THE RELATION BETWEEN
INDUSTRIAL AIR POLLUTION
AND HUMAN HEALTH
13-14 NOVEMBER, 2014
BURSA
Content

• A-Definitions
• B-The relation between air pollution and human health
• C-Emissions released by large combustion plants and their impacts on human health
• Ç-Assessment of Large Combustion Plants under EIA (Environmental Impact Assessment) process
• D- The methodology of identifying the impact of hazardous chemical substances on human health
Content (2)

• E-Classification of chemical substances in Turkey,
• F-Duties and responsibilities of the MoH concerning the impacts of air pollution on human health,
• G-Provisions of the Turkish Criminal Code numbered 5237,
• H-Conclusion and suggestions,
Definitions

• Chemical substance: Any kind of element, compound or mixture including wastes found in nature and produced or used during a process regardless whether they are being marketed.

• Hazard: The potential risk of chemical substances with hazardous chemical structures that may damage the health of the exposed person(s).
Definitions (2)

• Risk: Degree of likelihood that exposure to a hazardous substance may damage health of the exposed person(s).

• Health (WHO): Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

• Environmental Health: The life quality of person(s) determined by physical, chemical, biological and psychosocial factors existing in the environment.

• Community Health: The term includes environmental health, infection, disease control, life style and health education of person(s).

• Health Impact Assessment: A systematic process including assessment of evidences about impacts of a proposed project or policy on health at a certain interval.
Definitions (3)

• Environmental Pollution: The undesired effects of human actions on air, water and soil yielding results such as ecological imbalance, bad smell, noise and wastes.

• Health Risk Assessment: The prediction of the potential impacts of a chemical, biological, physical or social element on a certain human population system under specific conditions and timeframe.

• Regulatory Impact Assessment: A systematic policy tool used in order to measure and assess possible cost and benefit impacts of an existing or new arrangement.
Definitions (4)

• External Air: The air outside of troposphere other than the air in working spaces.

• Air Pollution: Air pollution occurs if amounts which could be harmful to the health or comfort of humans and animals or which could cause damage to plants and materials accumulate or intensify in the air.

• Sustainable Environment: The maintenance of practices that may contribute to the protection and development of current and future environmental values (social, economic, physical, etc.) on a long-term basis without endangering the existence and quality of the resources that will be needed by future generations.

• Sustainable Development: The development and improvement based on a balance among environmental, economical and social targets that ensure a healthy environment for current and future generations to live in.
Definitions (5)

- **Toxic Substances**: Substances that may result in acute or chronic damages on human health or death following inhalation and oral or dermal exposure in small amounts.
- **Mutagenic Substances**: Substances that may cause or facilitate heritable genetic damages through following inhalation and oral or dermal exposure in small amounts.
- **Toxicology**: A scientific branch concerned with the study of the adverse effects of chemicals on living organisms.
Definitions (6)

• Toxicity- is the degree to which a substance can damage animals and plants.

• Acute toxicity- describes the adverse effects of a substance that result either from a single exposure or from multiple exposures in a short space of time (usually less than 24 hours) or from 4 hours of inhalation.

• Chronic toxicity- describes the adverse effect of a chemical substance on human health that result from exposure in 3 months or longer period of time.
Definitions (7)

• **Dose-Respond Assessment**: To document the relation between dose and biological response resulting from exposure to a factor.

• **Endocrine Disruptors**: Exogenic substances or mixtures changing the development and function of endocrine system.

• **Ecological Balance**: describes all conditions necessary for sustainability and development of humans and other organisms.
Definitions (8)

- **Persistency** - the state of chemicals or mixtures of chemicals which resist to dissolve in other chemicals but easily dissolve in the environment.
- **Bioaccumulation** refers to the accumulation of substances in fat tissue (lipophilic), food chain, soil and sediments.
- **Most Significant Items in REACH Regulation**: The most significant items in 1907/2006EC REACH Regulation:
  - PBT (Persistent, Bioaccumulative and toxic substances)
  - vPvB (Very persistent and very bioaccumulative)
  - CMR (Carcinogenic, mutagenic or toxic for reproduction, category 1 or 2)
The Relation between Air Pollution and Environmental Health
The Relation between Air Pollution and Environmental Health(1)

- Air pollution can be divided in 3 sub-classifications:
- 1 – Air pollution resulting from heating,
- 2 – Air pollution resulting from motor vehicles,
- 3 – Air pollution resulting from industrial facilities.

(Unwise location choices for industrial facilities, ignoring proper techniques and environmental protection measures (such as flue gas filter, treatment systems etc.), using improper fuels with high sulphure content are some of the key factors triggering air pollution.)
The Relation between Air Pollution and Environmental Health(2)

• Clean environment is fundamental for human and environmental health and welfare. However, the interaction between humans and the environment can be highly complicated; thus difficult to evaluate.
• Environmental pollution is responsible for 24% of all diseases whereas 23% of all deaths in the world.
• Indoor and ambient air pollution, low quality water, poor sanitation and hazardous chemicals lead to the most critical health problems related with environment in Europe.
• World Health Organization, International Agency for Research on Cancer has classified ambient air pollution as cancer-causing (carcinogen) agent (group 1).

• **Group 1:** Cancer-causing agents including 113 substances; i.e. Aflatoxins (Cas No: 001402-68-2), Benzene (Cas No: 71-43-2)

• The report released by WHO on march 2014 noted that 3.7 million deaths occurred due to ambient air pollution while 2.7 million deaths occurred due to indoor air pollution. The total reported number of deaths was 7 million in that year.
The Relation between Air Pollution and Environmental Health

• Considerable part of European population live in big cities where air quality standards are worsening. Ozone, nitrogen dioxide, particulate matter (PM) pollutants pose serious health risks. The emission limit values were exceeded for several pollutants of these four in various countries in 2010. Therefore, it is still important to reduce air pollution.
The Relation between Air Pollution and Environmental Health (5)

• Clean Air For Europe (CAFE) Programme has noted that 348 000 premature deaths occur every year as a result of exposure to fine particulate matters ($\text{PM}_{2.5}$) and this exposure reduces the average life expectancy by nearly one year.
• According to a research conducted on the effects of long term exposure to ambient air pollution on brain and cerebrovascular disorders, there are some evident associations between paralysis and long term exposure to fine particulate matters.

(Long-Term Exposure to Ambient Air Pollution and Incidence of Cerebrovascular Events: Results from 11 European Cohorts within the ESCAPE Project)
The Relation between Air Pollution and Environmental Health(7)

Emissions Released By Large Combustion Plants and Their Impacts On Human Health

A risk assessment taking hazardous impacts (characteristics) of chemical substances and the length of exposure to these chemicals into account, can be used to find out the degree of their effects on human health.
The Emissions Released from LCPs And Their Impacts On Human Health

(1)

<table>
<thead>
<tr>
<th>Number</th>
<th>Type of LCP</th>
<th>Environmental Health Risk Factors of Several LCPs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gas Emissions</td>
</tr>
<tr>
<td>1</td>
<td>Solid fuel firing thermal plants</td>
<td>+ NO\textsubscript{x}, SO\textsubscript{2}</td>
</tr>
<tr>
<td>2</td>
<td>Liquid fuel firing thermal plants</td>
<td>+ NO\textsubscript{x}, SO\textsubscript{2}</td>
</tr>
<tr>
<td>3</td>
<td>Natural gas firing thermal plants</td>
<td>+ NO\textsubscript{x},</td>
</tr>
<tr>
<td>4</td>
<td>Integrated steel manufacturing</td>
<td>+ , NO\textsubscript{x}, SO\textsubscript{2}, CO,NH\textsubscript{3},</td>
</tr>
<tr>
<td>5</td>
<td>Steel manufacturing by arc furnace</td>
<td>CO, CaF\textsubscript{2}</td>
</tr>
<tr>
<td>6</td>
<td>Petroleum refineries</td>
<td>+ NO\textsubscript{x}, SO\textsubscript{2}, CO, VOC\textsubscript{e}</td>
</tr>
</tbody>
</table>
Coke Oven Emissions and Other Emissions Released From Integrated Arc Furnaces

<table>
<thead>
<tr>
<th>Unite</th>
<th>Air emission</th>
<th>Waste water</th>
<th>Solid waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coke oven</td>
<td>PCDD-F, PAH, PCB, VOC</td>
<td>0.42 m³ waste water /tons of coal Phenol 0.197 kg/ton</td>
<td>Waste water Mud Cr 10 gr/m³</td>
</tr>
<tr>
<td>Blast furnaces</td>
<td>VOC,</td>
<td>14.4 m³ /ton pig iron</td>
<td>Clinker 348kg/ton pig iron</td>
</tr>
<tr>
<td>Steel mill/Oxygen converter</td>
<td>PCDD-F, VOC</td>
<td>2.3 m³ /ton liquid steel</td>
<td>Clinker 145 kg/ton liquid steel</td>
</tr>
<tr>
<td>Sinter</td>
<td>SO₂, HCl, HF, PAHs, PCB ve PCDD/F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical arc furnace</td>
<td>PCDD-F, PAH, PCB, VOC -Uncontrolled 5.5 kg dust /ton liquid steel -Controlled 0.3 kg dust/</td>
<td>0.8 m³ /ton liquid steel</td>
<td>Clinker 120 kg/ton Dust 12.8 kg/ton Mud 8.7 kg /ton liquid steel</td>
</tr>
</tbody>
</table>
The Emissions Released from LCPs And Their Impacts On Human Health(2)

- Emission Limit Values Released From Solid Fuel Firing Plants (ELVSFFP)

<table>
<thead>
<tr>
<th>Number</th>
<th>Parameter</th>
<th>European Union 2001/50/EC Directive</th>
<th>Turkey (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total dust</td>
<td>New plant 30 Old plant 50</td>
<td>Thermal input of fuel &gt;50 MW 100 (2)</td>
</tr>
<tr>
<td>2</td>
<td>SO₂</td>
<td>New plant 200 Old plant 400</td>
<td>Thermal input of fuel &gt;300 1000 (2)</td>
</tr>
<tr>
<td>3</td>
<td>NOₓ</td>
<td>New plant 200 Old plant 500</td>
<td>Thermal input of fuel &gt;50 MW 800 (2)</td>
</tr>
</tbody>
</table>
## The Emissions Released from LCPs And Their Impacts On Human Health(3)

- Emission Limit Values Released From Solid Fuel Firing Plants (RLCP) New Plant

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Thermal input of fuels</th>
<th>Emission limit values (mg/Nm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Toz</td>
</tr>
<tr>
<td>Solid fuel</td>
<td>50 MW ≤ thermal input of the fuel &lt;100 MW</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Thermal input of the fuel ≥100 MW</td>
<td>30</td>
</tr>
</tbody>
</table>
The Emissions Released from LCPs And Their Impacts On Human Health(4)

- Emission Limit Values Released From Solid Fuel Firing Plants (RLCP) Existing Plant

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Thermal input of the fuel</th>
<th>Emission limit values(\text{mg/Nm}^3)</th>
<th>Toz</th>
<th>(\text{SO}_2)</th>
<th>(\text{NO}_2) (NO ve (\text{NO}_2))</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid fuel</td>
<td>50 MW ≤ thermal input of the fuel &lt; 100MW</td>
<td></td>
<td>100</td>
<td>2000</td>
<td>600</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>100 MW ≤ thermal input of the fuel &lt; 500 MW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Emissions Released from LCPs
And Their Impacts On Human Health(4)

<table>
<thead>
<tr>
<th>Pollutant parameter</th>
<th>Main resource</th>
<th>Health impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulphure dioxide</td>
<td>Fossil fuel combustion</td>
<td>Respiratory diseases</td>
</tr>
<tr>
<td>Nitrogen oxides</td>
<td>Emissions released from vehicles, combustion processes at high temperatures</td>
<td>Eye and respiratory diseases, acid rain</td>
</tr>
<tr>
<td>Particulate matter</td>
<td>Industry, fuel combustion, agriculture and secondary chemical reactions</td>
<td>Increase in cancer cases, heart problems, respiratory diseases, infant mortality, rates</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>Incomplete combustion product, transport vehicles</td>
<td>Decrease in oxygen carrying capacity in blood when combined with the hemoglobin in blood and deaths.</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>Nitrogen oxides resulting from traffic and transformation of volatile organic compounds (VOC) under sunlight</td>
<td>Respiratory system problems, irritation in eyes and nose, asthma and decrease in body resistance</td>
</tr>
</tbody>
</table>
The Emissions Released from LCPs And Their Impacts on Human Health(5)

• Other parameters that may be found in gas or dust content released from large combustion plants;

• Arsenic: IARC Group 1, human carcinogen
  Benzene : IARC Group 1, human carcinogen
  Benzo-a-pyrene (PAH) : IARC Group 1, human carcinogen
The Emissions Released from LCP's And Their Impacts on Human Health(6)

- Cadmium: IARC Group 1, human carcinogen.
- Arsenic: IARC Group 1, human carcinogen.
- Nickel: Group 2B: agent; possibly human carcinogen.
- Mercury: IARC Group 3 Group 3: this agent is not classified as human carcinogen.

67/548/EEC Directive Annex-1, T; R23,R33,N; R50-53, (Toxic)
1278/2008 (EC) (CLP) Regulation Annex-1, Table 3.1
Acute Tox. 3 ,STOT RE 2 ,Aquatic Acute 1,AquaticChronic 1
H331, H373,H400,H410 (Toxic)
The Emissions Released from LCPs And Their Impacts on Human Health (6)

• Parameter Limits For Ambient Air Pollution

<table>
<thead>
<tr>
<th>Parameter</th>
<th>World Health Organization</th>
<th>European Union 2008/50/EC Directive</th>
<th>Turkey (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate matter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>20 μg/m$^3$ (Yearly)</td>
<td>50 μg/m$^3$ (daily, limit)</td>
<td>300 μg/m$^3$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(daily)</td>
</tr>
<tr>
<td>Particulate matter</td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>10 μg/m$^3$ (Yearly)</td>
<td>25 μg/m$^3$ (target, yearly)</td>
<td></td>
</tr>
<tr>
<td>SO$_2$</td>
<td></td>
<td>125 μg/m$^3$ (daily, average)</td>
<td>400 μg/m$^3$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(daily)</td>
</tr>
<tr>
<td>NO$_2$</td>
<td>40 μg/m$^3$ (yearly),</td>
<td>200 μg/m$^3$ (hourly)</td>
<td>NO$_2$ 200 μg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>200 μg/m$^3$ (hourly)</td>
<td></td>
<td>(hourly)</td>
</tr>
</tbody>
</table>
Assessment of large combustion plants during EIA (Environmental Impact Assessment) process

• In case the mass flows prescribed by Chart 2.1 of Annex 2 in the Regulation on the Control of Industrial Air Pollution, are exceeded by using the emission factors included in the legislation on pollutants released from LCPs, the report that is drafted using the distribution model as part of modelling works concerning impact areas of the plants, must be evaluated in order to understand whether concerned pollutants threat public health.
Assessment of large combustion plants during EIA (Environmental Impact Assessment) process(2)

- The total pollution load that will be caused by new plants and current levels of air pollution must be less than the Short-Term Limit Value.
The Methodology of Identifying Impacts Of Hazardous Chemicals on Human Health

- Identifying the hazard,
- Identifying the exposure
- Assessment of dose-respond,
- Risk characterization,

Risk = Toxicity x Exposure
Classification of health hazards

• **Chemical Hazards:** Posinous and irritating substances taken directly into human body. Gases, vapours, liquids, dusts and their mixtures.

• **Biological Hazards:** Microbiological hazards such as bacteria, viruses, fungi, insects, parasites, plants, animals.

• **Physical Hazards:** Heavy lifting, bad posture, fatigue, excessive force, pressure.
Hierarchy of Precautions against Risk of chemical exposure

- Elimination of hazards,
- Changing hazardous factors with less hazardous ones (substitution),
- Safety precautions in engineering (automation, isolation),
- Administrative precautions (working hours, workplace arrangements),
- Personal protective equipment,
Major ways that hazardous substances enter the body

- Inhalation,
- Skin contact,
- Digestion.
Toxicology

• A branch of science concerned with the study of adverse interactions among chemical, biological, physical factors and biological systems.

• World Health Organization explains the adverse effects of chemicals on human health as an assessment process aiming to identify the risks of chemical exposures in line with scientific principles.
Toxic effects appear due to the biochemical interaction among certain toxic substances, their metabolites and certain parts of the organism. Most of toxic responses occur in the form of cell death, organ injury and physiological imbalance.
Toxicology (3)

-Toxicokinetic

It determines how the toxic substances are taken into the body.

Toxicokinetic processes of a substance,

1. Absorption,
2. Distribution,
3. Metabolism (biotransformation),
4. Excretion.
The ways of interaction between two chemicals enter simultaneously into the body

Interaction of toxic chemicals;

• **Independent interaction:** Two chemicals entering simultaneously into the organism, may completely have different physiological effects.

• **Sinergic interaction:** Two or more chemicals may have a stronger effect together than individual reaction effect \((1+1=10)\) for instance cigarette and asbestos.

• **Potential interaction:** One chemical may have a stronger effect than the other when reacted by one toxic and one inactive substance \((1 + 0=5)\).

• **Antagonistic reverse interaction:** One chemical effect can be eliminated by another. For instance, antidote used in poisoning.
E-Classification of Chemicals in Turkey and EU

- Identification of hazards is the first step for risk assessment. Prior to this, hazardous chemicals must be classified.
- The Turkish Regulation on Classification, Packaging and Labeling of Dangerous Substances and Drugs (it will be repealed on 01.06.2016) published in the (repeated) Official Journal dated 26.11.2008, numbered 27082, was drafted in parallel to the EU Directive 67/548/EEC on Classification, Packaging and Labelling of Dangerous Substances. According to the I. Paragraph of the IV. Article of this Regulation: dangerous substances and drugs are defined as; “explosive, oxidising, flammable, highly flammable, extremely flammable, highly toxic, toxic, irritating, sensitizing, carcinogenic, mutagenic substances, toxic substances effecting reproductive system, environmentally hazardous substances and drugs”. 
Classification of Chemicals in Turkey and EU

- According to the Turkish Regulation published in the (1. repeated) Official Journal dated 11.12.2013, numbered 28848 was drafted in line with the EU Regulation (EC) 1278/2008 on Classification, Labeling and Packaging of Dangerous Substances, the term dangerous refers to the danger degree, classification or category of a certain substance or mixture under certain circumstances.
Classification of Chemicals in Turkey and EU(3)

- 16 physicochemical hazards
- 1. Explosives (Unstable explosives) Part 1.1, 1.2, 1.3, 1.4, 1.5, and 1.6) (ANFO, TNT -trinitrotoluen)
- 2. Flammable gases (Category 1 and 2) (Acetylene, Butane, Propane, Ethylene)
- 3. Flammable aerosols (Category 1 and 2) (Liquid or solid dispersed in gas; i.e. room deodorants)
- 4. Oxidising gases (Category 1) (hydrogene peroxide, perchloric acid, sodium potassium nitrate)
- 5. Gases under pressure (permanent gases, compressed and dissolved gases; i.e. Oxygen, nitrogen, hydrogen, argon; liquified gases; i.e. Carbon dioxide, propane, dissolved gases that can be dissolved in impregnated porous solvent in tubes; i.e. acetylene 6. Flammable liquids (Category 1, 2 and 3) (petrol)
Classification of Chemicals in Turkey and EU(4)

- 16 physicochemical hazards(2)
  - 7. Flammable solids (Category 1 ve 2) (nitrocellulose),
  - 8. Self-reactive substances and mixtures (Type A, B, C, D, E, F, and G) (acetylene),
  - 9. Pyrophoric liquids (Category 1),
  - Pyrophoric refers to flammable liquids at normal temperature.
  - 10. Pyrophoric solids (Category 1) white phosphor,
  - 11. Self-heating substances and mixtures (Category 1 and 2),
  - 12. Substances and mixtures releasing flammable gases when contacted with water (Category 1, 2 and 3) Calcium Carbide,
  - 13. Oxidising liquids (Category 1, 2 and 3),
  - 14. Oxidising solids (Category 1, 2 and 3),
  - 16. Corrosive to metals (Category 1),
Classification of Chemicals in Turkey and EU (5)

- 10 health hazards
  - 1- Acute toxicity, (Category 1, 2, 3 and 4),
  - 2- Skin corrosion/irritation (Category 1A, 1B, 1C and 2),
  - 3- Serious eye damage/eye irritation, (Category 1 and 2),
  - 4- Aspiration hazard or skin sensitization (Category 1),
  - 5- Germ cell mutagenity, (Category 1A, 1B and 2),
  - 6- Carcinogenity (Category 1A, 1B and 2) (known, proven, not proven),
  - 7- Reproductive toxicity (Category 1A, 1B and 2) and additional categories for reproductive toxicity effect on or via lactation,
  - 8- Specific target organ toxicity (STOT) – Single exposure (Category 1, 2) and for only narcotic effects and respiratory sensitization Category 3)
  - 9- Specific target organ toxicity (STOT)– repeated exposure (Category 1 and 2),
  - 10- Aspiration hazards (Category 1),
Classification of Chemicals in Turkey and EU(6)

- 1 additional hazardous chemical to ozone and 1 to the environment
  
  • 1-Hazardous chemical to aquatic environment (Acute Category 1, Chronic Category 1, 2, 3, and 4),
  
  • 2-Hazardous chemicals to the ozone layer,
Classification of Chemicals in Turkey and EU(7)

- According to the Turkish Bylaw on the Protection of Buildings from Fire published in the Official Journal dated 19.12.2007, numbered 26735, dangerous substances are classified in 9 groups:
  - Article 102- (1) dangerous substances are classified as follows:
  - a) Explosive substances,
  - b) Sparkler and explosive gases,
  - c) Flammable liquids,
  - ç) Flammable solids,
  - d) Oxidizing substances,
  - e) Poisonous and noisome substances,
  - f) Radioactive substances,
  - g) Etching substances,
  - ğ) Other dangerous substances,
The classification of substances shall currently be made as per the EU Directive 67/548/EEC and Regulation 1278/2008 (EC) until 01.06.2015. As of this date it shall be made as per the EU Regulation 1278/2008 (EC). Whereas the classification of mixtures shall currently be made as per the EU Directive 99/45/EEC and EU Regulation 1278/2008 (EC) until 01.06.2017. As of this date it shall be made as per the EU Regulation 1278/2008 (EC).
Classification of Chemicals in Turkey and EU (9)

- Classification of hazards as per CLP Regulation 1278/2008 (EC)
  - 27 hazard classes
    - 16 physical, 10 health, 1 environment and 1 Ozone
  - 84 hazard categories such as, flammable liquid, category 1, 2, 3 and 4
  - Carcinogenic, Category 1A, 1B and 2
- Hazard communication elements- Labelling
  - Hazard pictograms and relevant signal words.
CLASSIFICATION OF CARCINOGENS BY INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC)

International Agency for Research on Substances (IARC) is a member of World Health Organization (WHO). 464 chemicals were classified as carcinogen or potentially carcinogen.

• **Group 1**: Agents causing cancer in humans. Total number of agents 113, i.e., Aflatoxins (Cas No: 001402-68-2), Benzene (Cas No: 71-43-2)

• **Group 2**: Sufficient evidence exist for animals while there is lack of evidence for humans.
CLASSIFICATION OF CARCINOGENS BY INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) (2)

- **Group 2A**: Agents probably causing cancer in humans. Totaly 66, i.e., Acrylamide (Cas No: 79-06-1),
- **Group 2B**: Agents possibly causing cancer in humans. Totaly 285, i.e., Aflatoxin M1 (Cas No: 6795-23-9), Benzofurane (Cas No: 271-89-6),
- **Group 3**: Agents that cannot be classified as carcinogenic for humans. Totaly 505, i.e., Benzoyl peroxide (Cas No: 94-36-0),
- **Group 4**: Agents probably not causing cancer in humans. Totaly 1, Caprolactam (Cas No: 105-60-2),
THE DUTIES AND RESPONSIBILITIES OF THE MINISTRY OF HEALTH CONCERNING THE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH

According to the Article 56(1) in Turkish Constitution,

• Everybody has right to live in a healthy and ecologically balanced environment. It is the duty of both state and public to protect the environment and to prevent environmental pollution.
THE DUTIES AND RESPONSIBILITIES OF THE MINISTRY OF HEALTH CONCERNING THE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH (2)

Decree Law on Organization and Duties of the Ministry of Health numbered 663

Public Health Agency of Turkey:

• Article 26 (a): To protect and develop public health; to overcome agents risky for health
THE DUTIES AND RESPONSIBILITIES OF THE MINISTRY OF HEALTH CONCERNING THE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH (3)

Article 26 (e): organizing significant actions for developing an early warning system, taking the necessary precautions to protect public health and imposing sanctions when needed.
THE DUTIES AND RESPONSIBILITIES OF THE MINISTRY OF HEALTH CONCERNING THE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH (4)

Directorate General of Emergency Health Services, Article 9;

• f) Organizing significant actions in order to plan and response to chemical and biological health hazards.
Provisions of the Turkish Criminal Code numbered G-5237 related with Environmental Pollution

Intentional Environment Pollution

• **Article 181**- (1) the persons who intentionally pollute the environment and dispose wastes in soil, water and air resulting in unlawful harm to the environment shall be punished with a prison sentence from six months to two years.

• (2) The persons who smuggle wastes or residues shall be punished with prison sentence from one year to three years.

• (3) If the disposed wastes and residues mentioned in the 1st and 2nd paragraphs remain in soil, water or air, above mentioned punishment will be given as double.
Provisions of the Turkish Criminal Code numbered G-5237 related with Environmental Pollution (2)

• (4) If the actions mentioned in the 1st and 2nd paragraphs cause irreversible and mutagenic health damages, reproductive health related diseases in humans, animals and plants, the persons who commit these actions shall be punished with prison sentence at least for five years along with a fine for maximum thousand days.

• (5) If the actions mentioned in 2nd, 3rd and 4th paragraphs of this Article are committed by legal persons, these persons shall be punished in line with the special security measures.
Provisions of the Turkish Criminal Code numbered G-5237 related with Environmental Pollution

Unintended (reckless) Environmental Pollution

• **Article 182-** (1) The persons who recklessly cause disposal of wastes and residues in soil, water or air by harming the environment, shall be punished with fine. If the disposed wastes or residues cause irreversible impacts on soil, water or air, these persons shall be punished with prison sentence from two months to one year.

• 2) If the actions mentioned above cause irreversible and mutagenic health damages, reproductive health related diseases in humans, animals and plants, the persons who commit these actions shall be punished with prison sentence from one year to five years.
H-Conclusions and Suggestions

- Best compliance with the Ambient Air Quality Standards of the EU and WHO in order to protect environmental and human health at maximum levels;
- Transposition of the EU limit value for Particulate Matter PM$_{2.5}$ into our national legislation;
- Using process options in compliance with the Ambient Air Quality Standards and BATs of IPPC in combustion plants.
Conclusions and Suggestions(2)

- Applying Cleaner Production methods and technologies which produce less waste by consuming minimum amounts of raw materials and energy,
- Applying cost effective and technically proper materials and technologies to remove process related solid, liquid and gaseous wastes,
- Placing health protection strips at a proper distance around combustion plants,
- Taking necessary precautions to protect drinking water against wastes produced by combustion plants.
Thank you for your attention!
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