

Electromagnetic Radiation from Industrial Heating devices

In 1996 the federal government updated its regulations for Radiofrequency Radiation Energy emitted from electromagnetic sources. This was part of the 1996 Telecommunications Act; at that time, the general population was concerned about electromagnetic energy from radio and cell towers. The Telecommunications Act directed the Federal Communications Commission to establish standards to protect workers and the general public. The standards were also adopted by OSHA and state OSHA groups and are utilized as best management practices when dealing with electromagnetic equipment. This national standard supersedes any state or local regulations for electromagnetic energy and is recognized as the standard by all other government agencies at this time.

These regulations went into effect October 15, 1997; on October 16, 1997 the first case of enforcement action occurred. To the surprise of the wireless telecommunications industry, which the regulations were originally geared at, this enforcement action was at an industrial facility in Southern California near Ontario. This international manufacturer produces premium flashlights known worldwide. In their process, they use industrial heating equipment operating with 10,000 to 50,000 Watts per unit. They were unaware of the new regulations; they were also unaware that their equipment was FCC type accepted and operated under FCC scrutiny and authority. The equipment had recently been moved to a new manufacturing facility. This new facility was just coming on line for the Christmas holiday rush. Some of the equipment's shielding and guards had been redesigned or had been removed.

The Federal Communications Commission received reports from the Federal Aviation Administration that the aircraft landing navigation aids used at the Ontario California airport were being affected by an unknown RF radiation source. This unknown source of electromagnetic RF energy was causing interference to the navigational equipment on aircrafts that were attempting to land at the Ontario California airport located east of Los Angeles.

Radiofrequency Safety International Corporation along with many other consulting groups were contacted by the FCC in an effort to trace down this interfering source. Most groups were looking at the mountaintop telecommunications sites where high power radio and TV transmitters were located. I was driving down I-10 just east of the Ontario airport when my RF detection equipment, which we were using to analyze this radio spectrum, detected a strong signal near the navigational beacons frequency. I saw a cell tower located near an industrial site. But the cellular frequency was much higher than what the FAA was using for aircraft navigation. As I approached the building the radiofrequency radiation emissions were extremely high and it was very apparent that the signals were coming from inside this industrial facility. This was about the same time that the Federal Communications Commission's inspectors had also found this source.

On October 17, 1997 the Federal Communications Commission issued a cease and desist order to the plant to discontinue the use of six of their industrial heating units used for heating, packaging, sealing, welding, and epoxy coating of their products. Radiofrequency Safety International was called by the company's CEO and its legal group. We were asked if the FCC could in fact shut down this facility.

They emphasized that they had been shut down while moving the plant and were gearing up for the holiday's sales. I explained to the CEO, and owner of this large facility, that the FCC had authorization dating back to the 1934 Telecommunications Act to inspect sites and equipment that it regulated. It could in fact do inspections at will at any time and could also issue cease-and-desist orders as required (see the footnote at the end of this white paper FCC's authority to inspect). At that point, we were in daily contact with the Federal Communications Commission's office in Los Angeles trying to determine operating windows or times which we could temporarily turn on individual heating units. We needed to bring the units online so that we could redesign the shielding and reconfigure the operations. However, the FCC only allowed us to do this at certain times when visual flight conditions would allow safe airport operations. This went on for months; remember the plant was just coming back online at this new facility in trying to meet the Christmas holiday rush, so the financial loss for this type of disturbance would be a hardship on any organization.

Our findings were that the RF heating equipment that was designed to operate in the 27 MHz industrial heating frequency range was generating what is called harmonics. These substantially strong radiofrequency radiation harmonics were radiating out of the metal factory building and interfering with the aircraft radios. If you take 27 MHz times two you end up with 54 MHz; the next harmonic frequency would then be 108 MHz. The aircraft radios were operating at 108 MHz which is just above the common FM broadcast radio band, so the third harmonic was causing the interference.

Going back to the radiofrequency emissions regulation standards, not only did this facility have harmonic radiations which exceeded the allowable FCC emissions criteria, a complete survey of the facility showed that the RF emissions levels were also very high! Some areas had levels as high as 600% to 1000% of the allowable limits for non-ionizing radiation emissions. These standards are somewhat similar to the hearing or noise conservation programs used in most large facilities throughout the United States to protect workers. But the noise standards are set up on an eight hour time weighted average. The maximum permissible exposure for non-ionizing radiation was established using a six minute time weighted average at 100% of the Controlled/Occupational limit. In other words, you could be in an area at 100% of the maximum permissible exposure for no more than 6 minutes. As you can see, this facility was well above the maximum permissible exposure standards and presented another problem to the facility's management and ownership. Not only did they have problems with the harmonic radiation, but they also had potential personnel and OSHA problems originating from this radiation which was being generated from their production equipment.

This was the first time I heard "right to know" used relating to radiofrequency energy as was stated by a Cal OSHA inspector. Many states classify nonionizing radiation as a physical hazard and some states also list it under their Hazcom programs. Are you familiar with "right to know"? The inspector asked if the manufacturer had Maximum Permissible Exposure (MPE) data sheets for each induction heating unit. This would be like having a material safety data (MSDS) sheet for each of your chemicals. Also in California there is something called "Prop 65" which requires facilities to post any known agents that can cause carcinogens.

Fortunately, for the facility, Cal OSHA did not issue any citations for worker exposure; but they were aware that management was proactive in eliminating these hazards. Remember, the regulations were just rolling out at this point in time. As we see a rapid increase in wireless radio equipment from Wi-Fi, cellular, and smart meters along with the increasing fear of low-frequency power lines in the backyard, the public's perception of electromagnetic energy is changing. More and more people, citizen groups and labor unions, are becoming concerned about potential long-term health effects. This is why the Federal Communications Commission was directed to initiate a national standard. Fortunately, at this point, we are able to use the national standard as a reference when testing industrial facilities using EME radiating equipment. Some of the equipment at this facility was never able to be returned to use and had to be replaced or the process changed. So, it is evident that this equipment had been emitting nonionizing radiation and harmonics for some time even before the move.

To lower concerns to employees, employers should preempt a testing program to determine if their sites are in compliance. If they are in compliance, best practices at this point would be to train workers. During this training, the survey documentation proving compliance could be used to build confidence and lower concerns to the workers, unions, and the general population of this potential hazard as well as to restore confidence in the facility's programs.

If the equipment at the facility is out of compliance, the survey would allow the design engineers and the radiofrequency safety experts the opportunity to make changes to get the equipment into compliance. The first step is having a working knowledge of any potential hazards; remember electromagnetic energy from radiofrequency sources is invisible and undetectable without sophisticated scientific equipment. Even with sophisticated scientific equipment, knowledge and skills are required to eliminate many of these hazardous areas.

One other unique thing about the maximum permissible exposure regulations for Radiofrequency Energy is that there are two standards. This is unlike most other environmental health and safety rules, which have established a single baseline or threshold. The FCC RF radiation standard in fact has two threshold standards; one for trained workers (controlled), which are fully aware and know how to prevent exposure to themselves, and the other, which is in fact five times more stringent, was established for the untrained worker or the general population (uncontrolled) who are unaware of any such hazard. An important note: if you train your workforce, the uncontrolled standard goes away and they're allowed to work at the higher, controlled standard which was designed for workers. However, if the site is above the more stringent general population standard, then OSHA can issue citations to the facility for allowing workers to work because they are not fully aware of the hazard if training has not been conducted.

Steve Walz is director of Radiofrequency Safety International Corp, which is the leading company in electromagnetic safety and has provided services and training for tens of thousands over the years.

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Foot note

- **FCC Authority to Inspect** see FCC web site FAQpe
- (<http://www.fcc.gov/guides/inspection-fact-sheet>)
- Q: The FCC Agent standing at my door does not have a search warrant, so I don't have to let him in, right?

A: **Wrong**. One of the requirements as a licensee, or non-licensee subject to the Commission's Rules, is to allow inspection of your radio equipment by FCC personnel. Authorization from the Commission comes with the obligation to allow inspection. Both licensees and non-licensees must allow inspection of their equipment as required. Section 303(n) of the Communications Act of 1934 from FCC FAQ Page
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- Q: Can I have my attorney present during the inspection and can I make the agent wait until my attorney is present?

A: You may have your attorney present during the inspection; however, there is no constitutional right to have your attorney present. Therefore, you may not make the agent wait until your attorney arrives. Making the agent wait for your attorney conflicts with the "unnecessary delay" requirement. Section 303(n) of the Communications Act of 1934, FCC FAQ Page