Microwaves, Biological and Chemical Hazards

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Non Ionizing Radiation

"Radiofrequency (or RF) radiation" applies to electromagnetic fields with frequencies between 3 kHz and 300 MHz, while "Microwave (or MW) radiation" covers fields from 300 MHz to 300 GHz.

Since they have similar characteristics, RF and MW radiation are usually treated together.

The lower-frequency boundary of RF radiation is often extended to 3 kHz in order to include emissions from commonly used devices such as radio and television transmitters, computer network hubs, wireless internet (Wi-Fi) routers, Bluetooth devices, cordless telephones, cellular phones and their transmitting towers, and microwave ovens.

The nature and the degree of the health effects of overexposure to RF/MW fields depend on the frequency and intensity of the fields, the duration of exposure, the part of the body exposed, the distance from the source, any shielding that may be used and other factors.

Occupations with RF/MW exposures

Television transmitter station

Induction and dielectric heaters

Diathermy applicators

Military exposure

surface-to-air missile system radars.

Aircraft and helicopters.

Communication devices,

Airport radars.

Radio navigation systems

Health Effects

The main effect of exposure to RF/MW fields is heating of body tissues as energy from the fields is absorbed by the body.

For frequencies from 3 MHz to 10 MHz, worker over-exposure to time-varying electric and/or magnetic fields may result in short-term nerve stimulation including headaches, fatigue, stress and sleeplessness.

Localized heating, or "hot spots," may lead to heat damage and burns to skin and/or internal tissues.

There is a higher risk of heat damage with organs which have poor temperature control, such as the lens of the eye and the testes.

Hot spots can be caused by the interaction of the fields with metallic implants, for example, cardiac pacemakers or aneurism clips.

Cancers or congenital defects are still not proven.

Biological Hazards:

biological agents: “any microorganism, cell culture, or human endoparasite, including those who have been genetically modified, which may cause any infection, allergy, toxicity, or otherwise create a hazard to human health.”

Additionally, biohazards encompass biological substances including medical waste, or samples of body tissues or fluids from a biological source, which may contain microorganisms, viruses or toxins that can adversely affect human health.

Biohazards may exert an effect on a human, either by direct contact with the causative agent (e.g. a bite from a venomous snake) or by transmission of zoonotic agents through contact with animals, animal matter or animal products (e.g. brucellosis).

Also Plant and plant products: Contact with certain plants, plant materials may cause non-infectious poisoning, stinging, allergic reactions (e.g. anaphylaxis, mushroom workers’ lung, and bagassosis in the sugar cane industry), and irritant-contact or allergic-contact dermatitis

Chemical hazards

refer to health hazards caused by hazardous substances, compounds and particles.

There are an estimated 650,000 existing hazardous chemical products, and hundreds of new ones are being introduced annually. Theses poses serious problems for exposed workers and their employers.

Major Types

1. Primary Irritants - cause intense redness or swelling of skin or eyes on contact. No permanent tissue damage
2. Corrosives - cause tissue damage and burns on contact with skin or eyes
3. Carcinogens - may cause cancer
4. Teratogens - may cause birth defects
5. Organ Specific hazards - damage to specific organ systems such as liver or lungs

The employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working.

They also need to know what protective measures are available to prevent adverse effects from occurring

Labels, Tags and Markings

The employer must ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following:

Identity of the hazardous chemical

Appropriate hazard warnings

This above labeling information required is of the manufacturer so the employer must ensure that the original labels from the manufacturer are on all containers and remain legible

Material Safety Data Sheets (MSDS)

one of the most important tools available to employers for providing information, and protection to workers from hazardous chemicals which are used in the workplace.

It is a technical document which provides detailed and comprehensive information on a controlled product related to:

1. health effects of exposure to the product
2. hazard evaluation related to the product's handling, storage or use.
3. measure to protect workers at risk of exposure.
4. Emergency Procedures

MSDS may be kept in any form including operating procedures

It may be more appropriate to address the hazards of a process rather than individual hazardous chemicals

MSDS, required information

1. Identity of the chemical
2. Physical and chemical characteristics
3. Physical hazards
4. Chemical hazards
5. Primary routes of entry
6. PEL's or other exposure limits
7. Control measures
8. Emergency procedures
9. Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens
10. precautions for safe handling and use
11. Date of preparation
12. Name, address and telephone of the manufacturer

Trade Secret Exemptions

Information may be withheld to protect industries' right to protect confidential business information.

This information is referred to as trade secrets.

The producer of the product can withhold the name and concentration of any ingredient.

Doctors and nurses can access withheld information however this information remains confidential.

Control of Chemical Hazards and Exposures

1. *Elimination or substitution*
2. *Engineering and Mechanical Controls*
3. *Personal Protective Equipment*
4. *Administrative and Procedural Controls*