

## CENTRAL POLLUTION CONTROL BOARD

### **AWARENESS NOTE ON MOBILE TOWER RADIATION & ITS IMPACTS ON ENVIRONMENT**

#### **I. Radiation Sources**

All forms of life on earth have been living amidst radiation through the ages. Radiation is present everywhere. All living beings are exposed to the Sun, which is the largest radiation source. Many common known sources of radiation with advancement of technology include radio, transistor, television, microwave oven, mobile handset, Mobile Towers and many more.

#### **II. What is Radiation?**

The Radio Frequency (RF) energy is a non-ionizing radiation like radiation from visible light, infra-red radiation, and other forms of electromagnetic radiation with relatively low frequencies. Cell phone is a very, very low level of radio frequency energy. The type of energy emitted is non-ionizing – means it does not cause damage to chemical bonds or DNA.

#### **III. What is a Mobile Tower?**

Mobile Tower is a triangular / cone shaped metal structure which is more than nine meter in height on which 3 or more antennas are fixed, the structural height may depend on whether it is fixed on land or on a building. Height of the Ground based towers varies from 30-200 meters however most of the towers are of 40 meters and roof-top towers vary from 9-30 meters. Mobile Tower Antennas are the source of radiation in a mobile tower.

However, a telecom infrastructure consists of *electronic* (active) and *non-electronic* infrastructure.

- Electronic infrastructure includes base tower station, microwave radio equipment, switches, antennas, transceivers for signal processing and transmission.
- Non-electronic infrastructure includes tower, shelter, air-conditioning equipment, diesel electric generator, battery, electrical supply, technical premises.

For a good quality wireless communication, Mobile Tower Base Stations (MTBS) are an inevitable part of the telecom infrastructure system.

#### **IV. Working of a Mobile Tower**

Mobile phone operators divide a region in large number of cells, and each cell is divided into number of sectors. The base stations are normally configured to transmit different signals into each of these sectors. In general, there may be three sectors with equal angular coverage of 120 degrees in the horizontal direction as this is a convenient way to divide a hexagonal cell. If number of users is distributed unevenly in the surrounding area, then the sectors may be uneven.

These base stations are normally connected to directional antennas that are mounted on the roofs of buildings or on free-standing masts. The antennas may have electrical or mechanical down-tilt, so that the signals are directed towards ground level. Mobile Tower Antennas are the source of radiation in a mobile tower.

#### **V. Difference between Mobile Tower and Base Transceiver Station (BTS)**

Mobile Tower is a triangular / cone shaped metal structure on which 3 or more antennas are fixed radiating electro-magnetic power, whereas Base Transceiver Stations (BTSs) are established at suitable locations, as per their Radio Frequency (RF) Network Planning for proper coverage of the area and for meeting capacity requirements. BTS also contain a number of radio transmitter and each of these has the same maximum output power. The outputs from the individual transmitters are then combined and fed via cables to the base station antenna, which is mounted at the top of a mast (or other suitable structure).

#### **VI. Mobile Tower - Status**

With the growing population of India, the wireless communication density and its network has escalated at a rapid pace over the past few years. The statistics reveal that there are 867.8 million wireless subscribers in India at the end of March 2013 which account for nearly 96 % of the total telecom subscriptions.

According to TRAI currently there are 5 lakh telecom towers and it is estimated that around One lakh additional towers would be required to cater the need of ONE billion mobile telephones by 2014. There are 12-14 telecom service providers catering to total projected wireless subscriber base all the over the country covering both GSM (Global System for Mobile Communications) and CDMA (Code Division Multiple Access) technologies.

## VII. Radiation limits and regulations – A global scenario

As per the studies conducted so far, no conclusive relationship has been established to relate radiation from mobile towers exclusively with health hazards, however, as a precautionary measure various standards for radiation from mobile towers have been formulated by Department of Telecom (DoT), Government of India in India, based on **International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines** (issued by Germany & adopted by UK, Australia, Malaysia, India and Korea).

Consequent to the revision of EMF radiation norms by Department of Telecommunications (DoT), Indian Standards are now 10 times more stringent than many countries (like USA, Canada, Japan and Australia) in the world which follow ICNIRP guidelines. A number of countries have specified their own radiation levels keeping in mind the environmental and physiological factors. The International Standards are provided at Table 1 as below;

**Table 1 International EMF Radiation Norms for Mobile Towers**

<b>International Exposure limits for EMF in W/m<sup>2</sup> (1800 MHz)</b>	
<b>12</b>	<b>USA, Canada and Japan</b>
<b>9.2</b>	<b>ICNIRP and EU recommendation 1998</b>
<b>9</b>	<b>Exposure limit in Australia</b>
<b>2.4</b>	<b>Exposure limit in Belgium</b>
<b>1.0</b>	<b>Exposure limit in Italy, Israel</b>
<b>0.5</b>	<b>Exposure limit in Auckland, New Zealand</b>
<b>0.45</b>	<b>Exposure limit in Luxembourg</b>
<b>0.4</b>	<b>Exposure limit in China</b>
<b>0.2</b>	<b>Exposure limit in Russia, Bulgaria</b>
<b>0.1</b>	<b>Exposure limit in Poland, Paris, Hungary</b>
<b>0.1</b>	<b>Exposure limit in Italy in sensitive areas</b>
<b>0.095</b>	<b>Exposure limit in Switzerland</b>
<b>0.09</b>	<b>ECOLOG 1998 (Germany) Precaution recommendation only</b>
<b>0.001</b>	<b>Exposure limit in Austria</b>

*Guidelines on Exposure Limits in Various Countries (Source: TRAI, 2014)*

## VIII. Mobile Tower Certification and Testing – India

All telecom service providers (TSPs) / mobile service providers (MSPs) are governed by Terms & Condition of Licenses issued by Department of Telecom and they should ensure that radiation from

mobile towers is within the prescribed limit. For this, all TSPs are bound to submit the **self-compliance certificate** of all the mobile tower installations on bi-annual basis to ensure radiations are within stipulated limits.

Further, on a sample survey basis, Telecom Enforcement Resource & Monitoring – TERM Cell (field unit of DoT) also tests upto 10% of the total BTS's in their jurisdiction per year as per DOT guidelines, this includes **testing the radiation from all the neighboring BTSs** also. For non-compliant site i.e. where radiation exceeds the limit, there is provision for imposition of penalty. For non-compliance of EMF standards, a penalty of Rs. 5 lakh is liable to be levied per BTS per service provider.

As per the 'Guidelines for issue of Clearance for installation of Mobile Towers' published by Department of Telecommunications (DoT), *'Telecom installations are lifeline installations and a critical infrastructure in mobile communication. In order to avoid disruption in mobile communication, an essential service, sealing of BTS towers/disconnection of electricity may not be resorted without the consent of the respective TERM cell of DoT'*. In view of the above the regulatory agencies (CPCB & SPCBs) have no authority to dismantle any Mobile Towers/disconnect the telecommunication service.

## **IX. Legal references on 'Radiation' – India**

In view of above and as the number of public complaints on aesthetics, health issues concerning radiation hazards and safety of Mobile Tower Base Stations (MTBS) (frequently referred to as telecom towers), this section summarises legal aspects on the subject of radiation.

1. **The Indian Wireless Act, 1933:** *"wireless communication means any transmission, omission or reception of signs, signals, writing, images and sounds, or intelligence of any nature by means of electricity, magnetism, or Radio waves or Hertzian waves, without the use of wires or other continuous electrical conductors between the transmitting and the receiving apparatus. Explanation:- Radio waves or Hertzian waves means electromagnetic waves of frequencies lower than 3,000 gigacycles per second propagated in space without artificial guide"*
2. However, under **The Indian Telegraph Act, 1885** it is mentioned that *" 'telegraph' means any appliance, instrument, material or apparatus used or capable of use for **transmission** or reception of signs, **signals**, writing, images and sounds or intelligence of any nature by wire, visual or other **electro-magnetic emissions, radio waves or Hertzian waves, galvanic, electric or magnetic means.**"*

3. Under **The Telecom Regulatory Authority of India Act, 1997**, it is mentioned that *'telecommunication service' means service of any description (including electronic mail, voice mail, data services, audio text services, video text services, radio paging and **cellular mobile telephone services**) which is made available to users by means of any **transmission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, visual or other electro-magnetic means but shall not include broadcasting services.***"

**X. Jurisdiction of Regulatory authorities (CPCB/SPCBs) with reference to installations of Mobile Tower Base Stations (MTBS)**

As per the studies conducted by MoEF on radiation from Mobile Tower Base Station, no conclusion can be arrived at to ascertain that radiation from mobile tower is exclusively responsible for health hazards. The impact of Mobile Tower (MT) antenna radiations on the environment has been drawing constant attention due to increasing public concern on radiation from mobile towers installations particularly in urban areas which are subjected to various environmental impacts due to varying lifestyles influenced by ex. Noise from TV / music systems etc, vehicular traffic , dwelling units are in close proximity, activities in the nearby vicinity etc. Several media reports, public complaints besides RTI and court cases are also being forwarded to Central Pollution Control Board (CPCB), State Pollution Control Board (SPCB) / Pollution Control Committees (PCCs) on installations of MTBS.

The following are salient points that highlight the role of regulatory agencies in the area of installations of Mobile Tower Base Stations (MTBS);

1. Under **The Air (Prevention and Control of Pollution) Act, 1981 and Environment (Protection) Act, 1986** '**air pollutant**' is defined as:

*' any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment'*

**Note:** 'radiations' is excluded from the above definition that includes Electro Magnetic Radiation (EMR) emitted from mobile tower, a non-air pollutant."

2. 'No person shall, without the previous consent of the State Board, establish or take any steps to establish any industry, operation or process, or any treatment and disposal system or an extension or addition thereto' as per **section 25/26 of the Water (Prevention & Control of**

**Pollution) Act, 1974 and /or under section 21/22 of the Air (Prevention & Control of Pollution) Act.**

3. For the user end of MTBS, the user has to seek consent from the concerned SPCBs / PCCs for installation of the DG sets which is a source of power supply. The regulatory agency ensures that the DG sets functions as per approved guidelines with respect to emission & noise.
4. The Noise Pollution (Regulation & Control) Rules , 2000 states that ‘Whereas increasing ambient noise levels in public places from various sources inter-alia, industrial activity, construction activity , (fire crackers , sound producing instruments ), **generator sets**, loud speakers, public address systems, music systems, vehicular horns and other mechanical devices have deleterious effect on human health & psychological well being of the people, it is considered necessary to regulate & control of noise producing & generating sources with the objective of maintaining the ambient air quality standards in respect of NOISE’.
  - a) Noise is an ‘air pollutant’ and is covered under the E (P) Act , 1986 and under Noise Rules 2000
  - b) As per guidelines under Schedule I, Environment (Protection) Act 1986 for every DG set(upto 800 KW), the following abatement measures applicable to the manufacturer’s within Indian territory until & unless it is exempted otherwise :
    - Abatement for DG noise: mandatory as per GSR 371 (E ) dated 17<sup>th</sup> May 2002 (Schedule I , SI #94 )
    - Abatement of Emissions: mandatory as per GSR 371 (E ) dated 17<sup>th</sup> May 2002 (Schedule I , SI #95 )

## **XI. Conclusion by Pollution Control Authorities**

- 1.0 All living beings are exposed to the Sun, which is the largest radiation source. Few other sources of radiation include radio, transistor, television, microwave oven, mobile handset, Mobile Towers and many more.
- 2.0 The Radio Frequency (RF) energy is, therefore, a non-ionizing radiation like radiation from visible light, infra-red radiation, and other forms of electromagnetic radiation with relatively low frequencies.
- 3.0 The intensity of the radiofrequency radiation from base stations are less than one thousandth of those from mobile phones. The output power of mobile phones is less than 1

watt (typically is in the range of 0.2 to 0.6 watts) which is far lower than the emission levels that emanate from the microwave of the radio.

**4.0** An 'Expert Committee to study the possible impacts of Communication Towers on Wildlife including Birds and Bees' was constituted by the Ministry of Environment & Forests, Government of India on 30<sup>th</sup> August 2010. On the basis of review of the available scientific information by the Expert Committee, the Report indicates that the Electro-Magnetic Radiations (EMR) interfere with the biological systems besides impact on human beings has also been reported.

**5.0** However, the issue of direct concern to Pollution Control Boards is noise/air emissions from the power generator sets attached to mobile towers for which the provision is made under Environment Protection Act, 1986. In view of above, following are the limited provisions under Pollution Control Acts with reference to emissions and noise of DG sets attached to Mobile Tower;

- a)** Under The Air (Prevention and Control of Pollution) Act, 1981 'air pollutant' means 'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment (*Note: This clearly shows that Radiation is not covered under the act and is not a pollutant*)
- b)** Under Environment (Protection) Act, 1986 'environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property;
- c)** As per section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and /or under section 21/22 of the Air (Prevention & Control of Pollution) Act, 'No person shall, without the previous consent of the State Board, establish or take any steps to establish any industry, operation or process, or any treatment and disposal system or an extension or addition thereto'
- d)** The Noise Pollution (Regulation & Control) Rules , 2000 'Whereas increasing ambient noise levels in public places from various sources inter-alia, industrial activity, construction activity, (fire crackers , sound producing instruments ), **generator sets**, loud speakers, public address systems, music systems, vehicular horns and other mechanical devices have deleterious effect on human health & psychological well being of the people , it is considered necessary to regulate &

control of noise producing & generating sources with the objective of maintaining the ambient air quality standards in respect of NOISE'

**6.0** In India, Mobile Tower Radiation testing and monitoring is regulated by Telecom Enforcement Resource & Monitoring (TERM) cell of Department of Telecommunications (Ministry of Communications & Information Technology). Similarly, the mobile tower radiation control is governed by telecom regulatory authorities in other countries like Srilanka, U S, U K, China etc.

**7.0** As per legal provisions quoted above, radiation from Mobile Towers & Phones are covered under;

- a) Indian Wireless Telegraph Act, 1933 (Act No XVII)
- b) The Indian Telegraph Act, 1885
- c) The Telecom Regulatory Authority of India Act, 1997

However, none of the Acts cover the regulation of health impacts of radiation on living beings.

**8.0** Radiation sources are varied in number like Mobile Tower, wireless phones, computers, laptops, TV towers, FM towers, AM towers, microwave ovens etc., however radiation emission from mobile towers are huge due to its dense installations and unscientific proliferation.

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