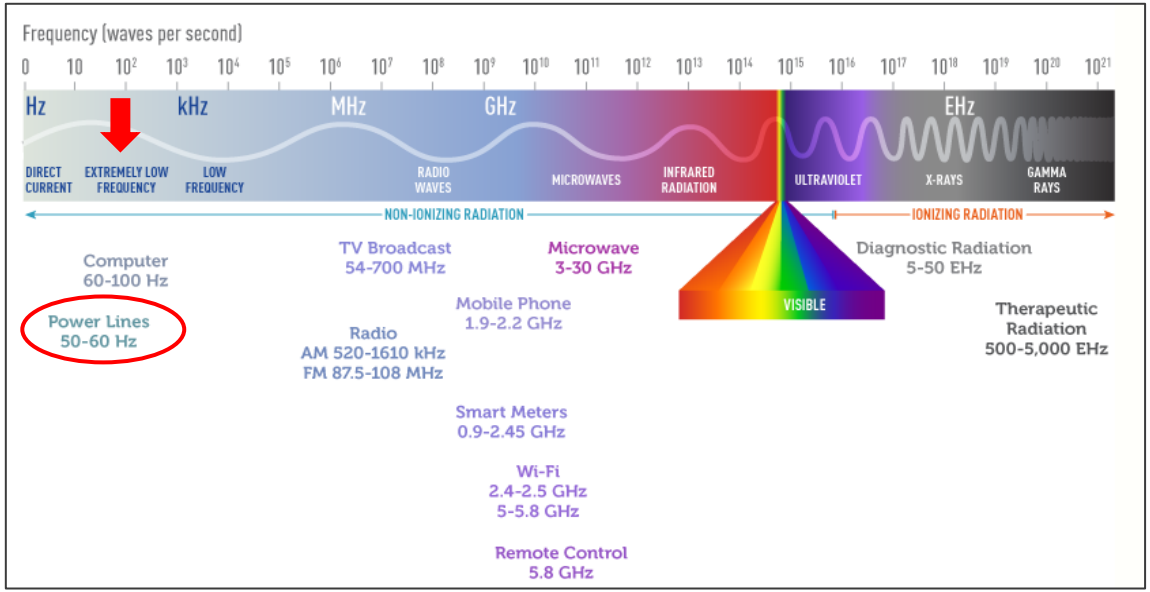
- Electric and magnetic fields are produced by anything that:
  - **Generates**
  - **Transmits, or**
  - **Uses electricity**

Electromagnetic fields

- Key Characteristic is FREQUENCY
- Frequency refers to the number of times per second that the field changes direction
  - Measured in units of Hertz (Hz)



Electromagnetic Spectrum



Source: National Cancer Institute (https://www.cancer.gov)

Focus of our presentation: Extremely low frequency (ELF) electric and magnetic fields (EMF)

- 50-60 Hertz (Hz), Alternating current (AC)
- Also referred to as **power frequency EMF**

Properties of Power Frequency EMF

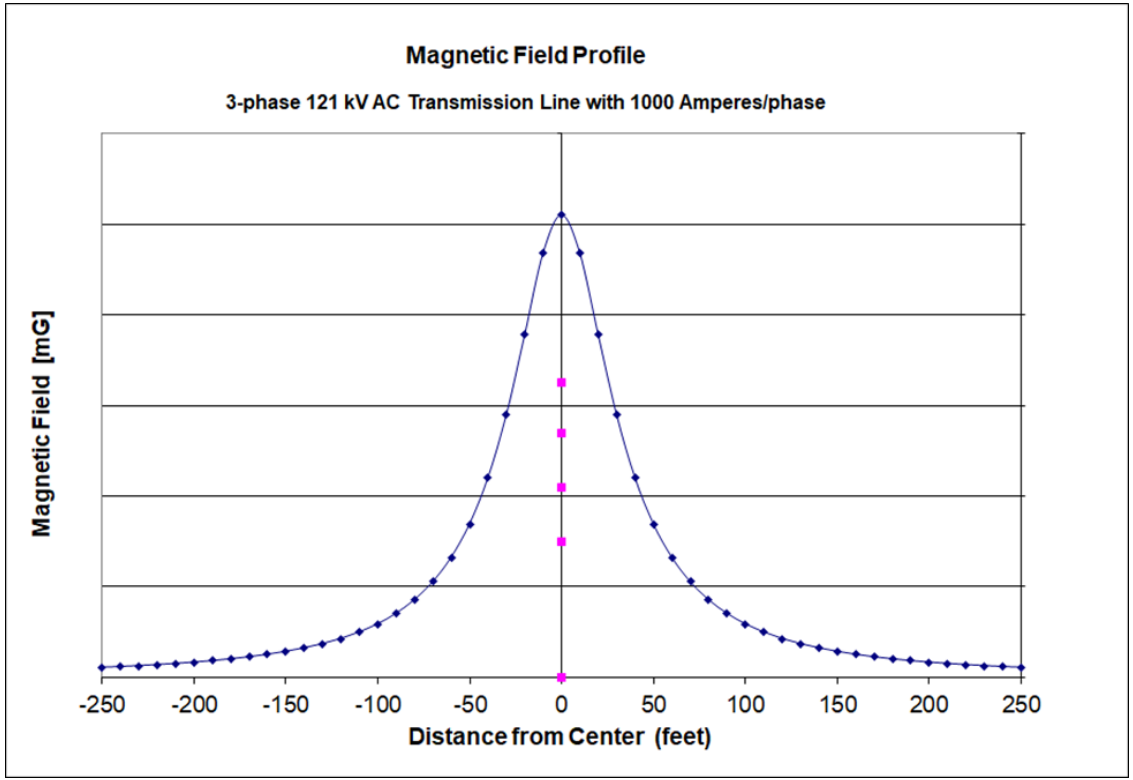
Electric Fields

- Produced by voltage
- Measured in units of volts per meter (V/m) or kilovolts per meter (kV/m)
- Strength decreases quickly with distance from the source
- Blocked by conductive objects *(e.g., trees, buildings, and fences*

Magnetic Fields

- Produced by the flow of electric current
- Measured in units of milligauss (mG) or gauss (G); *also microtesla (μT) or tesla (T)*
- Strength decreases quickly with distance from the source
- Unlike electric fields, not blocked by common conductive objects

Typical Profile of Magnetic Field Levels from a Transmission Line

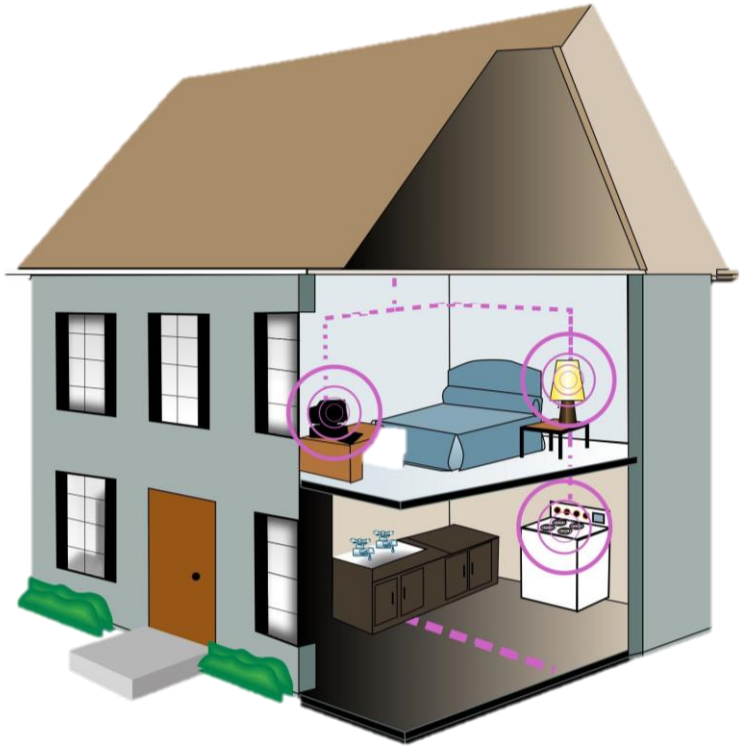


Common Sources of Power Frequency EMF

- Electrical appliances
- Power tools
- Building wiring
- Grounding systems (e.g., water pipes)
- Nearby distribution and transmission lines

Household Sources of Magnetic Fields

- Indoors, the primary sources of magnetic fields in most homes and buildings are the electrical wiring and appliances



AC Magnetic-field levels (mG) in the Home*			
	Distance from Source		
Source	**6 inches**	**1 foot**	**2 feet**
Hair dryer	300	1	--
Electric shaver	100	20	--
Blender	70	10	2
Can Opener	600	150	20
Electric range	30	8	2
Vacuum cleaner	300	60	10
Power saw	200	40	5

*Values represent median magnetic field levels, measured in units of milligauss (mG)

Source: Electric and Magnetic Fields Associated with the Use of Electric Power, National Institute of Environmental Health Sciences (NIEHS) and National Institutes of Health, June 2002

EMF Health Research

Research on Health Effects of Power Frequency EMF

- Research on the possible health effects of power frequency EMF has been on-going since the late 1970s
- Since that time, thousands of studies have been published in this area
- Research has been regularly and repeatedly reviewed by many national and international public health and scientific agencies
  - Assemble panels of experts to comprehensively review the literature
  - Results of relevant studies are assessed <u>together</u> to form a conclusion

Overview of the Scientific Review Process

- All research studies have strengths and limitations
- Scientific process involves consideration of *all* the evidence
  - Human studies (epidemiology studies)
  - Animal studies (*in vivo*)
  - Laboratory studies of cells and tissues (*in vitro*)
- Each study can be considered a piece of the puzzle
  - When examined all together, provides a more complete picture of the exposure-disease relationship

Cannot draw a valid scientific conclusion from a single study!

Agency Reviews of Power Frequency EMF

Scientific Organization	Country / Agency	Publication Dates
Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC)	Canada	1998, 2005
International Commission on Non-Ionizing Radiation Protection (ICNIRP)	International	1998, 2010
National Institute for Environmental Health Sciences (NIEHS)	United States	1998
International Agency for Research on Cancer (IARC)	United Nations	2002
National Radiological Protection Board (NRPB)	United Kingdom	2004
Swedish Radiation Protection Authority (SSI)	Sweden	2007, 2008
World Health Organization (WHO)	United Nations	2007
Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR)	European Commission	2007, 2009, 2015, 2023
Health Council of the Netherlands (HCN)	Netherlands	2009
Swedish Radiation Safety Authority (SSM)	Sweden	2009, 2010, 2013, 2014, 2015, 2016, 2018, 2019, 2020, 2021, 2022, 2024
The European Health Risk Assessment Network on Electromagnetic Fields (EFHRAN)	European Commission	2010, 2012

Summary of Scientific Consensus

- None of the reviewing agencies have concluded that power frequency EMF, at the levels we typically encounter in our daily lives, cause or contribute to adverse health effects

"Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals."

"Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health."

– World Health Organization (2024)

https://www.who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields

EMF Exposure Guidelines

Limits on Exposure to Power Frequency EMF

- No federal standards or guidelines for limiting exposure to power frequency electric and magnetic fields
- No exposure limits set in the State of California
- Several states have developed limits for electric fields and/or magnetic fields
  - Not based upon health-based risk assessments
- Two international scientific organizations developed limits to protect workers and the public
  - Based on review of the health research
- Limits are set to be much lower than the lowest levels for which there are known effects of exposure
  - Acute effects that occur at very high exposure levels
  - No established effects of long-term exposure

International Exposure Guidelines for General Public Exposure to Magnetic Fields

Organization	Magnetic Field Limit (mG)
International Commission on Non-Ionizing Radiation Protection (ICNIRP)[1]	2,000
International Committee on Electromagnetic Safety (ICES)[2]	9,040

[1] International Commission on Non-ionizing Radiation Protection (ICNIRP). Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz to 100 kHz). Health Phys 99: 818-36, 2010.

[2] International Committee on Electromagnetic Safety (ICES). IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz (IEEE Std. C95.1): Corrigenda 2. New York: IEEE, 2020.

Summary

Summary

- EMF are present nearly everywhere in our modern society
- Research on power frequency EMF has been on-going since the 1970s, resulting in thousands of published studies in this area
- Agency reviews of this large body of research have not concluded that exposure to power frequency EMF are a source of adverse health effects
- Health-based exposure guideline limits have been developed for power frequency EMF
  - These limits are protective against the only established effects from exposure (i.e., acute effects that occur at very high field levels)

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Thank You!

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