

Comments of an Individual Commenter

Docket No. HHS-OASH-2026-0397. Request for Information, 91 FR 59792 (21 September 2026), FR Doc. 2026-19252. Comments due 21 October 2026.

Summary

The radiofrequency exposure limits in force in the United States in 2026 rest on two documents whose literature reviews closed more than forty years ago: NCRP Report No. 86, whose review closed in 1982, and ANSI/IEEE C95.1-1992, whose review closed in December 1985 and whose final evidence base was 120 papers. The FCC adopted its limits from them in 1996 and has not substantively revised them since.

Federal agencies told the FCC at the time that this evidence base needed updating. The limits still rest on it. EPA stated both cut-off dates in its November 1993 comment to the FCC. OSHA told the FCC in March 1994 that both standards rested on literature reviews “conducted over seven years ago” that “need to be updated.” EPA asked the FCC to request that NCRP revise Report No. 86; it has never been revised. EPA told the FCC in June 1995 that its own public RF exposure guidelines were “substantially complete” and would issue in early 1996; they never issued. FDA told the FCC in 1993, and again in 1996, that the standard did not address long-term chronic exposure. The agencies nonetheless concurred in 1996 in the hybrid limits the FCC adopted — EPA’s Administrator wrote that the approach “addresses our concerns about adequate protection of public health” — but the updating they had asked for did not follow. In 1999 the federal Radiofrequency Interagency Work Group, in a letter signed by NIOSH’s representative on HHS letterhead, set out fourteen unresolved issues; in 2003 it added three more. Both letters say they record the views of the Work Group’s members, not their agencies’ official positions. No agency has taken a position on any of the seventeen since, and none has been answered. HHS is the department whose agencies wrote the 1993 and 1996 FDA letters and the 1994 NIOSH comment, and whose scientist signed the 1999 Work Group letter.

The comment also addresses people who report symptoms they attribute to these exposures. Question 18 ¶5 sets out the course of care such a person moves through, from recognition and diagnosis to stabilization, treatment and ongoing management, and the gap at each stage. The recommendations that follow it, and those at Questions 9, 10, 16 and 17, ask HHS components to act on each gap without first deciding whether exposure causes the condition.

Response to Question 2

I submit this comment solely on my own behalf, as an individual. My response to Question 3 describes my own experience.

I am not a healthcare professional, a worker with occupational exposure, an equipment or product manufacturer, a service or infrastructure provider, a business, an industry group, a government entity, or a research entity. No part of this comment was drafted by, funded by, reviewed by, or coordinated with any organization.

Apart from my response to Question 3, which is my own account of my own experience, this comment rests on documents — primary federal records, the standards documents the exposure limits were adopted from, peer-reviewed research, and federal and state program documents — each cited so that it can be checked against the source. I am not a scientist or a clinician. Outside Question 3, I offer no scientific judgment of my own on whether these exposures cause harm, and I disclose my own view as a bias at Question 12 ¶10. My recommendations on care, coverage and research are proposals, not findings.

Response to Question 3

We invite individuals, families, caregivers, healthcare professionals, and organizations to share experiences regarding potential adverse health effects they believe may be associated with exposure to RF/EMFs.

EMR-S Onset

On September 26th, 2024, I experienced the onset of Electromagnetic Radiation Syndrome (EMR-S), formerly known as Electrohypersensitivity (EHS), upon my exposure to the newly installed mesh WiFi network distributed by the eero PoE 6 gateway and its three access points. I noticed novel, severe neurologic symptoms immediately upon entering the home for the first time since its installation. I felt a severe disorientation to my environment, a mild deficit in proprioception and an overall feeling of discomfort. To my great surprise, when I tried to walk through the family room and into the dining room, I felt as though I was walking through waves in the ocean. I then felt incoming pressure to my head. I walked to the kitchen and had to stop. The degree of pressure forced me to halt, as it continued to balloon and expand throughout my torso. I could not tolerate the symptoms and had to leave within 60 seconds. I walked approximately 100 feet away from the home and grounded (i.e., stood on grass) for approximately 10 minutes until my symptoms decreased enough to attempt re-entry. As I walked back towards the house,

my symptoms increased once again. After an uncomfortable evening in which I got nearly no sleep, I left the house all day on the 27th, sincerely hoping that the response on the 26th was a fluke. Upon arriving home late at night, I once again experienced a strong symptomatic response upon entering the home, and spent as much time as possible outside before coming in for another attempt to sleep.

After yet another failed attempt to re-enter the home on September 28th, my family disabled the eero and my symptoms halted immediately. I felt a calmness and serenity that I had never previously experienced, and was able to sleep deeply for hours immediately thereafter.

Clinical Context

At the time of this exposure event with the newly installed eero mesh network, I had no changes in my sleep pattern, medication, stress levels, life circumstances or any other confounding variable of that sort. However, on the morning of September 25th, I received transcranial direct current stimulation (tDCS) treatment from a chiropractic neurologist to treat the longstanding effects of prior head trauma. I had worked with this practitioner for nearly three years, during which time this practitioner applied DC stimulation to my peripheral nervous system nearly every week to treat the impacts of prior head trauma on musculoskeletal recruitment during exercise, which affected my chronic low back pain. This practitioner had previously, albeit rarely, administered transcranial direct current stimulation in prior appointments. I never experienced any adverse events following my appointments with this practitioner. I never intentionally avoided environments with high anthropogenic EMF/RF levels following appointments incorporating DC stimulation as treatment. This included taking a 14-hour flight immediately after one of my appointments with this practitioner with no observable health effects whatsoever.

While I mostly felt better after my appointment on September 25th, namely in improved mood and cognitive function and reduced anxiety and rumination, the side effects that I did experience were entirely consistent with those commonly reported with tDCS (i.e., minor headache, fatigue, drowsiness). My therapist, who has a history of treating OCD patients in inpatient and research settings, informed me at our September 26th appointment, immediately preceding the eero exposure, that my presentation reminded him of other patients who had just received electroconvulsive therapy (ECT), and that he was mildly concerned.

My relative success in rehabilitation spurred a passion and curiosity in the potential for bioelectric medicine to treat a variety of conditions. As I learned more about the modern applications of TMS, tDCS, DBS, VNS, SNS and focused ultrasound, I also learned about

the scientific literature on the health effects of anthropogenic EMFs, specifically pulsed, polarized RFs.

While I did not view the conclusions of the literature from any source as definitive at the time, for various reasons, I applied the precautionary principle to my ongoing degree of EMF exposure, given the historical precedent of ubiquitously used materials understood to be “safe” that were later found to be toxic (e.g., lead, PFAS, microplastics), without changing my entire life around it. This meant that I started taking my cell phone calls on speaker to keep the phone an arm’s length from my head, keeping my laptop screen about one foot away from my head at all times, turning on airplane mode whenever practical, and placing my cell phone outside of my bedroom during sleep. I also purchased an SLNT phone Faraday sleeve, placed my phone inside of it and documented any observed symptomatic changes. All of these practices produced a minor, negligible alleviation in head symptoms (e.g., head pressure, fogginess) that did not merit any major life changes or further alterations in behavior or current practices. On one occasion, I had mild discomfort and head symptoms, such as mild head pressure and confusion, during a hot day on a beach in close proximity to a cell tower, and I wondered whether the RF from the cell tower contributed to my symptomatic experience. I had a passing interest in whether my depression would lessen at all if the WiFi router in the office was placed further from my computer, but I had no actionable plans to act on that, any instruments to measure EMF and RF levels in my environment, or any knowledge of these instruments in the first place. I did not practice any avoidance behaviors, such as driving on routes without cell towers, lowering EMF/RF levels in the home or forgoing events in locations with high levels of anthropogenic EMFs, nor did I deliberately tie my symptomatic experience to my level of EMF exposure. Any further insights on the health impacts of anthropogenic EMFs were gathered purely out of intellectual curiosity.

I had no ability to quantitatively measure my susceptibility to the health effects of EMFs, and therefore assumed that I had no ongoing risk, and that any observed improvement in health symptoms from my precautionary practices would be experienced just the same by anyone else who chose to try them. I became aware that an individual whom I knew well had developed a hypersensitivity to electromagnetic fields, but given the differences in our clinical profiles, I did not at all interpret this development as an indication of my own risk level.

Care Journey

After the eero was removed from the home, my disease state stabilized for only the next few weeks. Whether through ignorance of the EMR-S patient journey, wishful thinking, or a combination of both, I operated under the assumption that the aforementioned episode with the eero mesh network was a singular event, meaning that it was not indicative of a trend or of future symptomatic responses to EMF/RF exposures, and that with a combination of improved sleep and the use of standard WiFi networks, as opposed to mesh networks, I could avoid or minimize future episodes.

From approximately mid-to-late November through the end of December, my neurologic symptoms came back and their severity corresponded directly with my degree of EMF/RF exposure. I went from comfortably tolerating two standard WiFi networks to tolerating only one during waking hours, turning it off at night for symptomatic relief and any chance of 4+ hours of sleep. My symptoms increased as family members visiting for the holidays brought and used their laptops and cell phones within a few feet of me. During Christmas, a family member accidentally turned on a speaker that, previously unbeknownst to all of us, broadcast its own local standalone WiFi network to enable wireless device-to-device connection. My symptoms increased dramatically. Upon noticing the speaker's name listed as a new option among the home's available WiFi networks, the speaker was unplugged and my symptoms dropped immediately.

In January 2025, I began to aggressively pursue additional medical support. My psychologist maintained a neutral position on the potential basis for my symptomatic responses (e.g., psychosomatic or somatic) and recommended a specific subspecialist neurologist to perform a differential diagnosis and identify any potential root causes in my brain. My PCP had no exposure to any patients with my reported symptomatic pattern, and referred me to the subspecialist neurologist, documenting only an R51.9 diagnosis code for headaches. Since the first available appointment with the recommended subspecialist neurologist was not until January 2026, I searched for alternative options to receive more immediate care.

The void of current and relevant patient education, qualified clinicians and well-validated therapies meant that my most reliable clinical guidance to date consisted of patient testimony, decades-old consensus statements, and conflicting study findings that all shared the same flaw: little-to-no quantitative evidence of patient treatment response beyond an n=1 population, let alone robust trial design or replicated findings.

The content of this clinical guidance largely consisted of vague self-care, ranging from intestinal dysfunction regulation and CBT to consuming copper supplements and drinking water, that collectively preached a set of shared philosophies: symptomatic responses to

anthropogenic EMF/RF sources would be lifelong with no clear path to remission, and symptomatic reduction was primarily possible through maximally feasible anthropogenic EMF/RF exposure reduction, with detoxification of underlying triggers (e.g., heavy metals), grounding and mindfulness practices, and other efforts to optimize health as supporting adjunctive practices. However, the expectation was clearly set that some functional recovery did not mean that residing anywhere other than a low-EMF home was a long-term possibility, and that a regained tolerance of anthropogenic EMF/RF could be lost at any moment with no predictable trend or well-established reason.

In an earnest effort to preserve as much of my EMF/RF tolerance as possible, I followed this guidance to the best of my ability, with no clinician oversight or regard for the side effects.

I stayed away from anthropogenic EMF/RFs (e.g., finding public/private spaces with no cell signal, going on nature walks) as much as possible, took multivitamin supplements, drank kefir, consumed lion's mane and cordyceps mushrooms, went to the sauna, and sourced the cleanest water in the state. I even took Immun'Age, a fermented papaya preparation (FPP) supplement developed by Osato Research Institute in Japan, for several weeks because Dominique Belpomme, the author of EMR-S studies arguing a neurological genesis for the condition, recommended it as an EMR-S treatment because it demonstrated some recovery of cerebral blood flow in his EMR-S patients.

I also continued pursuing care from my current care team of acupuncturists and chiropractic neurologists, who had supported me through various neurological conditions in the past. While neither was familiar with my condition, in a position to offer me a diagnosis, or had the appropriate clinical training to properly treat or manage the condition, both practitioners made every attempt to treat my clinical presentation to the greatest extent of their clinical expertise. The acupuncturist and I found resources suggesting EMR-S could be equated with excess heat wind, and chose points accordingly, in addition to other points for grounding and neurologic function, including the vagus nerve. My chiropractic neurologist surmised that the anthropogenic EMF/RFs were "stealing electrons" and therefore some restoration could be made through continued use of the DC stimulation. While my body would feel marginally better after my appointments with them, any improvement in my tolerance to EMFs afterward was short-lived.

One widely reported finding across the literature was that patients benefited from energy medicine. Upon visiting an energy medicine practitioner's office for the first time, I almost had to leave due to my inability to tolerate its EMFs. Oddly, the practitioner was able to reduce my sensitivities on the spot, and upon returning home, I was not only in a better mood but slightly more tolerant of anthropogenic EMFs. Her course of treatment

for me included a wide range of energy medicine practices and devices, such as a BioCharger, a pulsed EMF (PEMF) device. Other electrically sensitive patients and I did experience symptomatic improvements as a result of using the device. Eager to expand on this progress, I jumped at the opportunity to obtain a device of my own with at least some research behind it. I found a study conducted by Magda Havas demonstrating favorable HRV-derived responses and no obvious ill effects from the use of SEQEX PEMF mats among a small, self-identified group of patients experiencing adverse health effects from RF/EMF exposure. Since the SEQEX PEMF mat was only available to U.S. residents through a select number of practitioners, I immediately booked an initial appointment with a naturopath in a neighboring state through whom I could order the SEQEX. While he acknowledged my symptomatic responses to EMF/RF, he did not offer a formal diagnosis, preferring to focus on treatment for historical brain injuries, specifically homeopathic remedies (i.e., Arnica, NatSulph) and peptides (i.e., Epitalon), alongside the procurement of a SEQEX PEMF mat.

During my initial appointment with the naturopath, I lay on the SEQEX PEMF mat for several short sessions. When I walked back to the car, I held my phone in my hand with my signal turned on to identify the route home and noticed no symptomatic response whatsoever. I later had a phone call with an individual in remission from prior EMF/RF exposure-induced triggers who cited the SEQEX PEMF mat as an essential tool in her recovery, alongside cold ocean water exposures as part of a treatment methodology focused on mitochondrial health, and as a maintenance tool she and her partner use to this day, years after her remission. Distributors in Canada then alleged that patients treated by Dr. Riina Bray, one of the few doctors in North America who explicitly diagnoses this condition, are referred to their clinic for SEQEX as their sole source of treatment for these specific symptomatic responses, with multiple patients continuously visiting to attain care. Dr. Riina Bray's published treatment protocol is far more comprehensive and does not reference SEQEX PEMF mats, and I was not able to verify her recommendation to use SEQEX PEMF mats as part of her treatment plan. I later took one course of Arnica, based on the naturopath's recommendation, and felt some general reduction in overall headaches upon initially taking it. Its long-term impact was not clear to me given the events of the following months.

I then had my first visit with an EMF consultant. He had decades of industry experience and was trained at one of the top electrical engineering schools in the nation. He was also a fierce ally of the EMR-S population, knowing all too well the challenges they faced in maintaining safety in their own homes. I did experience spikes in my symptomatic responses both to his use of EMF and RF measurement tools, which he said was common among individuals with EMR-S, and to his turning off the breaker to my bedroom, which

he thought was quite rare and inexplicable. He offered a game plan for the family to eliminate or remediate sources of EMF in the home, as well as reading material for me from medical doctors like the retired Dr. Neil Nathan, who has decades of experience successfully treating thousands of patients with heightened sensitivities.

Despite these care sources, my family's initiative to reduce EMF levels was low, and as such, my disease state continued to tumble. When I brokered a deal with my family that they could turn the Wi-Fi on during the times that I left the house, they rarely delivered on turning the Wi-Fi off in time for me to get back. I consistently predicted correctly whether the Wi-Fi was on or off based on my symptomatic responses alone. This includes multiple instances in which my parents were adamant that the Wi-Fi had been turned off, only for them to discover that they had pressed the wrong button and it was still turned on.

My symptomatic responses to RF/EMF exposures were now multi-system (e.g., psychological, gastrointestinal, dermatological), and the level of anthropogenic RF/EMF in the environment required to trigger symptoms dropped precipitously. Previously painless visits to the library or other office locations resulted in neurologic and gastrointestinal symptoms that often required a prolonged recovery period in non-threatening environments before I could consider another exposure. I began to experience symptoms of increasing severity while using laptops, cell phones and TVs, and while driving in close proximity to cell towers or electric vehicles, which collectively made everyday office work a significant challenge. By the beginning of April, I had lost my ability to tolerate driving a car or even opening my refrigerator door. I was hunting for a new place to sleep every night for weeks, until I found a closet in the basement that I could tolerate and in which I could get some sleep.

I eventually lost my ability to tolerate the SEQEX PEMF mat. After a brief period of hope in which I had a response to the PEMF mat similar to the one I had in the clinic with the naturopath, I eventually began feeling symptoms akin to exposure to all of the other sources of EMF, rather than the therapeutic benefits that I was accustomed to feeling on the mat.

My deterioration, along with a follow-up appointment scheduled with my EMF specialist, who was eager to see progress, prompted some proactive support for reducing EMF levels in the home. The family purchased an RF meter. Although I felt a sharp pain in my gut and stomach (so severe that I could not tolerate being in the house whenever that meter was turned on), it meant that, slowly and piece by piece, the sources of RF in the house were being turned off. I felt a nearly instant reduction in my symptoms across the board as smart technology and other hidden forms of RF, such as a Wi-Fi signal emanating from the refrigerator, were disabled. The measurements also confirmed that my sleeping

spot in the basement had by far the lowest RF levels in the household. In a test to measure the effects of turning off all of the breakers in the home, I had the most healing and curative experience of my life. I felt a serenity in my heart and my gut that I hardly recall ever feeling before. If it had been up to me, I would have seriously considered whether it was at all feasible to live that way forever. However, compromises were made. When the breakers were turned back on, I had a sharp uptick in my symptoms, with a degree of pressure in my stomach and my head that was absolutely unbearable, as if I were a balloon being blown up until I popped. When asked to identify the source, I pointed to the TV in the family room. This, of course, was illogical, because the TV had long been unplugged. However, after some investigation, my father discovered, with the use of his RF meter, that upon turning the breakers back on in the home, the device used to wirelessly open and close the garage door had accidentally been turned on. He made this discovery and turned the device off without informing us, and I immediately felt symptomatic relief.

After some time with less EMF in the home, I began to slowly tolerate using my cell phone outdoors at arm's length. I then discovered the American Academy of Environmental Medicine (AAEM), a professional association dedicated to environmental medicine with a directory of physicians with specialized training, expertise and experience treating patients with various environmental sensitivities, including EMR-S. Most of these providers operate standalone clinics, are not a part of the standard referral pathway, and are in limited supply; however, a former AAEM faculty member with decades of experience practiced only about 25 minutes away and offered virtual care options for EMR-S patients. Furthermore, despite billing for services out-of-pocket, she prioritized cost-efficiency.

Her clinical philosophy mapped directly onto that of Dr. Neil Nathan, prioritizing mold removal and EMF mitigation, neural retraining, and mold detoxification.

According to Dr. Nathan, EMR-S, as well as multiple chemical sensitivity (MCS), could be treated through a combination of exposure reduction (in my case, EMF mitigation in the home), custom-designed neural retraining and vagal nerve treatment. Furthermore, he stated that mold toxicity is generally upstream of newfound sensitivities like EMR-S, and that once the mold toxicity is resolved, the root cause of the sensitivities is generally resolved as well.

While I had become aware of the specialized neural retraining programs during my research, it was unclear to me at what stage the treatment should begin in relation to exposure reduction. This stems from commentary from the patient community indicating that patients who began the programming before home remediation was complete found

that their results worsened instead of improving. I did not get any more detail on this. However, it is entirely plausible that, without extensive remediation, the patient(s) would not have had a tolerable baseline from which to conduct neural retraining anyway, and sleep, which is essential for consolidating new learning, would not have been possible whatsoever.

Upon hearing that I had already taken significant steps to reduce my home's EMFs and that I could tolerate at least a few areas of the house on a consistent basis, my environmental medicine practitioner gave the green light to start the programming.

Within six weeks, I had fully regained my functional capacity. I was driving, using cell phones and computers, watching TV with my family during dinner and going to places outside the house with high levels of EMFs, like hospitals, without any symptomatic response.

I can report with confidence that the EMF exposure reduction, paired with the neural retraining, was responsible for my recovery. I know this is true for certain within the confines of the environmental medicine practitioner's care plan for me because, from the time that I started the neural retraining to when I had largely achieved remission, I was not able to tolerate any of the medications or supplements that the practitioner gave me. Furthermore, she recommended that I stop taking any supplements that worsened my bowel movements, which in turn resulted in my stopping all of them (see the reference above to ignored side effects from when I was taking supplements without clinician supervision).

The naturopath who prescribed the PEMF mat, the homeopathic remedies and the peptides gave an ambiguous long-term timeframe for the Arnica to finish its curative process. Under that hypothetical framework, it is possible that the Arnica that I took a few months prior finally settled in, coincidentally at exactly the same time that I started performing the neuropsychological programming. I find the evidence supporting this logic to be weak and therefore attribute very little, if any, of my recovery to taking a course of Arnica.

Shortly before my appointment with my environmental medicine practitioner, a second EMF consultant, with a strong reputation across industries, visited the house to further investigate sources of EMF and electromagnetic interference. He quickly dismissed the dirty electricity filters offered by the former EMF consultant as products that worsen EMF levels in the home rather than improve them, and advised against further use of the PEMF mat, despite its being advertised as producing only "earth-like" EMFs. He found the level of magnetic field that it produced to be far too high to merit ongoing use.

He then assessed the EMFs in my bedroom. Using advanced instrumentation, he found that, upon turning the breaker off in my bedroom, EMF levels at much higher frequencies were increasing rather than decreasing. His hypothesis was that extra voltage was running on the current going through my bedroom. As such, when the breaker for my bedroom was turned on, the interference of the competing voltages lowered EMF levels at the higher frequencies. Therefore, once the breaker was turned off, the lack of competition on the current no longer inhibited the extra current.

An electrician visit to identify the source of the extra voltage was scheduled for several weeks out. I left the house with my dog while the electrical engineer conducted the assessment and remediation. I felt that my progress was valuable and did not want to experience any alterations to my newfound lack of symptomatic shifts in the home. While I was willing to accept any symptomatic response upon my return, a part of me wanted to feel no difference. My progress in reducing my symptomatic severity to anthropogenic EMF/RFs led me to hope that I could no longer feel any EMFs whatsoever, such that I could be sure to travel and live anywhere without symptomatic repercussions. While the wonderful summer day spent with my dog may well have served as a confounding variable, I could not deny how much better I felt in the home after the electrical engineer had finished his work. My body felt lighter and much more energetic than it had in years, in ways that were clearly distinct from previous time spent in the home or from arriving back home after a summer day.

While this left me with many questions regarding the status of my recovery or the nature of my body's response to EMFs, I was ultimately thankful for the restored health that I was experiencing. I have since traveled to different countries, staying in Airbnbs and hotels, despite their WiFi and smart technology, with no major symptomatic shifts.

In fairness to this question, I realize that I have not provided an accounting of all of the devices involved in my symptomatic responses. Please note that the breadth of these devices, as my disease state evolved, makes this documentation challenge extraordinarily difficult. I provided a detailed overview of the eero unit at the beginning of my care journey. All other products can reasonably be inferred to be standard household or consumer items. The extent to which the referenced PEMF items belong on this list is another open question. A consistent pattern I noticed is that if a device or setting involved some level of EMF exposure, I eventually lost my ability to tolerate it at some point between September 2024 and early summer 2025 (e.g., driving a car). Whether my initial positive response to these PEMF units would fall under the same category as any of the

other devices emitting anthropogenic EMFs (e.g., TV, laptop, cell phones) to which I eventually lost my tolerance is unsettled, and as such, so is whether those devices deserve inclusion on this list.

Response to Question 4

We invite healthcare professionals, researchers, and public health practitioners to describe observations from clinical practice, occupational settings, or research that may help identify patterns, if any, of reported potential adverse health effects associated with RF/EMF radiation and exposure.

1. I am not a clinician and offer no clinical observation of my own. I address this question because its most important answer is structural: there is presently no instrument, definition or reporting channel through which a clinician in the United States could contribute systematic observations even if they wished to. I state the mainstream position first.

2. *The mainstream position.* The World Health Organization's position, set out in Fact Sheet No. 296 (2005) and not superseded, is that the symptoms reported by people who attribute them to electromagnetic fields are real and can be disabling, but that there are no diagnostic criteria and no scientific basis to link the symptoms to EMF exposure. National health authorities in France (ANSES, 2018), the Netherlands, the United Kingdom, Australia and Canada take substantially the same position. I do not ask the Department to set it aside.

3. *(h) and (i) — what the blinded evidence shows, and what it does not cover.* The provocation literature is large and consistently null. Rubin, Das-Munshi and Wessely, *Psychosomatic Medicine* 67(2):224–232 (2005), reviewed 31 experiments involving 725 self-identified hypersensitive participants and found no reliable evidence that blinded exposure triggers symptoms. The WHO-commissioned review by Bosch-Capblanch et al., *Environment International* 187:108612 (2024), covering 41 studies and 2,874 participants, found that self-identified individuals could not detect exposure better than chance and that standardized mean differences for symptoms clustered around zero, with confidence intervals crossing zero. I accept those findings.

4. They have a boundary, and the boundary matters. Every blinded provocation study that recruited self-identified sufferers used continuous-wave or older single-source signals — GSM, UMTS, TETRA or similar. Every study that has applied a realistic contemporary signal — for example the 5G NR sleep-EEG study of Sousouri et al., *NeuroImage* 317:121340

(2025), and the 26 GHz triple-blind series reported in 2026 — recruited healthy volunteers and screened electrosensitive individuals *out*. I have found no published study that combines the two: self-identified subjects exposed under blinded conditions to the pulsed, intermittent, multi-band signatures of current fixed infrastructure. For that exposure the correct statement is absence of evidence, not evidence of absence. The authors of the WHO-commissioned review themselves note that a real effect confined to a sensitive subgroup could be masked when such subjects are mixed with insensitive ones.

5. (j) — *population characteristics, and why prevalence cannot be estimated*. Self-reported prevalence ranges from roughly 1.5 percent to more than 20 percent across countries and surveys, and a 2025 comparative study found that only about 61 percent of people who labelled themselves sensitive remained in that category once symptom frequency and functional impact were considered. The variation tracks question wording more closely than any exposure measure. That is not a finding about the condition; it is a finding that no comparable metric exists.

6. (k) — *exposure patterns*. The one peer-reviewed case series specific to utility metering, Lamech, *Alternative Therapies in Health and Medicine* 20(6):28–39 (2014), reported that of 92 respondents approximately 29 percent attributed their symptoms to meters on neighbouring properties and 22 percent to their own. I cite the series with its limits stated: its cases were self-submitted to an Australian advocacy website's register, not to a public-health authority; the author identifies as an affected person; there are no controls, no exposure measurement and no denominator. Its value is that it records an attribution pattern — an exposure the respondent could not avoid by decisions about their own property — which bears on Question 15(b).

7. *Clinical testimony*. At a Massachusetts Department of Public Utilities evidentiary hearing on 27 February 2014 (D.P.U. 12-76), Dr. Lisa Nagy, an environmental physician board-certified in emergency medicine, stated that electrical sensitivity can occur in 20 to 30 percent of people with chemical sensitivity, that chemical sensitivity presents at approximately four to one women over men, and that she sees “the worst of the worst.” She also stated that her own illness originated in a mold exposure, not in radiofrequency exposure. I present this as one physician's clinical impression in a public proceeding, not as a case series, and I note the mold history because it points toward a question the literature has not resolved: whether what is reported is an agent-specific condition or a susceptibility state with multiple possible precipitants.

8. (l) — *standardized methods*. None exists. Baliatsas et al., *BMC Public Health* 12:643 (2012), reviewed the identifying criteria used across the literature, found them heterogeneous and unvalidated, and called for a case definition to be developed and then validated for its ability to distinguish this presentation from conditions such as chronic fatigue. Fourteen years later, no validated case definition has been published. The criteria documents that circulate most widely — the Austrian Medical Association working-group guideline of 2012, the EUROPAEM guideline of 2016, and the diagnostic criteria proposed by Belpomme and colleagues — are consensus products of environmental-medicine bodies, have no published validation data, and have not been adopted by any national health authority. Proposed biomarkers, including the Belpomme panel and the 2025 INSERM fibroblast study (*International Journal of Molecular Sciences* 26:4792), are observational in self-selected patients, did not apply controlled RF exposure, and have not been independently replicated. None can presently support diagnosis.

9. *Surveillance does not exist in any form*. There is no ICD code specific to this presentation. 21 C.F.R. §1002.20 requires manufacturers to report accidental radiation occurrences arising from product defects; it is not a channel for symptom reports concerning compliant products. FDA's Medical Device Reporting system covers regulated medical devices. CDC's National Environmental Public Health Tracking Network has no radiofrequency indicator. And no United States federal agency has issued clinical guidance on evaluating or managing patients who present with these complaints — in contrast to France, where ANSES in 2018 recommended that the national health authority consider care recommendations of the kind it issued for fibromyalgia, and the Netherlands, where the national knowledge platform provides guidance to general practitioners.

10. (m) — *recommendations*.

- **Commission and validate a case definition.** This is the step that unblocks every other one. HHS should fund development of provisional criteria sufficient for consistent case ascertainment, explicitly without prejudging aetiology, followed by a formal validation study reporting sensitivity, specificity and inter-rater reliability.
- **Issue interim clinical guidance.** Modelled on the national approaches cited above: take the symptoms seriously, exclude treatable conditions, offer evidence-supported symptom management — the best available evidence, reviewed by Rubin et al. in *Psychotherapy and Psychosomatics* 75(1):12–18 (2006), supports cognitive behavioural therapy — and neither assert nor dismiss causation.

- **Fund the missing provocation study.** One adequately powered, pre-registered, double-blind study in self-identified subjects using realistic current-infrastructure signals, with adequate washout and placebo controls. A null result would be as valuable as a positive one; either would settle a question the existing literature cannot.
- **Scope, before building, a voluntary report mechanism.** The Lamech register shows both that people will report and why an advocacy-run register is uninterpretable. Any federal mechanism needs a case definition, structured exposure capture and a denominator strategy from the outset.

11. Two of the four recommendations depend on a case definition that does not exist. Producing one is within the Department's capacity.

Response to Question 5(n)

What scientific, technical, or regulatory changes by federal health agencies, if any, would improve the assessment, disclosure, and regulation of wireless radiation exposure?

1. The most consequential fact about the U.S. RF exposure limits is not scientific but archival. The limits at 47 C.F.R. §1.1310 were adopted in FCC 96-326 (ET Docket No. 93-62, released 1 August 1996) from NCRP Report No. 86 and ANSI/IEEE C95.1-1992, the ANSI-approved version of IEEE C95.1-1991. NCRP Report No. 86 states at §17.6 that it is based on literature published through 1982. IEEE C95.1-1991 states at §6.3 that its literature list used a cut-off publication date of December 1985, and that its final data base comprised 120 papers. Those limits have not been substantively revised since.
2. The federal health agencies told the Commission this during the rulemaking. EPA's comment of 9 November 1993 (ECFS 123890), signed by the Director of the Office of Radiation and Indoor Air, states that the 1992 ANSI/IEEE standard "is based on literature published before 1986" and that the cut-off date for the NCRP review "is 1982." OSHA's reply comment of 1 March 1994 (ECFS 127798) states that both criteria "are based on biological-effects literature reviews conducted over seven years ago, and need to be updated." Thirty-two years later, neither has been.
3. The agencies also identified work that needed to follow adoption, and it did not follow.
 - EPA in 1993 recommended that the FCC "consider requesting the NCRP to revise its 1986 report to provide an updated, comprehensive review of the biological effects on RF radiation and recommendations for exposure criteria." NCRP Report No. 86 has not

been revised.

- EPA wrote to the FCC on 19 June 1995 (ECFS 147044) that its own *Guidelines for Limiting Public Exposure to Radiofrequency (RF) Radiation* were “substantially complete,” were entering review, and should issue “in early 1996.” They were never issued. EPA now states it has no funded mandate for radiofrequency matters.
- FDA’s Center for Devices and Radiological Health wrote on 10 November 1993 (ECFS 123942) that it did not believe the standard “addresses the issue of long-term, chronic exposures to RF fields,” that “the relevance of such questions can only increase as the use of portable and hand-held devices grows,” and recommended “that new research be closely monitored for possible evidence that the levels in the 1992 guideline may need to be reduced.” I am not aware of any published FDA review performing that monitoring function against the limits.
- On 17 June 1999 NIOSH, writing on Department of Health and Human Services letterhead on behalf of the Radiofrequency Interagency Work Group, sent the IEEE committee revising the standard fourteen issues the Work Group believed needed to be addressed “to provide a strong and credible rationale to support RF exposure guidelines.” On 16 July 2003 EPA wrote to the co-chair of the successor IEEE committee that the Work Group remained “particularly interested in how these 14 issues are to be treated in the revision process,” and added three more. Both letters state that they record the views of the Work Group’s members rather than the official positions of their agencies; the 1999 letter says its views “do not represent the official policy or position of the respective agencies.” The 2003 letter is in the record of Federal Communications Commission ET Docket No. 03-137, at pages 18-19 of the Comments of The EMR Policy Institute filed 8 December 2003 (ECFS 5510444038), with the Work Group’s membership directory at page 20; the Commission discussed it in FCC 13-39 at ¶46 and nn. 83-87. The 1999 letter was placed before the D.C. Circuit in *Environmental Health Trust v. FCC* as Exhibit G to the amicus brief of the Natural Resources Defense Council and local elected officials (Doc. #1855212, filed 5 August 2020, at 107-114). Neither letter appears to have received a substantive response.

4. I recommend four changes.

5. *First, a formal HHS review of the evidentiary basis of the current limits.* The FCC describes its rules as “continuously evaluated and based on gold-standard research from entities with specialized expertise in health and safety issues, including the National Council on Radiation Protection and Measurements” (Public Notice DA 26-997, ET Docket No. 13-84, 17 September 2026). The NCRP report on which the rules rest has not been revised since 1986 despite EPA’s request that it be revised; the health agencies’ own

guidelines were never completed; and no HHS component has published an assessment of whether the 1982 and 1985 literature bases remain adequate. The Department should conduct one.

6. *Second, uncertainty-factor methodology.* Issue 6 of the 1999 RFIAGW enclosure observes that an accepted practice in setting human exposure levels is to apply factors for each area of uncertainty, and lists five: extrapolation from acute to chronic exposure; extrapolation from animals to humans in prolonged exposure; variation in individual susceptibility; incomplete databases; and uncertainty in selecting the effects basis. EPA had made the antecedent point in 1993: “No explanation is given for the decision to employ safety factors of 10 and 50.” IEEE C95.1-1991 §6.5 concedes that for some phenomena the distribution of responses is inadequately known to formulate a precise margin of safety. HHS should recommend that any future RF limit be derived using the uncertainty-factor methodology the Department applies to other environmental agents.

7. *Third, disclosure at the point of installation.* NCRP Report No. 86 §17.4.5, adopted by the FCC as the source of its localized SAR criteria, permits general-population exposure at occupational levels from a hand-held emitter expressly as “a personal decision by the individual,” and conditions that permission on the individual not exposing others above the population guidelines. Utility-mandated equipment on a dwelling, and equipment on neighboring dwellings, satisfies neither condition. EPA’s 1993 comment made the related point directly: “In our view, ‘awareness’ is not equivalent to protection.” Where an RF-emitting device is installed on or serving a dwelling at the direction of a utility or other entity rather than at the occupant’s election, the occupant should receive written disclosure of operating frequencies, transmission interval, duty cycle, and peak and time-averaged emissions, together with a no-cost non-transmitting alternative.

8. *Fourth, make the federal record findable.* The federal health agencies’ filings in the 1993–1997 rulemaking are preserved in the FCC’s Electronic Comment Filing System, but they are effectively undiscoverable. Of the five agency letters the Commission relied on in 1996–1997 (FCC 97-303 ¶37 n.27), NIOSH’s is indexed under “Public Health Service” and OSHA’s under the name of its signatory with no agency name at all, so neither is returned by a search for the agency that wrote it. Filer names are truncated to about 25 characters; all five letters carry the submission type “Notice of Pre-Hearing Conference,” a catch-all applied to roughly 182 of the docket’s 458 filings; and no filing in the docket has searchable text. The RFIAGW letters are worse served still. Neither was filed by the agencies that wrote them. The 2003 letter survives on a government server only because a private organization attached it to comments in a different docket twenty-three years ago (ECFS 5510444038, ET Docket No. 03-137, at 18-19). The 1999 letter appears in the

Commission's system only as an attachment to filings by private commenters, almost all of them made after 2020 and in dockets unrelated to radiofrequency exposure limits; its appearance before the D.C. Circuit was as an exhibit to an amicus brief. Neither letter can be found by searching for its authoring agency, its subject, or the Work Group's name. HHS should ask the FCC to correct the ET Docket 93-62 metadata and add searchable text, and should itself publish the RFI/AFWG correspondence and any subsequent interagency RF records it holds.

Response to Question 5(p)

How, if at all, should a classification system account for exposure-related characteristics, including operating frequency, power density, SAR, field strength, modulation and pulse characteristics, duty cycle, beamforming, simultaneous exposure to multiple frequencies, duration, distance, proximity to the body, and cumulative exposure over time?

1. It should account for all of them, and the documentary record shows the current framework was built by the authors of the standards themselves in the knowledge that it does not. I address the three parameters where the record is most explicit: spatial averaging, modulation and pulse characteristics, and time averaging.

Spatial averaging conceals peak absorption, and all three source documents say so

2. ANSI C95.1-1982 §6.2 records that whole-body-averaged SAR is the mean of a distribution whose high side is an envelope of electrical hotspots, and that peak SAR can range more than an order of magnitude above the whole-body average. §6.11 repeats the point. The standard states that explicit use of peak SARs was precluded not because peaks were unimportant but because data on distributive SARs was limited and distributions highly variable.
3. NCRP Report No. 86 §17.4.5 states that maximal localized SAR typically reaches 10 to 20 times the whole-body-averaged SAR, and that for exposure criteria based on whole-body-averaged SAR the maximal SAR in small regions of the body may be 10 to 20 times higher.
4. IEEE C95.1-1991 carries the 1982 language forward verbatim and revises the multiple upward, stating that spatial peak SAR values can exceed a whole-body average by more than a factor of 20.

5. Three independent standards documents, spanning 1982 to 1991, state that the metric on which the limits are built understates local absorption by one to one and a half orders of magnitude. A classification system should specify localized SAR over defined tissue volumes and require reporting of the spatial distribution, not a single averaged figure.

Modulation and pulse characteristics were identified, provided for once, and removed

6. ANSI C95.1-1982 §6.8 states that SAR does not contain all of the factors that could be important in establishing safe limits, that other characteristics of an incident field such as modulation frequency and peak intensity may pose a risk to health, and that some members of the subcommittee had what the standard calls an *intuitive* concern about exposure to a pulse-modulated field of high peak but low averaged density, or a sinusoidally-modulated field, where the recurrence rate falls in the range of bioelectric rhythms. The standard states that the data base did not provide the evidence of adversity by which to recommend special provisions for modulated fields, and that no supportable way of expressing the concern could be reached. §6.5 of the same standard records that modulation-specific effects, specifically calcium-ion efflux from brain materials, were not considered adverse because of the subcommittee's inability to relate them to human health. The two underlying studies — Bawin, Kaczmarek and Adey (1975) and Blackman et al. (1979) — appear in the standard's own Table A1 at whole-body SARs of 0.003 and 0.0023 W/kg, approximately two orders of magnitude below the 0.4 W/kg limit the standard then adopted.

7. NCRP Report No. 86 §17.4.7 reached the opposite operational conclusion. It states that while it is not known whether low-frequency modulation effects pose a risk to health, their reliability and their independent confirmation in avian and mammalian species dictate the need for caution, and it therefore imposes a special-circumstance criterion: where a carrier is modulated at a depth of 50 percent or greater at frequencies between 3 and 100 Hz, the general-population criteria apply to occupational exposure as well.

8. IEEE C95.1-1991 constituted a dedicated Modulation (RF) subgroup within its Biological Validation Working Group (§6.4). The resulting standard contains no modulation provision, and its rationale states that no reliable scientific data exist indicating that non-thermal or modulation-specific sequelae of exposure may be meaningfully related to human health.

9. In 1996 the FCC adopted NCRP's field-strength and power-density limits but not NCRP's modulation criterion. At ¶25 of FCC 96-326 the Commission records that EEPA, Ericsson, Motorola, Raytheon and TIA argued against it, and at ¶32 it concludes that there

was insufficient evidence to give special consideration to modulation effects and that adopting the criterion would be premature. The federal health agencies did not urge otherwise. EPA's 1993 comment states that “while studies continue to be published describing biological responses to nonthermal ELF-modulated RF radiation, the effects information is not yet sufficient to be used as a basis for exposure criteria to protect the public against adverse human health effects” — while adding, in the next paragraph, that “many other studies provide evidence that nonthermal modulated-RF exposures produce effects that are not produced by CW (unmodulated) RF radiation.” NIOSH's comment of 11 January 1994 (ECFS 126103) noted in vitro and in vivo effects under the NCRP conditions “although the implications for risk to human health are not clear,” observed that ELF amplitude modulation is present on many common sources, and recommended that its depth in those sources be measured before any restriction was adopted.

10. The record therefore does not show a regulator overriding the health agencies on modulation. It shows something more consequential: every federal body that addressed modulation between 1982 and 1994 treated it as a real and unresolved question, and the work each identified as the next step — NIOSH's measurement of modulation depth in common sources, EPA's comprehensive NCRP update — was never done.

11. In 1998 the IEEE Committee on Man and Radiation published a technical information statement on radiofrequency interference with medical devices, prepared by H. I. Bassen of the FDA Center for Devices and Radiological Health with contributions from E. R. Adair, Q. Balzano, G. J. Beers, C. K. Chou, L. N. Heynick, B. J. Klauenberg and G. D. Lapin. Five of those eight — Adair, Bassen, Balzano, Chou and Heynick — served on the IEEE Subcommittee IV that produced C95.1-1991; Adair was its Co-Chair. The statement reports that amplitude modulation including pulsed RF is usually the most significant modulation factor for interference, that digital mobile systems often use pulsed amplitude modulation that can enhance the potential for interference, that such systems generate peak powers up to 8 watts modulated at 2 to 217 pulses per second, and that this range spans the physiological frequencies of the human body — roughly 0.5 Hz to several hundred Hz — monitored by many medical devices. Its recommendation is that the modulation frequencies of RF transmitters should be outside the physiological passband.

12. The modulation band NCRP's criterion addressed — 3 to 100 Hz — lies within the band IEEE's own medical committee identified in 1998 as the principal mechanism of documented device failures. I draw no inference about what the Commission knew in 1996. I observe that the standards community identified modulation frequency as potentially health-relevant in 1982; that NCRP provided for it in 1986; that IEEE assessed it through a dedicated subgroup in 1991 without providing for it; that EPA and NIOSH in 1993

and 1994 described the effects as real but their health significance as unresolved; that IEEE documented a modulation-specific harm mechanism in medical devices in 1998; that the Radiofrequency Interagency Work Group raised it again in 1999; and that no federal exposure limit today contains a modulation parameter.

13. On 17 June 1999, the Work Group, in a letter signed by NIOSH's representative, told IEEE that studies continue to be published describing biological responses to nonthermal ELF-modulated and pulse-modulated RF exposures that are not produced by continuous-wave exposure, and that the parameter used to describe dose and dose rate and used as the basis for exposure limits is time-averaged SAR, which erases the unique characteristics of an intensity-modulated exposure that may be responsible for producing an effect.

14. A classification system should treat modulation depth, modulation frequency, pulse width, pulse repetition rate and duty cycle as reportable exposure parameters distinct from time-averaged power, and should require that compliance demonstrations state them.

Time averaging permits pulsed sources to comply while delivering high instantaneous exposure

15. ANSI C95.1-1982 §6.12 retained 0.1 hour — six minutes — as the significant averaging period. IEEE C95.1-1991 §6.8 sets the averaging time for general-population electric-field exposure at 30 minutes between 3 MHz and 3 GHz. NCRP Report No. 86 §17.4.8 states that the time averaging of and limits on power densities and SARs preclude excessive instantaneous peak-power levels and that there is therefore no need to specify a limit on peak power as such.

16. Issue 8 of the 1999 RFIAGWG enclosure states that the 0.1 hour approach historically used should be reassessed, that time averaging for other features of RF exposure is not necessarily desirable, and that it should be re-evaluated specifically as it deals with modulation of the signal, contact and induced current limits, and prolonged or chronic exposure. Issue 9 notes that a change permitting six-minute rather than one-second averaging for induced current limits increases the concern about the absence of any peak limit.

17. The practical consequence is straightforward. A fixed source transmitting in bursts of milliseconds, thousands of times per day, is evaluated against a limit averaged over thirty minutes. Compliance is a near-certainty regardless of instantaneous field strength at the

point of exposure. A classification system that does not report peak and duty cycle alongside time-averaged power does not describe the exposure.

Parameters on which I have nothing to offer

18. I am unable to comment usefully on beamforming or on simultaneous exposure to multiple frequencies, and note that neither is addressed in any of the source documents underlying the current limits. Issue 11 of the 1999 RFIAGW enclosure observed that a revision should reduce concern that the standard is not restrictive enough for continuous exposures at lower microwave frequencies “where new wireless applications for consumers could make this an issue in the future.” That was written in 1999.

19. The standard the Commission relied on already addressed this, and the Commission did not carry the provision into its rules. IEEE C95.1-1991, one of the two standards on which the Commission based its limits (FCC 97-303 ¶29), caps “the peak (temporal) value of the MPE, in terms of E field,” at 100 kV/m for pulsed fields, and limits the energy density of pulses shorter than 100 ms “during any 100 ms period” (§4.1.2(f)–(g)). Its rationale states that “the lack of such consideration in the standard has allowed the peak power density to rise arbitrarily, as long as average power density met the standard” (§6.9). IEEE C95.1-2019 carries the 100 ms provision forward (§4.3.4.1) and adds a per-pulse fluence limit for intense pulses between 30 and 300 GHz (§4.3.4.2). The Commission’s rules contain neither the 1991 cap nor the 100 ms provision. In its 2019 order it stated that its rules “do not specify a cap at any peak value above the continuous limits” and “do not specify how much above that general population limit an instantaneous exposure is permitted to be” (FCC 19-126 ¶83; see 85 FR 18137), and in the accompanying notice it acknowledged that, because it does “not limit temporal-peak SAR or power density,” all the energy of an averaging period “could be deposited in a moment resulting in a well-defined temperature rise and be compliant with the rules” (¶136). The gap is therefore not between the U.S. framework and an unsolved problem; it is between the U.S. framework and a provision of the standard from which it took its limits.

Response to Question 6

What scientific evidence exists about potential adverse health effects caused by current exposure limits?

1. I read this as asking what harms are attributable to the limits being set as they are, rather than to RF exposure as such, and answer it as a question about regulatory design.

2. *The limits substitute an assumption for chronic-exposure data, and say so.* ANSI C95.1-1982 §6.4 states that because of the paucity of reliable data on chronic exposures the subcommittee focused on behavioral disruption under acute exposures, even that of a transient and fully reversible character, and that the assumption is that reversible disruption during an acute exposure is tantamount to irreversible injury during chronic exposure. IEEE C95.1-1991 §6.4 repeats the premise almost word for word — “Because of the paucity of reliable data on chronic exposures, IEEE Subcommittee IV focused on evidence of behavioral disruption under acute exposures, even disruption of a transient and fully reversible nature” — though it does not restate the assumption in terms. Issue 3 of the 1999 RFIWG enclosure states that the past approach of basing exposure limits on acute effects data with an extrapolation to unlimited chronic exposure durations is problematic, and that for lower-level, non-thermal chronic exposures the effects of concern may be very different from those for acute exposure, naming epigenetic effects, tumor development and neurologic symptoms. That assumption has never been validated and remains the bridge between the evidence base and the limit.

3. *The limits are widely construed as findings of safety, which the standards do not support.* ANSI C95.1-1982 §5 offers its guides as upper limits of exposure, particularly for the population at large, states that where exposure conditions are not precisely known or controlled exposure reduction should be accomplished by reliable means to values as low as reasonably achievable, and states that exposures slightly in excess are not necessarily harmful but are not desirable and should be prevented wherever possible. That is an ALARA instruction inside the standard. In practice, compliance with the derived federal limit is routinely presented as an affirmative demonstration of safety. Massachusetts Department of Public Utilities Order D.P.U. 12-76-B (12 June 2014) at 43 found that evidence from peer-reviewed studies, determinations by standards bodies and conclusions from other jurisdictions do not support a finding that the FCC guidelines are inadequate to protect against either thermal or non-thermal effects of RF emissions. In declining to tighten its guidelines in 1997, the Commission did not claim that they protect against non-thermal effects. It answered that “it would be impracticable for us to independently evaluate the significance of studies purporting to show biological effects,” that this “is especially true for such controversial issues as non-thermal effects and whether certain individuals might be ‘hypersensitive’ or ‘electrosensitive,’” and, in the preceding paragraph, that it “is not a health and safety agency” (FCC 97-303 ¶¶30-31). In 2019 it stated that it had “dismissed the notion that the existing framework should be altered on account of any ‘non-thermal’ effects,” while again recognizing “that it is not a health and safety agency” and giving “considerable weight to the expertise of agencies and groups” able to interpret the biological research (FCC 19-126 ¶¶152-153). Neither

statement is a finding that the limits were designed to address non-thermal effects; both rest on deference to others' expertise. A state regulator's attribution to the federal limits of a protective scope that the federal regulator grounds in other agencies' judgment is a concrete, demonstrable harm caused by the limits' ambiguity.

4. The safety factor has no stated quantitative basis and was carried forward by reaffirmation. ANSI C95.1-1982 §6.6 states that the order-of-magnitude reduction to 0.4 W/kg was nearly unanimous, that one biological scientist dissented on the ground that a specific justification should be given for the power-of-ten reduction, and that beyond the need for a wide margin of safety no quantitative justification was advanced. IEEE C95.1-1991 records that the 1982 safety factor of 10 was reaffirmed. FCC 96-326 footnote 16 states that appropriate safety factors were then added. A factor described by its authors as unjustified is described by the regulator as appropriate.

5. The framework excludes the exposures at issue by construction. Because compliance is assessed against a limit time-averaged over 6 or 30 minutes, with no peak limit and no modulation parameter, a fixed, involuntary, intermittently pulsing source in a residence will comply under essentially any deployment. A framework that cannot register the exposure cannot regulate it, and its compliance finding conveys no information about it.

Response to Question 9

What, if any, technical and exposure-related information should be disclosed to consumers, residents, workers, schools, healthcare providers, and local governments?

1. Disclosure obligations should be keyed to whether the exposed person chose the exposure. The current framework does not make that distinction, and the source documents show it was considered and set aside rather than overlooked.

2. IEEE C95.1-1991 records, in the rationale at Section 6, that voluntary versus involuntary exposure was among the arguments advanced for applying a larger safety factor to the general public, and that Subcommittee IV declined to act on it for want of reliable data. The 1999 RFIAGWG enclosure returns to the same problem from the other direction: it notes that an uncontrolled environment can be converted into a controlled one by restricting access and making individuals aware of the potential for exposure, after which the same persons may lawfully be exposed at the higher tier, and asks what biologically-based factor changed for those people. The tier a person falls into is therefore determined in part by what they have been told — which makes disclosure a determinant of the applicable limit, not merely a courtesy.

3. NCRP Report No. 86 §17.4.5, the source of the localized SAR criteria the FCC adopted, permits a member of the general population to be exposed at occupational levels from a hand-held emitter expressly as a personal decision by the individual, and expressly conditions that permission on the individual not exposing other persons above the population guidelines. Both conditions presuppose an informed chooser. Neither is satisfied by equipment installed on a dwelling at a utility's direction, or on a neighboring dwelling.

4. I recommend that HHS support disclosure, at or before installation and in writing, of the following for any RF-emitting device installed on or serving a residence, school, childcare facility or healthcare facility other than at the occupant's election:

- operating frequencies and bands, including any second radio;
- transmission interval, pulse repetition rate, pulse width and duty cycle;
- peak and time-averaged emissions, stated separately, with the averaging window used;
- measured or modeled field strength at the nearest habitable interior point, not only at the device;
- the certification basis relied on, and what that certification does and does not test;
- the existence, terms and cost of any non-transmitting alternative;
- a plain statement of whether installation is required by state or federal law.

5. Drafted statutory language of this kind already exists. Massachusetts House Bill H.3551 would require written consent before installation and before any alteration of meter functionality; written notice to every ratepayer stating whether a wireless meter has been installed; written notice that such installations are not mandated by state or federal law and are not permitted without the ratepayer's consent; and a prohibition on discriminating against ratepayers with medical conditions exacerbated by exposure to pulsed radiofrequencies. I commend it as a model, while noting it has not been enacted.

6. The disclosure principle is not new to the federal record. OSHA recommended in its March 1994 reply comment that manufacturers of hand-held RF devices above 1.4 watts "prepare a users manual which describes the safe use of the device and objectively describes health concerns for its use," and "affix a warning label to the device to direct the users to the manual."

7. For healthcare providers specifically, the IEEE COMAR statement discussed at Question 11 recommends that medical device manufacturers warn both medical professionals and patients of situations where interference failure may occur, including

how to recognize the symptoms of interference, how to deal with it, and how to report incidents. That recommendation was made in 1998. I am not aware that it has been implemented as a disclosure requirement.

8. *Information for clinicians and patients.* I could find no clinician or patient information on this condition from CDC, NIEHS, FDA or EPA. In a 2005 telephone survey of 342 Swiss general practitioners, 69 percent had been consulted at least once for symptoms attributed to electromagnetic fields, fewer than half had a standard approach to these patients, and 75 percent said they needed more information (Huss and Rösli, *BMC Public Health* 6:267 (2006); response rate 28 percent). I recommend that CDC publish clinician and patient pages, modeled on CDC's ME/CFS resources, covering how to take a structured exposure history, how widespread man-made electric, magnetic and radiofrequency sources are in homes, workplaces and care settings, how to rule out treatable conditions, how to document functional limitation, and where to refer. I also recommend that ATSDR restore and update its continuing education on taking an exposure history, which lapsed in 2019, so that it covers patients who attribute symptoms to environmental exposures, with content on electric, magnetic and radiofrequency fields carried on CDC's pages. (Recognition stage; see the care pathway at Question 18 ¶5.)

Response to Question 10

What data sources or surveillance systems currently exist to monitor potential adverse health effects associated with RF radiation exposure? (a) disease registries; (b) occupational monitoring; (c) environmental monitoring; (d) longitudinal cohort studies; (e) biomonitoring; (f) adverse event reporting; (g) disease or illness clusters; (h) other.

1. (a)–(h). None that can identify the population this comment is chiefly concerned with. As set out at Question 4 ¶9, there is no ICD code specific to this presentation; 21 C.F.R. §1002.20 concerns product defects, not symptom reports involving compliant products; FDA's Medical Device Reporting system covers regulated medical devices; and CDC's National Environmental Public Health Tracking Network has no radiofrequency indicator. Existing codes can record a symptom, and external-cause codes can record an exposure, but no code records the presentation itself. A person who brings these complaints to a clinician therefore cannot be counted in claims, health records, registries or cohort studies as a member of a distinct population.

2. Recommendation: consistent coding now, a diagnosis code once a definition exists.

Every surveillance source this question lists depends on being able to identify cases, and until a code exists these encounters cannot be coded consistently, so they cannot be counted. In my own case, the only diagnosis code recorded was R51.9, headache, unspecified (Question 3). Creating the means to do so is within the Department's own authority. ICD-10-CM, the U.S. clinical modification of the WHO classification, is maintained by CDC's National Center for Health Statistics, and diagnosis codes are added through the ICD-10 Coordination and Maintenance Committee, which NCHS conducts jointly with CMS. NCHS and CMS are also two of the four ICD-10-CM Cooperating Parties. I recommend that the Cooperating Parties publish interim advice on coding these encounters consistently, for example using Z77.128, "Contact with and (suspected) exposure to other hazards in the physical environment," with the presenting symptoms. That code records a reported or suspected exposure; it does not code the exposure as the cause of the presenting symptoms. Once a working case definition exists (Questions 4 ¶10 and 16 ¶8), I recommend that NCHS take a code request for the presentation, defined descriptively and without prejudging etiology, through the Coordination and Maintenance Committee, as happened for ME/CFS, whose code took effect in October 2022 after a request from patient organizations. A code would make this population countable for the first time. (Diagnosis stage; see the care pathway at Question 18 ¶5.)

Response to Question 11

Should exposure assessment or risk evaluation differ for sensitive populations?

1. Yes, and the question has already been considered and decided in the negative on a record now thirty-five to forty years old.
2. IEEE C95.1-1991 §6.4 states that variables characterizing the individual — "age, gender, activity level, debilitation, or disease" — may play a substantial role in possible biological effects, and that any protection guide "shall consider maximal amplification" of effects arising from "field-body interactions, environmental conditions, and physiological variables." That is a mandatory requirement the standard imposes on itself.
3. The same standard's rationale, in Section 6, discharges it by finding an absence of data. It records the arguments advanced for a larger public safety factor — subgroups of greater sensitivity, specifically infants, the aged, the ill and disabled; potentially greater exposure durations, 24 hours per day versus 8; adverse environmental conditions; voluntary versus involuntary exposure; and psychological factors — and states that the

members of Subcommittee IV believe the recommended exposure levels should be safe for all, submitting in support the observation that no reliable scientific data exist indicating that certain subgroups are more at risk than others, that exposure duration at 1982 levels is a significant risk, that damage from exposure is cumulative, or that non-thermal or modulation-specific sequelae may be meaningfully related to human health.

4. (a), (b), (c) and (f) — EPA disputed that conclusion in the rulemaking. Its 1993 comment states that the ANSI/IEEE “conclusion that there is no scientific data indicating that certain subgroups of the population are more at risk than others is not supported by NCRP and EPA reports,” and that contemporary guidelines from FDA (1988), the U.K. National Radiological Protection Board (1991), the International Radiation Protection Association (1991) and the International Electrotechnical Commission (1993) define groups who are less heat tolerant — “the elderly, infants, pregnant women, and people who are obese, have hypertension, or take drugs such as diuretics, tranquilizers, sedatives, or vasodilators that decrease heat tolerance.” The adopted limits make no provision for any of them.

5. Three observations follow.

6. *The sub-questions in the Department's Question 11 are the same sub-questions.* Sensitive subgroups, exposure duration, cumulative exposure and non-thermal effects were each raised in the standards process, and each was resolved against provision on the stated ground that data were absent — not that the question had been answered.

7. (e) — *The tiering rests on the exposure environment rather than the person, and NIOSH identified the difficulty.* IEEE C95.1-1991 states at Section 6 that the important distinction is not the population type but the nature of the exposure environment, and defines the uncontrolled environment to include the domicile and most places where the infirm, the aged and children are likely to be. Issue 5 of the 1999 RFIWG enclosure quotes that sentence and asks the operative question: an uncontrolled environment can be converted to a controlled one by restricting access and making individuals aware of the potential for exposure, after which the same persons may be exposed at the higher tier; what biologically-based factor changed for these people? The Work Group notes that the historical public-health basis for differential protection has been biological, and states that on that basis the sentence is not clearly valid. Three agencies made the same objection in the rulemaking itself. NIOSH's January 1994 comment called the two-tier structure “problematic” because it depends on a worker's knowledge, and concluded that “the conservative public health approach would be to adopt only the more restrictive ‘uncontrolled environment’ limits for all exposed workers and the general public.” OSHA's

March 1994 reply comment called the implication that employees may face higher risk because they are aware of their exposure “unacceptable.” EPA’s 1993 comment stated that “‘awareness’ is not equivalent to protection.”

8. (d) — *Individuals with implanted or attached medical devices are a distinct case requiring no resolution of the bioeffects dispute.* The 1998 IEEE COMAR technical information statement on radiofrequency interference with medical devices documents device malfunction with consequences ranging from inconvenience to serious injuries and death; the deaths of approximately 60 infants in the United States, known to FDA by the mid-1980s, while being monitored by one apnea monitor model subsequently shown to be extremely susceptible to low-level RF fields, including those from mobile communication base stations several hundred meters away and FM broadcast stations more than a kilometer away, and a voluntary recall exceeding 16,000 units; unintended motion of electrically powered wheelchairs initiated by interference from nearby emergency-vehicle transceivers, causing persons to be ejected or propelled into traffic; loss of pacemaker adaptive control; unintended firings of implantable defibrillators; and disruption of in-the-ear hearing aids by TDMA handsets. It records that the prevailing immunity standard, IEC 601-1-2 (1993 revision), sets a minimum immunity of 3 V/m over 26-1000 MHz, that non-life-supporting devices are tested at only three discrete frequencies, and that many devices tested cannot meet even that 3 V/m minimum while handheld phones produce fields above 3 V/m at up to one meter. It further records that many incidents likely go unreported because users are unaware that RF fields are present and because failures are intermittent.

9. This is an electromagnetic-compatibility question squarely within FDA’s device jurisdiction, documented by IEEE’s own committee and prepared by an FDA scientist, and it is entirely independent of whether non-thermal biological effects occur. I recommend that FDA determine what is currently known about RF interference with implanted and body-worn devices in contemporary ambient RF environments, including fixed infrastructure and utility metering equipment, and whether the 3 V/m immunity floor remains adequate thirty years after it was set.

10. FDA put this issue to the Commission directly and asked for it to be addressed. In its letter of 17 July 1996 (ECFS 166228), the Center for Devices and Radiological Health wrote that the proposed guidelines “do not address the indirect, but potentially harmful effects of electromagnetic interference with medical devices,” that “these environmental effects can induce failures in medical devices that can cause injury or death,” and that FDA “would encourage you to continue to work with our agency to address separately this issue.” Both current standards still disclaim that gap. IEEE C95.1-2019 states that its limits

“might not prevent interference with medical and other devices that might exhibit susceptibility to electromagnetic interference (EMI)” (§1.1), and ICNIRP 2020 states that interference with electrical equipment, “not only implantable medical equipment,” is “referred to as electromagnetic compatibility, and is outside the scope of these guidelines” (p. 484). I have been unable to identify any subsequent Commission proceeding that did so. HHS should ask FDA to state whether the issue it raised in 1996 has been addressed, and if so where.

11. (g), and responsive also to Question 13(f) — *Wearable and body-worn devices.* The compliance system tests wearables at fixed positions, not over the pattern in which they are worn. Where SAR evaluation is required, a wrist-worn device is tested for 10-gram extremity SAR “with the back of the device positioned in direct contact against a flat phantom,” and next-to-mouth use at 10 mm (FCC KDB Publication 447498 D04 §5.2.1); other devices worn on the body without an accessory are tested at a separation “not to exceed 5 mm for all use conditions required by the device” (§3.3.2.1). A single RF source whose available maximum time-averaged power is no more than 1 mW is exempt from routine evaluation “regardless of separation distance” (47 C.F.R. §1.1307(b)(3)(i)(A)), which the Commission has confirmed applies “where there is no separation” (FCC 19-126 ¶36); in 2019 it declined to extend its SAR-based exemption below 0.5 cm for wearables because “there is no modeling data that validates such an extension” (¶47). The exemption is from routine evaluation, not from the limits themselves (§1.1307(b)(2)). The rules’ multiple-source provisions address radiating structures “in the same device” (§1.1307(b)(3)(ii)(A)). I have found no provision that addresses several separate devices on one wearer, continuous twenty-four-hour wear, or child anatomy beyond a general applicability statement. FDA raised a related concern in 1993, recommending against a low-power exclusion because “some devices that meet the requirements of the low-power exclusion clause can induce SARs that exceed the local-SAR limits specified elsewhere in the same standard.” That clause was not the 1 mW exemption adopted in 2019, which the Commission grounded on its finding that at that power emissions “would fall safely under our existing SAR or MPE exposure limits” (FCC 19-126 ¶36). Device-specific health-outcome evidence for wearables is effectively nonexistent; I raise this as an exposure-characterization gap, not as evidence of harm.

12. (a) and (b) — Children and pregnancy. As to pregnancy specifically: the exposure model underlying the limits does not address it. IEEE C95.1-1991 §6.1 derives its limits for Standard Man at 175 cm and reduces the MPEs across the resonance range for human bodies from infants to large adults, so body size across the age range is addressed. Pregnancy, medication and pre-existing disease are not.

Response to Question 12

What scientific evidence exists regarding potential adverse health effects associated with RF radiation exposure at levels below current federal exposure limits?

1. I answer this question by first stating the evidence against the proposition, because I do not think a submission that omits it deserves to be read.
2. *What the current mainstream assessments find.* The International Agency for Research on Cancer classified radiofrequency electromagnetic fields as Group 2B, possibly carcinogenic to humans, at a working group meeting in May 2011, published as Monograph Volume 102. Group 2B is a hazard-identification category indicating limited evidence in humans and less than sufficient evidence in animals. It is not a quantified estimate of risk, it does not establish causation, and it is a category shared by a wide range of agents. Advocates on both sides routinely misstate what it means.
3. A systematic review of human observational studies commissioned by the World Health Organization — Karipidis et al., *Environment International* 191:108983 (2024) — found that mobile phone use was not associated with an increased risk of glioma, meningioma or acoustic neuroma, with no observable increase in risk with increasing time since start of use, cumulative call time, or cumulative number of calls, and rated that evidence of moderate certainty. It also found exposure from fixed-site transmitters not associated with childhood leukemia or pediatric brain tumors, on moderate- and low-certainty evidence respectively. A SEER-based incidence-trend analysis, Zhang and Muscat, *IJERPH* 22(6):933 (2025), found that among persons aged ten and over in the 22 SEER registries, malignant brain tumor incidence declined across 2000–2021 (annual percentage change –0.62), while U.S. mobile subscriptions rose from 109.5 million to 361.7 million over the same period.
4. I do not dispute those findings and I do not ask the Department to. Anyone assessing this literature must begin with them.
5. *What they do not address.* The weight of that evidence concerns mobile telephone use. Karipidis et al. included 82 mobile-phone studies, with exposure characterized by ever-use, time since start of use, call time and number of calls, and Zhang and Muscat compare incidence with subscriptions alone. The review's evidence on fixed-site transmitters — a category it defines to include “any other fixed-site transmitter” — consists of ten studies of childhood cancers in relation to broadcast antennas and base stations. The authors found “no studies eligible for inclusion investigating RF-EMF exposure from fixed-site transmitters and critical tumours in adults,” state that the pediatric brain tumor rating

“should be interpreted with caution, due to the small number of studies,” and identified only three eligible occupational studies of brain cancer or glioma. The exposure that is the subject of most of this comment — fixed, involuntary, whole-premises, intermittently pulsed, twenty-four-hour residential exposure from equipment the occupant did not choose and cannot relocate — falls within the review’s definition of a fixed-site source, but none of its included fixed-site studies concerns in-premises equipment. A null finding for a voluntary, episodic, head-proximate exposure characterized by minutes of call time is not a finding about a continuous ambient one. I say this as a limitation of the evidence, not as a criticism of the studies, which do what they set out to do.

6. *Where the honest uncertainty lies.* A 2025 risk-of-bias assessment of experimental studies bearing on eight of IARC’s ten key characteristics of human carcinogens — Simkó et al., *Mutation Research — Reviews in Mutation Research* 796:108545 (2025) — examined 119 in vitro studies and 40 in vitro measurements from in vivo studies, and identified “a strong association between the quality of study and outcome, with those meeting more RoB criteria less likely to report statistically significant effects.” Thirty-eight percent reported statistically significant effects overall, but only 3 of the 29 studies meeting five or six of its six criteria did, and effects were reported “over the entire range of frequencies and exposure levels employed, with no apparent demarcation separating positive from negative studies.” The authors conclude that none of these groups of studies “would permit any conclusions about effects of RF-EMF on the respective endpoints with high confidence, although the preponderance of negative studies with higher quality suggests that no such effects are readily apparent or exist at all,” and that the few statistically significant results in the highest-quality studies “deserve close examination, and replication if warranted by stronger studies.” The authors describe the work as a preliminary assessment rather than a PRISMA-compliant systematic review. It excludes genotoxicity and oxidative stress, which two recent systematic reviews addressed, and it excludes studies that used mobile-phone handsets as the exposure source.

7. I adopt that reading, including the authors’ observation that the higher-quality studies lean negative. It cuts against claims of established harm. It also cuts against claims of established safety, and it is the same conclusion the Radiofrequency Interagency Work Group reached from the opposite direction in 1999 when it told IEEE that the guidelines lacked a strong and credible rationale.

8. *The National Toxicology Program.* FDA requested the NTP study of cell-phone radiofrequency radiation in the late 1990s because long-term safety data did not exist. NTP reported its findings in 2018. FDA did not accept them. I do not ask the Department

to resolve that dispute in this proceeding. I ask it to note that the agency that commissioned the study and the program that conducted it — both within HHS — reached different conclusions about its meaning, and that no HHS component has since published a reconciliation. Question 17 asks how federal health agencies should coordinate. This is the clearest existing instance of a failure to.

9. I note, because it is frequently misstated, that the D.C. Circuit in *Environmental Health Trust v. FCC*, 9 F.4th 893 (2021), upheld the Commission's determination that exposure below its limits does not cause cancer, remanded only on non-cancer effects, children, long-term exposure, the ubiquity of wireless devices and other technological developments, device testing and environmental effects, and expressly took no position on the underlying science. The decision is not a finding of harm and should not be cited as one.

10. *My position.* My response to Question 3 describes my own experience, and I disclose it as a bias: I attribute my own symptoms directly to my exposure. The evidence I have reviewed does not establish that exposures below the current federal limits cause harm, and the best blinded studies have not found that self-identified people respond to exposure (Question 4 ¶3). Nor does it establish the reverse. The limits were not derived from evidence that such effects do not occur. They were derived, as set out at Question 6, from acute behavioral-disruption thresholds in animals, extended to chronic human exposure by an explicit assumption, with a safety factor its own authors recorded as quantitatively unjustified, from literature reviews closed in 1982 and 1985. Absence of demonstrated harm at those levels and demonstrated absence of harm are different things, and the current framework supplies neither. What remains open is why some people, as I did, experience disabling symptoms they attribute to exposure, and whether any of them respond to exposure itself; the research program at Question 16 ¶¶9–11 is designed to answer that.

Response to Question 13(k) — communication-enabled smart meters

According to scientific evidence, how do the technologies below affect cumulative exposure patterns?

1. Utility metering is the clearest case in the Department's list where the regulatory framework's structural gaps and the exposure's real characteristics diverge, for four reasons that have nothing to do with the contested bioeffects literature.

2. *It is pulsed, and pulse characteristics are unregulated.* A communicating meter transmits in short bursts at intervals, continuously, rather than as a continuous wave. As set out at Question 5(p), compliance is assessed against a limit time-averaged over six or thirty minutes, with no peak limit — NCRP Report No. 86 §17.4.8 states expressly that time averaging precludes excessive instantaneous peaks and that no peak limit is therefore needed — and with no modulation parameter, NCRP's modulation provision having been declined by the FCC in 1996. A source of this kind will comply with the federal limit under essentially any deployment configuration, and its compliance conveys no information about instantaneous exposure at the point of habitation.

3. *It is fixed and continuous rather than episodic.* The exposure is present twenty-four hours a day at a fixed location relative to the occupant, including during sleep. IEEE C95.1-1991 records that greater exposure duration — 24 hours per day versus 8 — was among the arguments raised for a larger public safety factor and was set aside for want of data. Nothing in the current framework distinguishes an eight-hour occupational exposure from a permanent residential one.

4. *It is involuntary, and the provision the FCC adopted assumes choice.* NCRP Report No. 86 §17.4.5 permits general-population exposure at occupational levels from a hand-held emitter as a personal decision by the individual, conditioned on that individual not exposing other persons above the population guidelines. Metering equipment installed at a utility's direction satisfies neither condition, and equipment on a neighboring dwelling violates the second by construction.

5. *Many units carry a second radio.* Where a meter includes a home-area-network function, it transmits in a second band for communication with in-premises devices as well as in the band used for utility backhaul, so the exposure is multi-frequency at a single location. Simultaneous exposure to multiple frequencies is named in the Department's Question 5(p) and is not addressed in any of the source documents underlying the current limits.

6. *Conducted emissions: a verified regulatory gap, and nothing more.* No U.S. or international standard imposes a limit on conducted emissions below 150 kHz from utility metering equipment on premises wiring. 47 C.F.R. §15.107 sets conducted-emission limits only from 150 kHz to 30 MHz; the floor was lowered from 450 kHz to 150 kHz in FCC 02-157 (2002), a proceeding in which the ANSI C63 committee described suppression in the 150–450 kHz range as particularly onerous for switch-mode power supplies. ANSI C12.1-2022 aligns its emissions test to the same 150 kHz–30 MHz window. IEC 62052-11 and the IEC 62053 series treat the 2–150 kHz band solely as an immunity matter, through IEC 61000-4-19:2014. I make no health claim about this band. The health literature on so-called “dirty

electricity” does not support one: de Vocht and Olsen, *Frontiers in Public Health* 4:52 (2016), concluded that the widely used 50 Graham/Stetzer-unit threshold is arbitrary and that the metric is not a traceable dose measure. I raise the band only because no federal body has asserted jurisdiction over it and no traceable metric exists with which anyone could investigate it.

7. As to health effects, the peer-reviewed literature specific to this exposure is thin and I do not overstate it. The one published case series — Lamech, *Alternative Therapies in Health and Medicine* 20(6):28–39 (2014), PMID 25478801 — describes 92 self-registered complainants in Victoria, Australia, and reports insomnia, headache, tinnitus, fatigue and cognitive disturbance as the most common reported symptoms. It is uncontrolled, the sample is self-selected, there is no dosimetry, and it cannot support a causal inference. I cite it for what it is: evidence that a reporting pattern exists and has been published, and an argument for the surveillance capacity discussed at Questions 4 ¶¶9–10 and 10 ¶¶1–2, not evidence of causation.

Response to Question 14

What scientific evidence exists regarding potential adverse environmental effects associated with RF radiation?

1. Section 704(b) of the Telecommunications Act of 1996 directed the Federal Communications Commission to prescribe and make effective rules regarding the environmental effects of radiofrequency emissions. Thirty years later, no rule addresses the biological effect of radiofrequency emissions on any non-human organism. I address the science briefly and the jurisdictional question at length, because the jurisdictional question can be answered definitively.

2. *The evidence base is large, low-quality and inconclusive, and I do not claim otherwise.* The most comprehensive assessment I have found is Karipidis et al., “What evidence exists on the impact of anthropogenic radiofrequency electromagnetic fields on animals and plants in the environment: a systematic map,” *Environmental Evidence* 12:9 (2023), conducted by the Australian Radiation Protection and Nuclear Safety Agency with Swinburne University of Technology. It screened 24,432 articles to 334 relevant studies, found the majority methodologically poor (59 percent of fauna and 66 percent of flora studies) with only 6 and 2 percent employing good-quality methods, and states that there are currently no recognized international guidelines to specifically protect animals and plants. The earlier review, Cucurachi et al., *Environment International* 51:116–140 (2013),

covering 113 articles and 152 experiments, reported effects in roughly 70 percent — but at high and low dosages alike, with no coherent dose-response relationship, and with an explicit call for replication.

3. I therefore make no claim that deployed wireless infrastructure demonstrably harms livestock, pollinators, birds or trees. The livestock literature reduces to a single uncontrolled German dairy-herd observation from 1998, confounded by stray voltage and contact currents that were never separated from RF, at field levels below the applicable German limits. The pollinator and bird literature is small, observational, and traceable to a handful of investigators citing their own prior work. The tree literature is one observational field study weakened by acknowledged non-random sampling, as the German Federal Office for Radiation Protection stated in its 2023 workshop report (*Health Physics* 124(1):31–38).

4. *One rigorous positive finding exists, and it is routinely misattributed.* Engels et al., *Nature* 509:353–356 (2014), showed in double-blind, Faraday-screened experiments over seven years that European robins lose magnetic-compass orientation in the presence of anthropogenic electromagnetic noise, with orientation restored when the noise was screened and lost again when noise was deliberately reintroduced. The effect concerns broadband noise in the kilohertz-to-megahertz range from ordinary electrical equipment, not telecommunications signals, and narrow-band fields did not disrupt orientation. It is not evidence about cellular infrastructure. It does establish that a real, replicable electromagnetic effect on a wild species exists, and that it was found only when investigators looked with adequate controls.

5. *The regulatory finding, at clause level.* I examined 47 C.F.R. §1.1306 and its Note 1, §1.1307(a) through (d), §1.1310 and §1.1311. Section 1.1307(a) requires an environmental assessment for facilities affecting wilderness areas, designated wildlife preserves, listed species and critical habitat, historic and religious sites, floodplains, significant surface features, and high-intensity lighting — that is, the structure, its siting, and its physical effects including bird collisions. Section 1.1307(b) triggers an assessment where a facility would cause *human* exposure above the §1.1310 limits. Section 1.1311 requires the assessment to address features of special environmental significance, including natural migration paths. **None of these provisions reaches the biological effect of the radiofrequency emission itself on a non-human organism.**

6. The same exclusion appears in the standards. The ICNIRP 2020 guidelines state that they “are for the protection of humans exposed to radiofrequency electromagnetic fields”; IEEE C95.1-2019 specifies exposure criteria and limits “to protect against established adverse health effects in humans” (§1.1). I identified no jurisdiction —

including Switzerland, Italy, India and China, all of which set limits stricter than ICNIRP — that sets any radiofrequency exposure limit or siting rule for non-human species or agricultural land.

7. No federal agency holds the question. EPA's published position is that it “does not regulate or provide oversight for medical radiation, consumer products, or the non-ionizing radiation that is emitted by electrical devices such as cell phones” (U.S. EPA, *Radiation Protection*, <https://www.epa.gov/radiation>, last updated 9 September 2026, accessed 24 September 2026). FDA's authority under 21 C.F.R. Subchapter J concerns radiation-emitting products and human safety. OSHA and NIOSH address occupational exposure. The Fish and Wildlife Service's consultations under the Migratory Bird Treaty Act and the Endangered Species Act reach towers, lighting and collisions; *American Bird Conservancy v. FCC*, 516 F.3d 1027 (D.C. Cir. 2008), concerned tower collisions, not emissions. I am aware of no environmental assessment or impact statement that has examined the effects of radiofrequency emissions on wildlife.

8. On the 2014 Department of the Interior letter. The letter of 7 February 2014 from the Director of DOI's Office of Environmental Policy and Compliance to NTIA criticized the FCC's standards as out of date and cited European observational studies of birds. I do not present it as strong evidence of harm. It rests on the same observational literature described in paragraph 3; its principal author subsequently acknowledged that neither the Department nor the Fish and Wildlife Service has a policy addressing radiation effects on migratory birds; and the letter itself states that no independent third-party field studies of tower radiation on migratory birds had been conducted in North America. That statement is evidence of an unexamined question, not of either harm or safety.

9. Recommendations. First, HHS should state whether any component of the Department regards itself as responsible for environmental effects of radiofrequency emissions and, if none does, recommend that a federal locus be designated. Second, HHS should support controlled, blinded, adequately powered field research at deployed frequencies with measured dosimetry — the category the ARPANSA map identifies as largely absent. Third, HHS should note in any communication with the Commission that §704(b) remains unexecuted as to non-human environmental effects, and that the D.C. Circuit's 2021 remand expressly included environmental effects among the issues the Commission failed to address.

Response to Question 15(b) — cumulative neighborhood exposure

1. The defining structural feature of network-wide infrastructure, including utility metering, is that an individual cannot control the exposure by controlling their own property. This is an argument about regulatory architecture, and it holds regardless of where the science lands.
2. Where deployment is network-wide, the RF environment at a residence is determined partly by installations on neighboring properties, in shared building infrastructure, and on nearby structures. An occupant who declines equipment on their own dwelling does not thereby change the field at that dwelling. In multi-unit buildings, meters are commonly banked in one location; an occupant adjacent to the bank experiences an exposure set by the number of units in the building, and where opt-out is available only per account and for a fee, that occupant may be unable to obtain any reduction unless every other account holder elects and pays for the same alternative.
3. NCRP Report No. 86 §17.4.5, adopted by the FCC as the source of its localized SAR criteria, conditions its personal-decision allowance on the individual not exposing other persons above the population guidelines. A network in which each participant's equipment contributes to every neighbor's field is the case that condition was written to exclude.
4. *What the measurements show, and I state it plainly.* The best available before-and-after evidence does not show that densification has raised ambient exposure. Loizeau et al., *Journal of Exposure Science and Environmental Epidemiology* (2026), funded by the Swiss Federal Office for the Environment, measured the same microenvironments in 2021/22 and 2023/24 and found median levels essentially unchanged — outdoor 0.16 to 0.17 V/m, public spaces 0.24 to 0.25 V/m, public transport 0.20 to 0.24 V/m — with the 5G component rising from virtually zero to 0.04 V/m despite a large increase in data traffic. I do not argue that population exposure has risen.
5. *What the measurements do not settle.* Those are time-averaged, spatially sampled ambient measurements. They do not characterize the peak beam delivered to a served user, or chronic exposure integrated over years, and the compliance framework does not require either to be measured. The FCC's principal guidance for evaluating compliance, OET Bulletin 65, dates from 1997 and has no supplement for beamformed or time-averaged base-station assessment; the Commission's 2013 inquiry in ET Docket No. 13-84 noted that “no OET Bulletin 65 supplement has yet focused on measurement procedures (or SAR evaluation) near fixed RF sources” and asked whether it should develop “a future technical supplement to OET Bulletin 65 for fixed evaluation including SAR” (FCC 13-39

¶246). I am not aware of any such supplement having been issued. International practice now permits assessment using statistically derived power-reduction factors rather than theoretical maximum power, and the engineering literature acknowledges that massive-MIMO beamforming reduces the reliability of the control-channel measurements those methods rely on.

6. *What HHS can realistically recommend.* Section 332(c)(7)(B)(iv) of the Communications Act bars state and local governments from regulating the placement of personal wireless service facilities on the basis of RF environmental effects where the facilities comply with the Commission's rules. Recommending RF-based setbacks would therefore be recommending something Congress has preempted. I recommend instead that HHS support (a) written advance notice to residents and building occupants of installations affecting them; (b) independent, periodic, published ambient measurement in residential and school settings, on the model of the Swiss federal monitoring program; (c) development of a measurement protocol for served-user peak exposure under beamforming; and (d) an exposure-classification distinction between exposures an individual can decline and exposures determined by the equipment of others.

Response to Question 15(e) — livestock

1. Evidence on livestock near wireless infrastructure should separate radiofrequency exposure from stray voltage and contact currents, report field levels measured at the animals, and include controls. The observation most often cited does none of these. As set out at Question 14 ¶3, it is a single uncontrolled German dairy-herd observation from 1998, confounded by stray voltage and contact currents never separated from RF, at field levels below the applicable German limits.
2. I have not found a study that meets those criteria. That is the gap, and it is the kind of controlled, measured field research recommended at Question 14 ¶9.

Response to Question 16

What are the highest priority research gaps?

1. The seventeen issues raised by the Radiofrequency Interagency Work Group in 1999 and 2003 constitute a research and standards agenda developed by federal health and safety scientists, never answered, and still open. I recommend HHS adopt them as its starting inventory rather than beginning a new one. Issue 13 of the 1999 enclosure is the

most directly translatable into a research program: it asks for documentation that the literature review process included comprehensive review of long-term low-level exposure studies, because of their importance to environmental and chronic occupational exposure; neurological and behavioral effects, because of their importance in defining the adverse effect level; and micronucleus assay studies, because of their relevance to carcinogenesis.

2. I recommend six priorities.

3. *Chronic, low-level exposure in vivo.* Both source standards state that they focused on acute exposure because chronic data were lacking. That deficit has not been remedied at the level of quality required to support a limit. The National Research Council's 2008 workshop report, commissioned by FDA, identified characterization of exposures in juveniles, children, fetuses and pregnant women, and evaluation of devices using newer technologies, among the gaps in dosimetry and exposure.

4. Two federal recommendations of this kind already exist in the record and were never acted on: FDA's 1993 recommendation that new research be monitored for evidence that the limits may need to be reduced, and EPA's 1993 recommendation that NCRP be asked for an updated, comprehensive review. Either would be a natural starting point.

5. *Replication under GLP conditions.* I note and agree with the conclusion of Simkó et al., *Mutation Research — Reviews in Mutation Research* 796:108545 (2025), discussed at Question 12: that the proportion of positive studies falls as rigor rises, that there is “clearly a need for much higher quality RF-EMF bioeffects studies,” and that the few statistically significant results in the highest-quality studies deserve close examination and replication. The authors also conclude that none of the groups of studies “would permit any conclusions about effects of RF-EMF on the respective endpoints with high confidence, although the preponderance of negative studies with higher quality suggests that no such effects are readily apparent or exist at all.” I do not read the finding as supporting the current limits, which were not derived from this literature; I read it as establishing that the literature on both sides is inadequate to support any limit, which is the conclusion the 1999 RFIAGWG letter reached from the opposite direction. HHS should fund GLP-compliant replication of the highest-quality positive findings, selected by an independent panel.

6. *Modulation-specific effects.* For the reasons at Question 5(p): identified in 1982, provided for in 1986, subgrouped and set aside in 1991, removed from federal regulation in 1996, documented as an interference mechanism in 1998, raised again in 1999, and never resolved.

7. Objective markers for reported electromagnetic intolerance. Work such as Sonzogni et al., *International Journal of Molecular Sciences* 26:4792 (2025) — an ANSES-funded INSERM study reporting delayed radiation-induced ATM nucleoshuttling in primary fibroblasts from 26 self-diagnosed individuals — proposes a testable biological marker for a condition federal agencies presently treat as unvalidated. I note the authors' own limits: the work is in vitro, the cells were challenged with X-rays and hydrogen peroxide rather than RF, and the authors state that a patient showing delayed nucleoshuttling does not necessarily have the condition. I cite it as a research direction worth funding, not as evidence of causation.

8. Bring the clinicians closest to these patients into the research agenda, alongside those most skeptical. Clinicians in sustained contact with people who report electromagnetic sensitivity hold information that no federal process collects: who these patients are, how the condition presents and progresses, and what they have and have not tolerated or responded to in treatment. HHS should convene a workshop, and commission a National Academies consensus study of the kind HHS agencies sponsored for myalgic encephalomyelitis/chronic fatigue syndrome — *Beyond Myalgic Encephalomyelitis/Chronic Fatigue Syndrome* (Institute of Medicine, 2015) — whose committee includes clinicians with direct experience treating people who report this condition and people with lived experience of it, alongside epidemiologists, provocation-study methodologists and clinicians experienced in functional somatic disorders, with conflicts of interest disclosed for every member. Its charge should be the nature of the condition, without prejudging etiology; a case definition and a validated screening tool; evidence-based care, referral pathways and outcome measures for clinicians; and candidate treatment targets drawn from clinical observation of these patients, on which researchers and industry could begin evaluating therapies in controlled trials. The 2024 National Academies definition of Long COVID (*A Long COVID Definition*, 2024) seated members with lived experience and concluded that the condition “can be diagnosed on clinical grounds” even though no biomarker yet confirms it; the same approach fits here. Because people who report this condition can lose their housing while they wait, I ask HHS to publish a timetable for the study at the outset and to invite clinicians to submit their clinical observations for the committee’s review. (Diagnosis stage; see the care pathway at Question 18 ¶5.)

9. Sixth priority: a research program on the condition, its care and its course. My search of NIH’s project database (RePORTER) on 21 October 2026 for “electromagnetic hypersensitivity”, “electrohypersensitivity” and “idiopathic environmental intolerance” returned no projects. A 2006 systematic review found nine controlled treatment trials, all of limited quality; the four of cognitive behavioral therapy suggested it was more effective

than no treatment, but none was blinded and together they randomized about 39 participants (Rubin, Das Munshi and Wessely, *Psychotherapy and Psychosomatics* 75(1):12–18 (2006)). The first trial designed to current standards, in France (NCT05973214), is expected to report around 2027. I found no controlled trial of home remediation and none of vagal interventions. Blinded provocation studies have found no consistent effect (Question 4 ¶3). A 2019 systematic review of 28 such studies concluded that “the evidence points towards no effect of exposure,” that any physical effect “must be very weak or affect only few individuals,” and that further experiments “should preferably be performed at the individual level” (Schmiedchen, Driessen and Oftedal, *Environmental Health* 18:88 (2019)). The 2024 WHO-commissioned review found no evidence of particularly vulnerable individuals but stated that it could not assess exposures beyond the acute or rule out an effect masked within mixed groups (Bosch-Capblanch et al., cited at Question 4 ¶¶3–4). A 2025 Belgian study shows what individual testing involves. Its provocation protocol was co-designed with volunteers who report the condition, and background fields in the test room were held below 0.05 μ T and 0.1 V/m. Of 47 volunteers enrolled, 20 left after the open first session, four of them because their symptoms were too severe or lasted too long, and 16 took part in the twelve sessions used for individual analysis. Among those 16, neither perception of exposure nor symptom reports tracked actual exposure, except for one volunteer whose perception mostly matched exposure and whose symptom reports showed a borderline association with it; for half, symptom reports tracked what they believed about exposure (Ledent et al., *Bioelectromagnetics* 46:e70006 (2025)).

10. The program. I recommend that NIH fund six preregistered lines of work, with conflicts of interest disclosed on all sides and no funder role in eligibility or endpoints. First, staged, blinded testing of individuals over many repeated sessions, under protocols co-designed with people who report the condition and using the current-infrastructure signals described at Question 4 ¶4, because a few sessions cannot show whether any one person responds. It should begin with a pilot that tests feasibility against a preregistered go/no-go rule and continue through confirmation and external replication, alongside studies of how supplied information and delayed exposure affect symptoms. Each of these studies should measure both symptoms and physiology, including heart-rate variability (the primary physiological endpoint in the individual testing), continuous ECG, logging of ambient field levels, and other physiological measures and candidate biomarkers as exploratory endpoints. Second, a three-arm trial comparing measured home remediation, sham remediation and usual care, each followed by graded exposure; a trial that randomizes whether stabilization or exposure comes first; and a trial of a care program with function and quality of life as primary outcomes. The remediation trial should enroll

only people who can remain in their homes. Third, a registry cohort, built to the case definition, that studies predictors of onset and severity and candidate biomarkers. Fourth, structured collection and testing of the methods used by clinicians experienced in treating these patients, such as those set out in the 2020 preliminary clinical guidelines of Women's College Hospital's Environmental Health Clinic in Toronto, so that their clinical observations can be validated or set aside on evidence. Methods that hold up should then inform the case definition and care pathways, federal clinician guidance and clinician consultation services, so that they become accepted practice. Fifth, sham-controlled trials of specific vagal interventions. Sixth, working with CDC's National Institute for Occupational Safety and Health, a standard protocol for measuring electric, magnetic and radiofrequency field levels in homes and care settings, for use in these trials and when patients request reasonable modifications (Question 18 ¶6). (Treatment stage; see the care pathway at Question 18 ¶5.)

11. Safeguards for every study in the program. The testing and trials should use validated shams; fully account for background electric, magnetic and radiofrequency fields and document how in each publication; check whether blinding holds; prespecify equivalence margins so that a null result is informative; let participants stop at any time under cardiology-set safety rules; use independent allocation, engineering and statistical teams; publish every protocol amendment; and offer home-based sessions or transport support so that severely affected people can take part. This program extends the provocation study at Question 4 ¶10 to the individual level.

Response to Question 17

How can federal health agencies improve coordination of EMF and RF radiation research? Please comment on potential roles for FDA, NIH, and CDC.

1. A coordinating body already exists and its history is instructive. EPA's letter to the FCC of 19 June 1995 records that "last year" — that is, in 1994 — federal agencies including the FCC formed an RF Interagency Work Group "to coordinate RF issues among federal agencies, provide technical input to the guidelines, and act as a sounding board to assess the general approach employed in the guidelines." The guidelines in question were EPA's own public RF exposure guidelines, which EPA described as substantially complete and expected to issue in early 1996. They were never issued. The Work Group's membership list circulated with its 2003 letter names officials at EPA, FCC, FDA/CDRH, NIOSH, OSHA

and NTIA. HHS's first step should be to determine the Work Group's current status and, if it is dormant, reconstitute it with a published charter, published minutes and a public docket.

2. (c) *CDC*. The 1999 letter setting out the fourteen issues was signed by NIOSH's representative to the Work Group, on HHS Public Health Service letterhead, and states that it records the members' views rather than any agency's official position. NIOSH's January 1994 comment in the rulemaking had already expressed concern "about the lack of participation by experts with a public health perspective in the IEEE RF standards setting process," noting that "epidemiology studies were categorically rejected as not useful" in setting the limits, and recommending that the FCC acknowledge that weakness. HHS should direct NIOSH to state, on the current record, whether each of the fourteen issues has since been resolved, and by what evidence. That is a small, concrete, achievable action that would convert a twenty-seven-year-old open question into a documented federal position.

3. (a) *FDA*. Four actions. First, FDA told the Commission in July 1996 that its guidelines did not address electromagnetic interference with medical devices, which "can induce failures in medical devices that can cause injury or death," and asked that the issue be addressed separately; FDA should state whether it has been. Second, FDA's 1993 recommendation that research be monitored for evidence that the limits may need to be reduced should be converted into a standing, published review function. Third, FDA requested the National Toxicology Program study of cell-phone radiation because long-term safety data did not exist; NTP reported in 2018; FDA did not accept the findings. FDA should state what it now concludes from the work it commissioned. Fourth, FDA should hold a patient-listening session, on the model of its Patient-Focused Drug Development meetings, so that people reporting this condition can describe their symptoms, functional impact and treatment priorities directly.

4. (b) *NIH*. NTP sits within NIEHS. NIH should be tasked with the replication program at Question 16 ¶5, the provocation study at Question 4 ¶10, and the research program on the condition and its care at Question 16 ¶¶9–11.

5. *Institutional competence*. The FCC's September 2026 Public Notice in ET Docket No. 13-84 describes the Commission's rules as "continuously evaluated and based on gold-standard research from entities with specialized expertise in health and safety issues," and states that it will accord probative value to parties able to interpret the biological research "with sufficient detail and persuasiveness to overcome the failings that the court identified when the Commission last attempted to rely on the expertise of expert agencies." The Commission is a spectrum agency. In 2019 it stated that it "recognizes that

it is not a health and safety agency, and necessarily gives considerable weight to the expertise of agencies and groups, like the FDA and IEEE, who can interpret the biological research necessary to assess the health impact of RF emissions and determine what exposure levels can be considered safe for humans” (FCC 19-126 ¶153). It now acknowledges that its last attempt to rely on such expertise was found wanting. The question this RFI should resolve is which HHS component holds the health-science function the Commission relies on, because no component has exercised it in a documented way since 1999.

6. Records. See Question 5(n) ¶8. The agencies’ 1993–1997 filings are preserved in ECFS but, for two of the five letters the Commission cited (FCC 97-303 ¶37 n.27), cannot be found by searching for the agency that wrote them. The RFI AWG correspondence is on a government server only by accident: the 2003 letter because a private organization attached it to comments in another docket in 2003, the 1999 letter because private commenters attached it to filings after 2020 in unrelated dockets. A coordination function that cannot readily locate its own predecessors’ positions is not coordinating.

7. (c) CDC and ATSDR, with HRSA: consultation for clinicians. A primary-care clinician who sees this presentation today has no one to consult. I recommend that ATSDR pilot adult consultations on environmental sensitivities through its Pediatric Environmental Health Specialty Unit network, which already provides free clinician-to-specialist consultation for children and pregnant people. I also recommend that CDC or HRSA add a telementoring module on this condition to an existing multi-condition program, building on the telementoring program CDC funded for Long COVID and fatiguing illnesses from 2022 to 2024, with faculty that include clinicians experienced in treating these patients and people with lived experience. Both should be evaluated before they are expanded. Ontario has offered a version of this since 1996: its publicly funded Environmental Health Clinic at Women’s College Hospital assesses referred patients, including people who report electromagnetic hypersensitivity, and returns a written report with suggestions for care to the family doctor. (Specialist-referral stage; see the care pathway at Question 18 ¶5.)

Response to Question 18

Please identify any additional scientific evidence, technical information, data, or recommendations that federal health agencies should consider.

1. Three points, all made above, restated here because I believe they are the ones that should survive if nothing else in this submission does.
2. *The limits rest on literature closed in 1982 and 1985.* NCRP Report No. 86 states at §17.6 that it is based on literature published through 1982. IEEE C95.1-1991 states at §6.3 that its literature cutoff was December 1985 and that its final evidence base comprised 120 papers. The FCC adopted both in 1996. They govern today. Before the Department evaluates any scientific claim in this docket, it should establish for itself whether that is an acceptable evidentiary foundation for a limit applied to the entire population, continuously, for four decades. That question can be answered without resolving a single contested bioeffects finding.
3. *Seventeen issues were identified by the federal government's own RF scientists and never answered.* The Radiofrequency Interagency Work Group transmitted fourteen to IEEE on 17 June 1999, in a letter signed by NIOSH's representative on Department of Health and Human Services letterhead. It added three more on 16 July 2003, in a letter signed by EPA's representative that asked how the original fourteen would be treated in the revision process. Both letters state that they record the members' views, not their agencies' official positions — so the Department holds its own scientists' unanswered work rather than a federal position on it. The most economical action available to HHS under this RFI is to require NIOSH to state, issue by issue, whether each has since been resolved and on what evidence.
4. *The agencies' unfinished work is in the record.* EPA asked for NCRP Report No. 86 to be revised; it was not. EPA's own public guidelines were substantially complete in 1995; they were never issued. FDA asked for research to be monitored for evidence that the limits should be reduced, and for medical-device interference to be addressed separately; I can find no record that either was done. Each of these is documented in the Commission's own ET Docket 93-62 record, and each is inexpensive to take up.

Care along the patient journey

5. *Care, coverage and access along the patient journey.* The recommendations that follow, and five I make under other questions, are organized around the course of care that a person who reports this condition moves through, and around the gap at each stage. The course runs in six stages: recognition, when the patient and the first clinician they see identify the presentation, take an exposure history and know where to refer; diagnosis, by primary care once it has a definition, screening tool and referral pathway, and by an environmental-medicine practitioner until then; specialist referral, to an environmental-medicine practitioner, a therapist trained in exposure and response prevention, and a

social worker; stabilization, beginning with remediation of the home if the patient can live there, or with respite if they cannot; treatment, including graded exposure once the patient is stable and care for co-occurring conditions; and ongoing management, including relapse planning, return to work and public places, and stable housing. Stabilization comes before exposure-based treatment. Three things run through every stage: one accountable care coordinator; fee-for-service payment at first, so that claims experience accumulates; and data captured to the case definition. Everyone who serves these patients in person, whether in the home, in respite or in a care setting, should follow what I call low-exposure practice: no fragrance, makeup or other scented or off-gassing products; personal phones and other wireless devices switched off or left outside; and equipment that does not emit radiofrequency fields, or unpowered equipment where the patient needs it. I describe this course as one to be tested, not one whose effectiveness is established; the trials at Question 16 ¶10 test its sequencing and its parts. My own course, described at Question 3, where I call the condition EMR-S, passed through these stages. The table maps each gap to the recommendation that addresses it and to where it appears in this comment.

Stage	Gap	Recommendation	Where
Recognition	No U.S. federal clinician or patient information; most clinicians have no standard approach	CDC clinician and patient pages; restore ATSDR exposure-history education	Q9 ¶8
Diagnosis	No case definition, screening tool or code, so cases cannot be identified or counted	National Academies case definition and screening tool on a published timetable; interim coding advice now, a code later	Q16 ¶8; Q10 ¶2
Specialist referral	A primary-care clinician has no one to consult	ATSDR adult pilot through the PEHSU network; CDC or HRSA telementoring module	Q17 ¶7
Stabilization	No home- and community-based route on functional need	Guidance on §1915(i) and state-plan services	Q18 ¶8
Stabilization	Home remediation is paid out of pocket; no payer found that covers it	Building-level remediation within existing Medicaid benefits, evaluated	Q18 ¶9

Stage	Gap	Recommendation	Where
Stabilization	Nowhere to stabilize while a home is remediated or replaced	Recuperative care without a hospital stay; HRSA respite pilot	Q18 ¶10
Treatment	No NIH-funded project found; treatment trials few and of limited quality	Six-line NIH research program	Q16 ¶¶9–11
Ongoing management	Housing, disability evidence and the built environment sit outside HHS	Coordination with HUD, SSA and the Access Board	Q18 ¶13
Every stage	Patients describe avoiding hospitals, emergency departments and imaging; providers have no guidance on accommodation	OCR technical assistance on reasonable modifications	Q18 ¶6
Every stage	Patients who cannot enter facilities go without routine care	Homebound criteria; Medicare home visits; Medicaid home health	Q18 ¶7
Every stage	No one coordinates care, disability and insurance; some patients can be reached only by landline	Community Health Integration, navigation and caregiver-training codes, by telephone	Q18 ¶11
Every stage	Fee-for-service covers little of this care; no claims experience to price a bundle	CMS Innovation Center model	Q18 ¶12
Every stage	Children: school settings, no pediatric guidance. Rural: fewer clinicians, distance, telephone	Noted with the access and coordination recommendations	Q18 ¶6, ¶11

6. Access in HHS-funded care settings. People who report this condition describe avoiding hospitals, emergency departments and imaging, and providers have no federal guidance on what accommodation looks like. In its 2024 Section 504 rule, HHS declined to list “chemical and electromagnetic hypersensitivities” but stated that omitting a condition “does not mean that that condition is not a physical or mental impairment” (89 FR 40068

(9 May 2024)). I recommend that the Office for Civil Rights issue technical assistance, as HHS and DOJ did for Long COVID in 2021, stating that coverage turns on functional limitation and does not depend on a diagnosis code. It should describe reasonable modifications such as first-of-day scheduling; a designated space where non-essential sources of man-made electric, magnetic and radiofrequency fields, including wireless devices, are switched off or absent where clinically safe, with levels checked by measurement at the patient's request and kept as low as possible given clinical needs; staff who follow low-exposure practice (§5); and home-visit or telephone alternatives. It should also state the limits set by fundamental alteration and patient safety. The National Council on Disability asked for this guidance in its 2022 *Health Equity Framework*. Children face the same gaps in access, compounded by dependence on school settings and the absence of pediatric guidance on this condition.

7. Primary care at home for patients who cannot enter facilities. Some people with this condition cannot enter a clinic or hospital, and so go without routine care for any chronic conditions they have. I recommend that CMS state in its Medicare Benefit Policy Manual that, for patients with this condition, a documented inability to tolerate settings outside the home, including clinical facilities, can satisfy both homebound criteria: that leaving home is medically contraindicated, and that leaving home requires a considerable and taxing effort. I also recommend that CMS confirm that Medicare home visits and Medicaid home health nursing can serve these patients. Clinicians visiting these patients should follow low-exposure practice (§5). Medicare's Independence at Home demonstration, which tested home-based primary care, found no conclusive evidence of savings overall but reported a 12.4 percent reduction in spending among dually eligible beneficiaries who needed help with most or all daily activities (CMS Innovation Center, *Independence at Home: Tenth and Final Evaluation Report*, demonstration years 2012–2023).

8. Stabilization at home: Medicaid services on functional need. Where a person's condition makes their own home intolerable to them, support and modification of the residence may be the alternative to displacement. The §1915(c) waiver, which can cover home modifications, requires that the person meet an institutional level of care; the §1915(i) state-plan option does not, and its eligibility need not wait for a validated case definition. CMS regulations provide that “a diagnosis is not a sufficient factor on which to base a determination of need” (42 CFR 441.715(a)), so a state's needs-based criteria must rest on an individual's assessed needs, not on a diagnosis. States may also target a benefit by age, disability or diagnosis, but a validated case definition is not a precondition. Home health aide, personal care, respite and case management services are already listed §1915(i) services, and Connecticut, Michigan and Texas have included home modifications in

approved §1915(i) benefits. I recommend that CMS issue guidance confirming that states may set needs-based criteria that capture functional limits arising from environmental intolerance, may include environmental modifications as an approved service, and may use state-plan home health and personal care for this population on the basis of functional need. Aides and other workers who deliver these services in the home should follow low-exposure practice (§5).

9. *Remediation of the home.* Medicaid already pays for home environmental remediation for other conditions: California covers asthma remediation up to \$7,500 per member; Massachusetts, New York and Oregon have approved home-remediation services in their demonstrations; and Washington has an approved payment method for them. People who report electromagnetic sensitivity pay for home remediation themselves, and I have found no payer that covers it. I recommend that CMS confirm that states may expand these benefits to include building-level electrical remediation for people who meet the case definition, meaning measured assessment, wiring correction, shielded wiring such as metal-clad cable, hardwiring and removal of building transmitters, with evaluation built in through the remediation trial at Question 16 ¶10. I do not recommend coverage of consumer shielding products such as paints, fabrics, clothing or mats.

10. *Somewhere to stabilize.* A patient who cannot tolerate their own home has nowhere to stabilize while it is remediated or a new home is found, and some lose their housing altogether. Medicaid recuperative care exists, but it is designed for people experiencing homelessness, typically after a hospital stay. I recommend that CMS confirm that recuperative-care benefits may serve people whose documented condition makes their home untenable, without a preceding hospital stay, and that HRSA, whose Health Center Program may fund recuperative care, consider an evaluated pilot of a respite setting whose staff follow low-exposure practice (§5).

11. *Coordination and navigation, including by telephone.* Many people with this condition need someone to coordinate their care, disability and insurance applications, and some can be reached only by landline telephone. Medicare's Community Health Integration services name no diagnosis and can be furnished by telephone, and CMS has stated that caregiver-training services have no diagnosis limits. I recommend that CMS publish guidance confirming that these and related navigation codes can be billed, including by telephone, for patients with this presentation who have documented functional limitation and the upstream drivers these services require, and that HHS identify this population as one for whom audio-only delivery should continue after the current extension ends in

December 2027. Rural and low-access patients face the gaps described in this section, compounded by fewer clinicians, longer distances and greater reliance on telephone delivery.

12. *A care model to test the pathway.* Fee-for-service Medicare has no benefit for most of the care this population needs, and the cost of home remediation varies too widely to price a bundled payment without claims experience. I recommend that the Secretary direct the CMS Innovation Center, under section 1115A of the Social Security Act, to design a small model that tests the pathway at ¶5, which stabilizes patients before exposure-based treatment. The model should include a care coordinator, home-based primary care, home health aides and caregiver support for patients who cannot manage household tasks on their own, an environmental-medicine practitioner, exposure-based therapy once the patient is stable, building-level home remediation, and respite. It should pay fee-for-service with a care-management fee at first and collect the data needed to price an episode-based or capitated payment later. Every member of the care team, including home health aides and remediation contractors, should follow low-exposure practice (¶5) in the patient's home.

13. *Coordination outside HHS.* Housing, disability determinations and the built environment sit outside HHS, but they shape this population's care. I recommend that HHS coordinate with HUD on housing for people whose condition makes their home untenable, with SSA on disability evidence once a case definition exists, and with the U.S. Access Board, which said in 2002 that it planned technical assistance on accommodating electromagnetic and chemical sensitivities (67 FR 56353 (2002)).

All recommendations

14. *The recommendations in this comment, in one place.* Items 17 to 21 follow the care pathway at ¶5.

- 1. Review the evidence base of the current limits** — whether literature reviews closed in 1982 and 1985 remain an adequate foundation (Questions 5(n) ¶5, 18 ¶2).
- 2. Answer the seventeen Work Group issues** — direct NIOSH to state, issue by issue, whether each has been resolved and on what evidence, and adopt the seventeen as the Department's starting research inventory (Questions 16 ¶1, 17 ¶2, 18 ¶3).
- 3. Reconstitute the RF Interagency Work Group** with a published charter, minutes and a public docket (Question 17 ¶1).

4. **Close FDA's open items** — whether the 1996 medical-device interference issue was addressed; current RF interference with implanted and body-worn devices and the adequacy of the 3 V/m immunity floor; a standing, published review of new research; and FDA's conclusion on the NTP study it commissioned (Questions 11 ¶¶9–10, 12 ¶8, 17 ¶3).
5. **Commission and validate a case definition** for reported electromagnetic sensitivity, issue interim clinical guidance, and scope a voluntary reporting mechanism with a denominator strategy (Questions 4 ¶10, 16 ¶8).
6. **Bring the clinicians closest to these patients into the research agenda** — a workshop and a National Academies consensus study on the model of the 2015 ME/CFS study. Its committee includes clinicians with direct experience treating people who report this condition and people with lived experience, alongside epidemiologists, provocation-study methodologists and clinicians experienced in functional somatic disorders. Its charge: the nature of the condition, a case definition and validated screening tool, care and referral pathways, and candidate treatment targets, on a published timetable (Question 16 ¶8).
7. **Hear from patients directly** — an FDA patient-listening session on the model of its Patient-Focused Drug Development meetings (Question 17 ¶3).
8. **Fund the missing research** — a preregistered, adequately powered double-blind provocation study in self-identified subjects using current infrastructure signals; GLP replication of the highest-quality positive findings; chronic low-level in vivo work; modulation-specific effects; and an NIH program on the condition and its care. That program covers staged blinded testing of individuals; remediation, sequencing and care-program trials; a registry cohort; testing of experienced clinicians' methods; sham-controlled vagal trials; and a field-measurement protocol with NIOSH (Questions 4 ¶10, 16 ¶¶3–11, 17 ¶4).
9. **Derive any future limit using uncertainty factors** (Question 5(n) ¶6).
10. **Report the exposure parameters the limits omit** — localized SAR and its spatial distribution; modulation depth and frequency, pulse width, repetition rate and duty cycle; peak alongside time-averaged values (Question 5(p) ¶¶5, 14, 17).
11. **Require written disclosure** before RF equipment is installed on or serving a dwelling, school, childcare or healthcare facility other than at the occupant's election, with a no-cost non-transmitting alternative (Questions 5(n) ¶7, 9 ¶4, 15(b) ¶6).
12. **Measure and classify exposure** — independent, periodic, published ambient measurement in residential and school settings; a served-user peak protocol for beamforming; and a classification distinction between exposures a person can decline

and those set by others' equipment (Question 15(b) ¶6).

13. **Assign responsibility for environmental effects**, support controlled field research on wildlife and livestock, and note that §704(b) remains unexecuted as to non-human organisms (Questions 14 ¶9, 15(e)).
14. **Make the federal record findable** — ask the FCC to correct the ET Docket 93-62 metadata and add searchable text, and publish the RFIAGW correspondence (Question 5(n) ¶8).
15. **Code these encounters now, and create a diagnosis code** — interim advice from the ICD-10-CM Cooperating Parties, for example Z77.128 with the presenting symptoms. Once a working case definition exists, an NCHS code request through the Coordination and Maintenance Committee, defined without prejudging etiology, so that the population can be counted (Question 10 ¶2).
16. **Prevent displacement from housing** — CMS guidance confirming that states may set §1915(i) needs-based criteria on functional need, include environmental modifications, and use state-plan home health and personal care for this population, without waiting for a validated case definition (Question 18 ¶8).
17. **Equip clinicians to recognize, assess and refer** — CDC clinician and patient pages and restored ATSDR exposure-history education; an ATSDR adult consultation pilot through the PEHSU network and a CDC or HRSA telementoring module (Questions 9 ¶8, 17 ¶7).
18. **Make HHS-funded care settings accessible** — HHS Office for Civil Rights technical assistance on reasonable modifications, turning on functional limitation and not on a diagnosis code (Question 18 ¶6).
19. **Pay for care at home, stabilization and coordination** — CMS: homebound criteria and home visits; building-level remediation within existing Medicaid benefits, evaluated; and recuperative care without a hospital stay, with an HRSA respite pilot. Also coordination, navigation and caregiver-training codes billable by telephone, with HHS continuing audio-only delivery (Question 18 ¶¶7, 9-11).
20. **Test the care pathway** — a CMS Innovation Center model, fee-for-service with a care-management fee at first (Question 18 ¶12).
21. **Coordinate outside HHS** — HHS with HUD on housing, SSA on disability evidence, and the U.S. Access Board on accommodation (Question 18 ¶13).

15. *A closing note on how I would like this comment to be read.* I have tried, wherever the evidence is contested, to state the case against my own position before stating my position; throughout, to distinguish peer-reviewed research from testimony, testimony from advocacy, and advocacy from AI-generated summaries; to keep my own account, at

Question 3, separate from the documentary record; and to decline questions where I have nothing reliable to offer. I have excluded a number of claims in common circulation on this subject because I checked them against primary sources and they did not hold. I would ask that the Department apply the same test to everything in this docket, including mine.

Appendix — Documents relied on

Every quotation in this comment is taken from one of the documents below.

Source	Identifier	Used at
ANSI C95.1-1982	American National Standard, 1 September 1982	5(p), 6
IEEE C95.1-1991	Approved 26 September 1991; ANSI-approved 1992 as ANSI/IEEE C95.1-1992	5(n), 5(p), 6, 9, 11, 13(k), 18
NCRP Report No. 86	NCRP, Bethesda MD, 1986	5(n), 5(p), 9, 13(k), 15(b), 18
FCC 96-326	Report and Order, ET Docket No. 93-62, released 1 August 1996; 61 FR 41006	5(n), 5(p), 6
FCC 97-303	Second Memorandum Opinion and Order, ET Docket No. 93-62, 25 August 1997	5(n), 5(p), 6, 17
FCC 19-126	Resolution of NOI, Second R&O, NPRM and MO&O, ET Docket Nos. 03-137, 13-84, 19-226; released 4 December 2019; final rules summarized at 85 FR 18131 (FR Doc. 2020-02745)	5(p), 6, 11, 17
FCC 13-39	First R&O, Further NPRM and NOI, ET Docket Nos. 03-137 and 13-84; released 29 March 2013; ¶46 nn. 83–87, ¶246	5(n), 15(b)
FCC DA 26-997	Public Notice, ET Docket No. 13-84, released 17 September 2026; FR Doc. 2026-19364	5(n), 17
HHS RFI (this docket)	Request for Information, 91 FR 59792 (21 September 2026), FR Doc. 2026-19252; comments due 21 October 2026	header

Source	Identifier	Used at
47 C.F.R. §§1.1306–1.1311 and §15.107	eCFR, current as of 21 September 2026	11, 13(k), 14
FCC KDB Publication 447498 D04	Interim General RF Exposure Guidance v01, 29 November 2021	11
IEEE C95.1-2019	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz	5(p), 11, 14
<i>Environmental Health Trust v. FCC</i>	9 F.4th 893 (D.C. Cir. 2021)	12, 14
U.S. EPA, <i>Radiation Protection</i> web page	https://www.epa.gov/radiation , last updated 9 September 2026, accessed 24 September 2026	14
EPA — Oge, 9 Nov 1993	ECFS 123890 (12 pp. with enclosure)	Summary, 5(n), 5(p), 11, 16
FDA/CDRH — Gill, 10 Nov 1993	ECFS 123942	Summary, 5(n), 11, 16
NIOSH — Niemeier, 11 Jan 1994	ECFS 126103	5(p), 11, 17
OSHA — Mallinger, 1 Mar 1994	ECFS 127798	Summary, 5(n), 9, 11
EPA — Trovato, 19 Jun 1995	ECFS 147044	Summary, 5(n), 17
FDA/CDRH — Jacobson, 17 Jul 1996	ECFS 166228	Summary, 11, 17
EPA — Browner, 25 Jul 1996	ECFS 166423	Summary
NIOSH — Schulte, 25 Jul 1996	ECFS 166719	Summary
OSHA — Baxter, 2 Aug 1996	ECFS 167003	Summary

Source	Identifier	Used at
RFIAWG letter, 17 June 1999	W. G. Lotz, NIOSH, to R. Tell, IEEE SCC28 (SC4), HHS/PHS letterhead; in the record of <i>EHT v. FCC</i> as Exhibit G to the NRDC amicus brief, D.C. Cir. Doc. #1855212, 5 August 2020, at 107–114	Summary, 5(n), 5(p), 6, 9, 11, 12, 16, 17, 18
RFIAWG letter, 16 July 2003	N. N. Hankin, EPA, to C. K. Chou, IEEE ICES SC-4; in the Comments of The EMR Policy Institute, ECFS 5510444038, ET Docket No. 03-137, 8 December 2003, at 18–19	Summary, 5(n), 17, 18
IEEE COMAR, 1998	<i>IEEE Eng Med Biol Mag</i> 17(3):111–114; PMID 9604711	5(p), 9, 11
NRC, 2008	National Academies Press; DOI 10.17226/12036	16
Karipidis et al., 2023 (ARPANSA systematic map)	<i>Environ Evid</i> 12:9; DOI 10.1186/s13750-023-00304-3	14
Cucurachi et al., 2013	<i>Environ Int</i> 51:116–140; DOI 10.1016/j.envint.2012.10.009	14
Engels et al., 2014	<i>Nature</i> 509:353–356; DOI 10.1038/nature13290	14
Rubin et al., 2005	<i>Psychosom Med</i> 67(2):224–232	4
Bosch-Capblanch et al., 2024	<i>Environ Int</i> 187:108612; DOI 10.1016/j.envint.2024.108612	4, 16
Baliatsas et al., 2012	<i>BMC Public Health</i> 12:643	4
Rubin et al., 2006	<i>Psychother Psychosom</i> 75(1):12–18	4, 16
Loizeau et al., 2026	<i>J Expo Sci Environ Epidemiol</i> ; DOI 10.1038/s41370-026-00909-z	15(b)
de Vocht and Olsen, 2016	<i>Front Public Health</i> 4:52; DOI 10.3389/fpubh.2016.00052	13(k)
Simkó et al., 2025	<i>Mutat Res Rev Mutat Res</i> 796:108545	12, 16
Sonzogni et al., 2025	<i>Int J Mol Sci</i> 26:4792	4, 16

Source	Identifier	Used at
Lamech, 2014	<i>Altern Ther Health Med</i> 20(6):28–39; PMID 25478801	4, 13(k)
D.P.U. 12-76 transcript and Order 12-76-B	Massachusetts DPU, 27 Feb 2014 and 12 Jun 2014	4, 6
H.3551	Massachusetts General Court	9
Institute of Medicine, 2015	Beyond Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: Redefining an Illness; National Academies Press	16
ICD-10-CM, FY2027	NCHS; code Z77.128	10
National Academies, 2024	<i>A Long COVID Definition: A Chronic, Systemic Disease State with Profound Consequences</i> ; National Academies Press; DOI 10.17226/27768	16
Schmiedchen et al., 2019	<i>Environ Health</i> 18:88; DOI 10.1186/s12940-019-0519-x	16
Ledent et al., 2025	<i>Bioelectromagnetics</i> 46:e70006; DOI 10.1002/bem.70006	16
Huss and Rösli, 2006	<i>BMC Public Health</i> 6:267; DOI 10.1186/1471-2458-6-267	9
Bray, 2020	<i>Clinical Practice Guidelines in the Diagnosis and Management of Electromagnetic Field Hypersensitivity (EHS), Preliminary</i> ; Environmental Health Clinic, Women's College Hospital, Toronto, October 2020; https://www.womenscolleghospital.ca/wp-content/uploads/2022/06/Preliminary-Clinical-Guidelines-for-EHS.pdf	16
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