

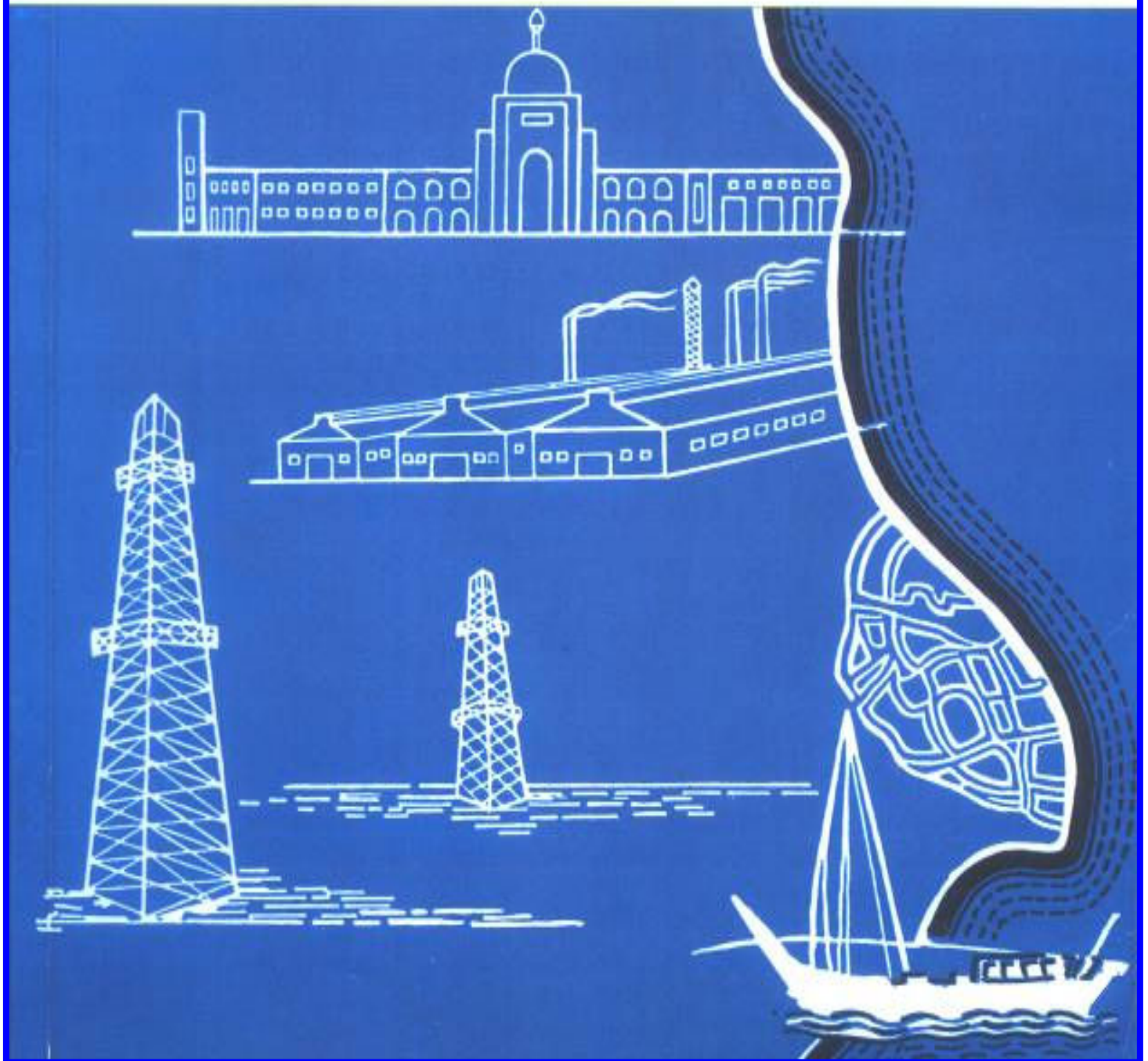


ENVIRONMENT PUBLIC AUTHORITY



State of Kuwait

**Regulations Implemented Under Law No. 21 of  
1995 as Amended by Law No. 16 of 1996  
Regarding Environmental Requirements and  
Standards in the State of Kuwait**



**Regulations Implemented Under Law No.  
21 of 1995 as Amended by Law No. 16 of  
1996 Regarding Environmental  
Requirements and Standards in the State of  
Kuwait**

**Environmental Public Authority  
Kuwait**

**October 2001**

# The Right to Know

ECO-Environmental Consultants mission statement is:  
**Caring for the environment, peoples' health and safety**

&

Our commitment to our customers is:  
**Outstanding quality, professional work and confidentiality**

&

Our commitment to our society is done through:  
**Social responsibility**

We took the responsibility to type all the Kuwait Environment Public Authority (EPA) new environmental standards released in October, 2001. This important document and its contents need to be known by the private and other government sectors and also by environmental professionals. This is a very important order to increase and widen the knowledge of knowing and the consequences of not implementing the new standards and related regulations.

We are working in order to achieve local and international environmental sustainability.

**ECO-Environmental Consultants, General Manager**

**Dr. Ali Muhammad Khuraibet**

Working towards achieving environmental sustainability

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**ENVIRONMENT PUBLIC AUTHORITY**  
**Decision No. 210/2001**  
**Pertaining to the Executive By-Law of the**  
**Law of Environment Public Authority**

**Chairman,  
Director General of Environment Public Authority,**

Having reviewed law No. 21/1995 concerning the establishment of the Environmental Public Authority as amended by law No. 16/1996.

- The decision of Environment Supreme Council No. 1/1997 issued for the constitution of the Authority's Board,
- Reports of the technical committees formed of specialized cadre at the Authority, and all the concerned state bodies for preparing the by-law,
- Following the approval of the Board of Directors at its meeting Bo. (5) held on May 7, 2001 on the by-law,

**It has been decided**

**ARTICLE ONE**

The executive by-law of law No. 21/1995 regarding the establishment of the Environment Public Authority amended by Law No.16/1996 attached herewith.

**ARTICLE TWO**

The decision shall be published in the Official Gazette and shall be effective after one year from the date of its publication. Any text that may contravene the provisions of the said decision shall be abrogated.

**Dr. Mohammed Abdul Rahman Al Sar'awi  
Chairman and Director General**

Issued on Rajab 5, 1422 AH  
Corresponding to September 22, 2001 AD

**By-Law of**  
**By-Law No. 21/1995, Amended by Law No. 16/1996**  
**Concerning the Establishment of the Environment Public Authority**  
**(Environment Requirements and Standards in the State of Kuwait)**

**CHAPTER I**

**Development and Environment**  
**The Environment Impact of the Development Projects**

**ARTICLE (1)**

The following terms-used in the implementation of this chapter's provisions – shall have the meanings as explained against each one of them:

- **The Project:** The plan for the performing of any one of the activities specified in the Appendix No. (1) of this by-law.
- **Studies of the environmental impact:** These are comprehensive scientific studies for assessing the effects of developmental projects and activities on the environment. These studies would determine the expected effects and forecast, measure and explain them, and finding methods of controlling them in order to confine their negative impacts during the various stages of the project.
- **The initial report:** it is a report to be submitted to the Authority in its primary form. Such a report include complete technical description of the project and the environment and demonstrate the type of the anticipated effects and their evaluation methods and results, the proposed measures to reduce their impacts over the different stages of the project as well as the applicable environmental monitoring ways.
- **The final report:** It includes environmental impact study in its final form. Such a report shall be submitted to the Authority for consideration to obtain environmental approval prior to execution. This report shall be more comprehensive than the first one and contain the amendments, which are required from the license to carry out.

**ARTICLE (2)**

All governmental, joint, private parties and others should carry out studies of the environmental impacts of their projects prior to execution them on when introducing modifications or expansion to the existing projects.

Concerned authorities which are entitled to grant licenses for the establishment of any project or introducing modifications or expansions to the existing projects, and also the

responsible parties for organizing and planning, of land use, should oblige the license to carry out environmental impact studies of these projects in accordance with the Article (4) of this by-law, and to be presented to the Authority for approval.

### **ARTICLE (3)**

The Environment Public Authority in collaboration and coordination with concerned state bodies to find an appropriate mechanism for speedy consideration of the license applications related to the environmental outcome, response to queries of the license applicants, prepares reclassification for environment experts and consultants, and provide the necessary forms, questionnaires and records

The Authority shall permanently review the projects listed in the Appendix No. (1) of the by-law, including upgrading them by adding some projects when necessary by a decision of the Authority. Such revision will be performed in accordance with the rules of the Authority, concerning whether they have negative effect on the environment or not, and in the light of the applied scientific criteria and the world industrial development.

The studies of the environmental impact of the projects will deal with the direct or indirect outcome that would led to environment pollution, natural imbalance, impact on public hygiene, or how they may have effect on life, enjoyment, private or public properties, natural biological and non-biological resources in permanent way, and how they may have effects on historical, cultural, natural territories and the game parks.

### **ARTICLE (4)**

All parties referred to hereinabove shall abide by the regulations and requirements specified by the Authority when proceeding with environmental impacts study. They have to submit an initial report to the Authority to study and to give its opinion. Such reports include the following details:

1. Complete technical description of the specified project, or the modification or expansions which are proposed to be introduced to an existing project, together with the necessary engineering plans, type of technology, equipments means and materials which would be used in the building or the expansion.
2. Statement of the economic and social feasibility of the suggested project.
3. Comprehensive description of the environmental project and the surrounding areas, which may be affected by the project execution, or introduction of modification or expansion to an existing project.
4. A comprehensive statement on the expected impacts on environment as a result of the proposed project execution.
5. Evaluation of negative, positive, accumulative and non-accumulative, direct and indirect impacts on the short-term and long-term stages, on the environment during the various phases of the project execution (as from the preparation stage, execution, operation, maintenance, accomplishment till after the expected age of the project or cancellation thereof), as well as the scientific illustration applied in assessment of these effects.

6. An overall statement of the steps that should be brought about in order to restrain or reduce the negative effects of the project on environment, which may be exposed to harm on the short and long run.
7. Commitment of applying continuous protection measures after project accomplishment, with necessary monitor and control systems that must to be followed.

The Authority should respond to these parties within 60 days from the date of collecting the detailed information specified hereinabove.

All license, applicant parties should after obtaining the Authority's approval on the initial report coordinate with the Authority and stipulate the time needed for submitting the final report including the environmental impact of the proposed project. The Authority has to study the final report and will give its opinion within 60 days from the submission date thereof.

#### **ARTICLE (5)**

The Authority shall have the right to ask information, statements, documents or carrying out additional studies related to the environmental impacts on the suggested project prior to presenting the final report about their studies by the project owner.

### **CHAPTER II**

#### **The work environment and the Indoor environment**

#### **ARTICLE (6)**

All industrial facilities should each according to its type of activity meet all the engineering and environmental requirements specified in Appendix No. (2) of this By-law.

#### **ARTICLE (7)**

All facilities shall provide suitable healthy atmosphere to their workers, while performing their duties and protect them against any emission or leakage of air pollutants. For implementing safely and healthy vocational conditions including the appropriate choice of machinery, equipment, materials and fuel, provided that workers exposure shall not exceed that following limits:

1. Maximum limits of occupational exposure to chemicals at work atmosphere should be as per the tables illustrated in Appendix No. (3-1) of this law.
2. Maximum limits of biological effects due to the occupational exposure to chemicals must be as per the tables illustrated in Appendix No. (3-2) of this by-law.

For ensuring the air quality, and avoiding any impact of the dangerous chemicals at the indoor environment, the instructions guide listed in the tables illustrated in Appendix No. (3-3) of this by-law should be followed.

### **ARTICLE (8)**

All facilities and individuals while proceeding production or service or other activities – have to protect their workers against noise within the following maximum limits:

1. The maximum permitted level of noise in an industrial environment within limited time, should be within limited as specified in Appendix No. (4 – 1) if this by-law.
2. The maximum permitted level of noise inside the industrial facilities measured by (dBA), should be as stipulated in Appendix No. (4 – 2).
3. The maximum permitted level of noise at an indoor non- industrial environment whatever its source should be as specified in Appendix No. (4 – 3) of this by-law.

### **ARTICLE (9)**

All facilities undertake to protect their workers against ultra-sonic waves at an industrial environment. Such limits are specified in Appendix No. (5) of this by-law.

### **ARTICLE (10)**

1. All facilities should take all necessary procedures to maintain temperature and humidity degrees inside workplace within the maximum limits listed in Appendix No. (6-1) of this by-law. In case of work necessity under higher degrees the facilities should provide the workers with appropriate protection means, such as special wears and the like.
2. All facilities should maintain temperature and humidity degrees inside mental works place within the extremes specified in Appendix No. (6-2) of this by-law.
3. At low temperature work condition, all suitable safety occupational procedures should be taken such as respiratory device for warning the inhaled air, and wearing the protective wears that maintain body temperature within the extremes mentioned in Appendix No. (6-3) of this by-law.
4. In order to ensure suitable temperature at the indoor environment, the limits of temperature listed in Appendix No. (6-3) of this by-law must be followed.
5. Public closed and semi-closed places should have adequate ventilation means that suit the place's capacity, volume and type of activity practiced therein in a way that secure air changing, cleanness and suitable temperature. All that shall be guided by air flow rations mentioned in Appendix No. (6-5) of this by-law.

### **ARTICLE (11)**

All facilities should provide suitable lightening not less than the limits stipulated in Appendix No. (7) of this by-law.

## **ARTICLE (12)**

All facilities should take all the necessary precautions to protect workers against high vibration degrees at all works venues. They shall abide by the limits of hands vibration at the axes (x, y, z) mentioned in Appendix No. (8) of this by-law.

## **ARTICLE (13)**

All facilities should abide with the following levels and rates of in-active radiation exposure:

### **A- Levels of Exposure to Ultraviolet Ray:**

1. Ultra-violet ray intensity within a spectrum field of (320-400 Nanometer) dropping on naked eye should not exceed (1 mm/cm<sup>2</sup>) for more than 16 minutes, and shall not exceed (1 joude/cm<sup>2</sup>) if exposure time is less than 16 minutes)
2. In cases of skin and eyes exposure to ultra-violet ray at all spectrum fields ranging between (180-400) Nanometer, the limits listed in Appendix No. (9-1) of this by-law must be applied.

### **B- Exposure to Electro-Magnetic Fields (E.M.F):**

Occupational exposure to electro-magnetic fields shall be guided by the two frequencies 50/  
60 Hertz in the values shown in Appendix No. (9-2) of this by-law.

### **C- Exposure to Laser Rays:**

1. Occupational selected exposure to some common laser rays must be within the extremes stipulated in Appendix No. (9-3) of this by-law.
2. Eyes direct exposure to laser band (looking inside the band) must be within the exposure limits specified in Appendix No. (9 -4 ) of this by-law.
3. Eye exposure to laser ray of expanded source (non-point) shall be in the limits mentioned in Appendix No. (9-5) of this by-law.
4. Skin exposure to laser should be within the limits stipulated in Appendix No. (9-6) of this by-law.

## **CHAPTER III**

### **Chemical Resources Management**

#### **The environment criteria for chemical substances production, safety, transport, storage, import and export from and to the State of Kuwait, and the customs transit through its territories**

##### **ARTICLE (14)**

All parties which produce, fill, handle, transport, import, export and deal with customs transit of chemicals should abide by the environmental conditions and criteria stipulated herein, and comply with the classification of dangerous chemicals mentioned in Appendix No. (10-1) of this by-law. Ministry of Health, Interior and Defense are exempted from this, and also any party who would be permitted by the Environment Public Authority.

##### **ARTICLE (15)**

Any party who would produce, import or export chemicals must obtain a license from the concerned authorities after taking consent of the Environment Public Authority.

The licensing Authority may cancel or cease the activity (in case it was proved that the product is environmentally or healthy harmful). Or, it may permit the above if there was a possibility of producing an item with developed modification, which may improve environment or maintain it. In all cases the Authority's approval must be obtained prior to marketing or importing any product.

##### **ARTICLE (16)**

The parties who produce, export and import chemicals should maintain a record numbered and sealed by Environment Public Authority containing the following information:

1. Type and quantity of the raw materials used in production.
2. Type and quality of the chemical product.
3. Any other details specified by the Environment Public Authority.

##### **ARTICLE (17)**

Parties who produce, import and export chemical materials should comply with the following requirements:

##### **(i) Conditions of the refills**

1. The refill should be of good quality from inside that suit the substance inside it, and may not be affected by acids, alkaline and solutions. The refill must be

painted with a substance resistant to rust, erosion, and reaction. It should be tightly closed, not to be fragile and can bear all transport circulation, vibration and thermal changes circumstances.

2. The volume of the refill must be suitable to contain all signs, information, pictures, drawings, and symbols internationally recognized and which show dangers toxicity of these substances, how they can be opened emptied, used or disposed thereof. All these details must be placed clearly on the refill, and details cannot be removed or modified according to the instructions listed in the Appendix Nos. (10-2, 10-3) attached with this by-law. They should be written in Arabic language, and should contain the following data, in particular :
  - a. Name of the manufacturing company, production and expiry dates, operation and registration numbers.
  - b. Refill content, chemical and trade names, activity substance, total and net weights, concentration degree, type of danger and toxicity.
  - c. Steps to be taken at emergency cases that may cause harm to environment and public hygiene.
  - d. The appropriate storage.

### **(ii) Requirements of handling**

1. While handling the chemicals, smoking having meals or drinking shall be strictly prohibited, by abiding the information and details mentioned on the refill, and the work venue should be clean, with adequate ventilation systems during handling operations. Also, suitable fire fighting devices should be available and emergency plan must be already prepared in order to face any unexpected accidents may happened while handling, well trained workers should deal with such substances. They should wear and use protective wears and equipment during handling works.
2. Mechanical and electrical equipment should be used while upon handling the chemicals. Each device must be employed for its designated purpose, and should be fit and well-maintained and suit the specified loads. Handling routes must be free from any obstacle that may hinder the movement of these equipments or its capacity during handling operation.
3. Worker should not move more than his physical ability of chemical upon manual handling. All pathways must be free from obstacles. Suitable light contains should be used. Preferably sledges or fitted stairs may be used during loading and unloading works.

### **(iii) Transport requirements**

The carriers should be well aware of the perils of chemicals when transporting them by land, sea or air. He should take all safety precautions. These substances must hold the internationally approved signs and symbols, and should be filled in refills the conditions stipulated in this article. The carrier and his representatives must keep the shipment documents.

#### **(iv) Requirements for the import and export of chemicals**

1. The following details should be submitted to the Environment Public Authority in order to import of chemicals :
  - a. List of ingredients.
  - b. Serial number of the substance.
  - c. Health and environmental impacts.
  - d. Purpose, the importing or the exporting party.
  - e. Precautions that should be applied upon emergency cases.
  - f. Chemical and physical specifications.
  - g. Product classification number or the customs statistical number according to the organizing system.
  - h. Ideal method of substances discharge or their containers.
2. The importing and exporting parties of chemicals should abide by the provisions of prior approval agreement (PIC) and other international agreements effective in the State of Kuwait.

#### **ARTICLE (18)**

For construction of warehouse for hazardous chemical substances, the following requirements should be applied:

#### **(i) Obtaining a license for warehouse construction in accordance with the following measures**

1. Obtaining the approval from the officials of the concerned authorities including the Environment Public Authority.
2. Submitting an application to the Environment Public Authority in order to obtaining a license for commencing the constructional works, attached with it an engineering drawing of the site, complete description of the materials to be stored, capacity of refills and their dangers, as well as the stipulated rules in storing thereof. The license shall not be granted except after performing final inspection by the concerned authorities.

#### **(ii) Requirements of warehouse site and specifications**

1. The building should be single floor only (ground floor, separated or isolated from other activates with fire resistant walls), storing in the basement is prohibited.
2. The site should be provided with adequate water sources for fire fighting purposes
3. Free access for fire engines and emergency equipment void of obstacles or water spots should be available.

4. The warehouse must be an independent building, designed in a way that prevent fire danger, pouring or injuries. The structure should suit the nature of substances to be stored, and shall be fire resistant for not less than two hours.
5. The warehouse ground should be smooth unslippy free from cracks with special canals that assemble leakage of extinguishing polluted water.
6. Finishing and joints between walls, ceilings and grounds must be tightly closed
7. Providing the suitable ventilation through the following means:
  - a. Providing one of the warehouse's walls with air holes and on the opposite walls holes for drawing air. Such holes should be 300 mm from ground level. Holes of air entry and exit should be far from each other as possible.
  - b. Furnishing the warehouse with mechanical ventilation system that permits air change with a rate not less than one cubic meter per minute for each  $3\text{m}^2$  of the ground area, provided that would not be less than  $4\text{m}^3$
8. Refraining from releasing leaked and poured materials to the public sewage network expect after taking the suitable steps such as the used of the traps, sorters or basins in order to neutralize the substances action, or the use of effective treatment units. When storing large quantities of perilous substances, an emergency drainage system should be prepared that contain the leakage substances and the polluted water.
9. Providing many emergencies exists easily opened in the dark and heavy smoke, be opened to the outside, and free from containers prepared fir transport.
10. All electrical equipment connections should be inside in the ground the warehouse. The electrical circuits must be provided with ground leakage circuit fuse, as well as protective devices against overload. Also, the electrical extensions must be spark resistant according to the type of the stored substances.
11. Providing 10 cm high thresholds at the entrance to hold leaked substances back.
12. The warehouse should be furnished with a plan that shows the nature of the stored dangerous substances at every corner of the stored substances with their hazardous specifications. Also, locations, of emergency equipment, pathways and fire fighting means should be specified. Such a plan should be weekly updated and be kept at a place far from the storage location.
13. To be away from neighboring building in a distance that must be specified according to the kind and danger of stored chemicals according to the following schedule:

**A schedule which shows the range of dangerous materials separation in accordance with UN Classification System and the requirement that must be observed**

Category	1-2	1-2	2-2	2-3	1-3	1-4	2-4	3-4	1-5	2-5	1-6	8
1-1		C	C	C	C	C	C	C	C	C	C	C
1-2	C			C	B	B	C	B	C	C	B	B
2-2	C			C	A	A	B	A	A	B	A	A
2-3	C	C	C		C	C	C	C	C	C	C	C
1-3	C	B	A	C		B	B	B	C	C	B	A
1-4	C	B	A	C	B		B	B	C	C	B	A
2-4	C	C	B	C	B	B		B	C	C	B	A
3-4	C	B	A	C	B	B	B		C	C	B	B
1-5	C	C	A	C	C	C	C	C		B	B	B
2-5	C	C	B	C	C	C	C	C	B		C	B
1-6	C	B	A	C	B	B	B	B	B	C		A
8	C	B	A	C	A	A	A	B	B	B	A	

**Remarks:** separation distance between two different categories of dangerous materials is determined by using the symbol found in the point of decussating between the vertical line representing the first category and the horizontal line representing the other category:

- a. Separation distance must be at least 3 meters.
- b. Separation distance must be at least 5 meters.
- c. Storing it in the same room or space is prohibited. The Minimum separation distance among storage areas must be 10 meters.

**(i) Storage conditions**

1. Packages must be organized so as to be always stable and balanced. The height of lined up packages must not exceed 3 m., unless shelves system was used.
2. Material must be lined up in a way that does not hinder the fork cranes and handling or emergency equipment.
3. Dangerous materials must be separated in accordance with International Classification System, and requirements provided in the schedule mentioned in this article, secondly, item (13).
4. All spoiled packages must be got rid of in a correct way. Further the cleanness of the area must be continuously preserved by removing cardboards, wood and packaging materials. Dust leakage into storage packages must be prohibited.

5. In the industrial establishments chemicals, when stored, must be stored in stores, which have separation distances of three metres away from production utility of flammable materials or any other fire source.
6. Processes in store must be accurately supervised by a well trained expert supervisor.
7. Flammable materials stacks must not be stored beside the building main pillars, which are not proof.
8. Smoking, drinking and eating must be prohibited in places where dangerous materials are stored or handled.
9. Workers must not enter the stores unless after wearing protective clothing which suits existing chemical dangers. The same include suitable breathing sets in case of necessity
10. Equipment must be maintained for influx suitable qualities of materials used in purification and pollution removal must be provided.
11. Record that reports the following must be kept:  
Stored materials. Quantity, Quality, purpose of use and date of supply and the quantity of discharged materials as well as wastes elements systems.
12. Dangerous materials must be kept away from anywhere frequented by public according to the requirements provided in the following schedule.

**A schedule showing the range of dangerous Materials separation from anywhere frequented by the public**

Category	Minimum space (meter)
1	50
2-1	5
2-2	5
2-3	15
3-1	10
4 – 1 to 3-4	5
5-1 to 5-2	5
6-1 to 6-3	5
7	Depending on activity level
8	5

## **CHAPTER IV**

### **Management of Household, Hazardous, Health and Sludge Wastes**

#### **First: Management of Household and Hazardous Wastes**

##### **ARTICLE (19)**

The following expressions shall have the meaning as explained against respective terms:

**Household wastes:** Means any wastes resulting from the household use (Houses include hotels and entertainment utilities) as long no hazardous waste are included therein.

**Hazardous wastes:** Means any waste posing potential direct hazards to man or animal's health or the environment in general, resulting from industrial, commercial and agricultural activities and from the household wastes, which are identifiable by any of the disciplines stated in appendix (11-1) and classified in appendix (11-2) hereof and, thus, required carrying out the toxicity tests, analyzing the waste filtrate to check the permissible limits stated in appendix (11-3) hereof.

**Treatment:** Is any method or technique used to change the physical, chemical, biological properties of the wastes, handle the wastes, makes use of the materials or energy therein, change the hazardous wastes to non or less hazardous wastes for safer transportation, storage or disposal thereof.

**Disposal dump:** Means or utility used to dispose of wastes in environment friendly methods such as storing, treatment, or the due disposal of hazardous wastes.

**Generator:** Means any such person who generates or becomes the main cause for the production thereof or who possesses the same.

**Identification Number:** It is the number specified by the Environment Public Authority for each product, transporter or storage, treatment or disposal utility or hazardous wastes.

**Incinerator:** Any such closed set used to incinerate by controlled flames in order to destroy wastes, provided the main aim of the incineration process is not to make use heat energy as boilers, or minimize or restore the resulting materials. Such as the industrial furnaces.

**Backfilling (Dumping):** Means wastes disposal by use of an engineering method, digging the wastes in or over the ground, provided it is not ground storage dump or treatment utility.

**Transporter (Carrier):** is the person licensed to transport wastes.

## **ARTICLE (20)**

Selection of household waste dump shall consider the following requirements:

1. The dumpsite shall be least five kilometers away from residential areas and be selected upon well-known scientific basics, which consider the geological and hydrological properties as well as the climatic factors and the various human activities.
2. The dumping site shall be far from such areas of economic value; agricultural and mineral or unique material environments areas such as protectorates or plant life, pastures, rain water catchments or course.
3. The site shall be in a dry and hot weather places in which evaporation rates exceed rainfall rates. The common wind direction shall be away from residential blocks or streets.
4. The space between filling up site and the nearest subterranean water borehole in the region shall be minimum 2 km. the location shall be in a direction opposite to that of the region subterranean water stream.
5. The site shall be place and free of ups and downs. The soil shall be argillaceous and not sandy. Soil permeability must not exceed  $10^{-7}$  cm/second. The area must be fire of any earth cracks or any other various natural phenomena. In addition, the site must be close to water source and soil strata used in daily coverage.

## **ARTICLE (21)**

Backfilling site design shall have the following conditions:

1. The site must be specified and connected to specified and paved ways that are connected with the main road. Traffic and guidance signs that determine the entry and the way out of the area.
2. The site shall be enclosed with an iron fence in minimum height of 2 meters. The same must be provided with a main gate for car entry, with a carload scale to weight every car entering into the location.
3. The backfilling hole volume in the site regarding height, width and depth, shall be sufficient for minimum 15 years use. The hole walls shall be sloping to insure that it will not collapse some compressed materials that fix the walls shall be used. The height between the bottom of the hole subterranean water shall be minimum 10 m.
4. The site shall be designed in accordance with engineering and environmental requirements. Followed in preparing wastes backfilling locations. These include the following :

- a) Site backfilling holes must be padded with ingenerating covering or insulating layer of natural soil such as compressed soil strata. Thereof permeability must not exceed  $10^{-7}$  cm/sec.
- b) The site shall be provided with accumulating and bypassing systems of gases resulting from bacterial dissolution.
- c) The site shall be provided with a system for bypassing water accumulated in the bottom of backfilling holes.
- d) The site shall be provided with surface drainage system to direct rain and floodwater away from the site.
- f) The site shall be provided with a sewerage system. The same shall be consisted of a layer of pebbles directly under the surface layer. Therefore, thickness must be minimum 30 cm. and thereof. Permeability must be minimum  $10^{-7}$  cm/sec. hereof shall be a plastic pipe network, which contains holes and ends in catchments.
- g) Monitoring points around the site shall be installed to watch the leakage and spread of gases generated in wastes back filling sites. In addition wastes must be dug in order to insure subterranean water validity.
- h) The site shall be provided with a station for washing car tires after discharging its load and before leaving the site.

### **ARTICLE (22)**

On operating the site the following shall be observed:

1. Separating materials apt to biotic dissolution from other wastes and not to bury them in the backfilling site.
2. The site shall be operated in a way that forms no danger on the citizens or workmen's health, besides following a method that depends on heavy machines. They shall be separated with layers of isolating material such as sand or Gutch (low penetration materials)
3. Material shall be buried in cells separated by a layer of medium size stones which has a vertical pipe with side holes penetrating it to facilitate gas escape. The same shall be connected to the generated gas bypass system.
4. Prohibiting any use of the site for house wastes burial to get rid of any kind of dangerous wastes, bury any kind of wastes, or to follow a random burning method in the site under any circumstances. Moreover, he must continually struggle the spread of insect, rodents and lost animals at the site in cooperation with the concerned authorities.
5. The burial site shall be covered after daily burial with a soil layer, the thickness of which must not be less than 25 cm. and permeability of which must be not less than  $10^{-7}$  cm/second). It shall be showered with water to fix it along with rolling it with equipment available at the site.
6. The dumping site shall be covered after the end of the period determined for its use with a soil layer, the thickness of which shall not be less than 60 cm. and the

penetration of which shall be not more than  $(10^{-7}$  cm/second). The cover final sliding degree shall be between (6-10 degrees) to bypass rainwater to sanitary drainage system in order to prohibit the wearing away of the site surface layer if not planted.

7. The special information form shown in Appendix No. (11-3) of this regulation shall be kept.

### **ARTICLE (23)**

All precautions and means necessary for the safety and health of site workers shall be provided in the dumping site in accordance with what is stipulated in laws and regulations in effect.

### **ARTICLE (24)**

A license from competent authorities shall be obtained in order to collect and transfer wastes. This license shall be issued after confirming that all conditions of such wastes transfer safely are available in a way that does not affect public health, environment or natural sources.

### **ARTICLE (25)**

Importing or exporting of dangerous wastes or permitting its entry or passings is prohibited in the State of Kuwait. An except thereof is exporting dangerous wastes which the country does not have the technical ability, required facilities, means or ports suitable for getting rid of it in an environmentally safe way, provided that a written approval from importing authority should be issued as well as the approval of Environment Public Authority board.

### **ARTICLE (26)**

The generator (source) of any of the dangerous wastes provided in the two Appendixes (11-1), (11-2) of this regulation shall obtain their identification number from Environment Public Authority.

The generator should comply with the following stipulations:

1. These wastes production rate shall be reduced in quantity and quality by developing the used technology; followings clean technology and choosing alternatives of the product or raw materials that is less dangerous on environment and public health.
2. Wastes shall not be transferred outside the site unless after the approval of Environment Public Authority. Temporary storage in an environment friendly way shall be observed. Any authority that produces dangerous wastes due to its activity must not deal with any waste carriers or storage, treatment or elimination sites, which do not have identification number from environment public authority; and necessary licenses from concerned authorities.

3. Wastes shall be transferred to special sites determined by concerned authorities in the state.

### **ARTICLE (27)**

In selecting the dangerous wastes disposal site following stipulation must be observed:

1. The site shall be remote from residential areas in a sufficient distance. It shall be managed in a way that creates not danger on citizens or workmen's health. The site shall be provided with good streets and public services such as electricity and water. In addition it shall be near the dangerous wastes generation areas. Materials of daily filling up and covering, such as soil strata .... etc. shall be available near to the site. The site expiry date shall be 20 years minimum.
2. The distance between the dangerous wastes disposal sites and the nearest subterranean water borehole shall not be less than 2 km. the area shall be free from any agricultural activities and shall not be of unique nature that makes it suitable for human usage, such as if it contains some rare or perishing animals and plants. The filling up site shall be flat and free of any ups and downs. The soil shall be argillaceous and not sandy. Soil penetration must not exceed  $10^{-7}$  cm/second. The area must be free of any earth cracks and remote from earthquakes, flowages and floods areas. The length between bottom of the hole and subterranean water must not be less than 10 meters.
3. It is necessary to install some monitoring points around the site to watch gas leakage probability in a horizontal way. It is also necessary to install a watching system on the generated gases, as well as to dig some wastes and prepare monthly report to results to be submitted to the competent authorities.

### **ARTICLE (28)**

In designing dangerous wastes disposal site the following points must be observed:

1. A network of streets shall be provided to facilitate transportation and circulation of wastes inside and outside the site.
2. The burial whole volume in the site, as for length, width and depth shall be sufficient to be used for 20 years maximum. The whole walls shall be side sloping from (1-3) and fixed to ensure it will not collapse.
3. The hole walls and bottom shall be covered with a coating resistant to liquid leakage into subterranean water, bacteria, heat and sudden cracks. The coating material thickness and quality must be according to the nature of wastes that are filled with subterranean water depth.
4. The site shall be provided with drainage system to divert rain and flood water away from the site. Subsystem shall consist of a layer of pebbles put directly under the surface layer and its thickness must not be less than 30 cm. and its

penetration must not be less than  $10^{-3}$  cm/second). There shall be a plastic pipes network, which contains holes and ends in a catchment.

5. The site shall be provided with a drainage system to bypass accumulated water in the bottom of backfilling hole. Therefore, the site ground must be sloping and provided with plastic pipes with side holes that transfers filtered liquids into a special hole where such liquids are bypassed and treated if the filtering materials concentration exceeded the limits allowed in Appendix (11-3). Then they are disposed after being treated in a secure way, in condition that the system shall contain one or two layers.
6. The site shall be provided with an incinerator to get rid of wastes to be burnt, and provided different planets special for treatment of semi solid wastes such as oil sludge and some chemicals before burning them, so as to remove water and oil from them.

### **ARTICLE (29)**

The owner or user of the dangerous wastes disposal site shall comply to the following:

1. To obtain a license from concerned authorities after the consent of environment public authority. This shall be before constructing and operating dangerous wastes disposal site and the site shall follow the ways of disposal provided in Appendix No. (11-5) of this regulation.
2. To verify, on receiving hazardous wastes, that their identification number, certified transfer document and security data form of the freight are available. Each waste freight shall be checked before receiving it to ensure that it conforms to stipulations provided in transfer document attached.
3. The site shall be operated in a way that creates no danger on the residents and workers health. The owner or the user shall not follow random burial method and to follow waste separation and he shall not use the site to bury house garbage or random burning it under any circumstances. In addition he shall check the spread of insects, rodents and lost animals in cooperation with concerned authorities.
4. He shall take all necessary precautions in transportation and circulation of barrels at the site to avoid leakage of its contents. It important to treat dangerous wastes such acids and alkalis before burial and to separate liquid dangerous wastes from other liquids in burial, as well as to define special places to bury liquid wastes and other to bury solid wastes.
5. Wastes transportation and burial data form provided in the appendix No. (11-6) of this stipulation shall be filled. The data of this form shall be written down in a record special for the site.

6. It is necessary to provide suitable means and equipment to maintain security and health of site workers and to train them on suitable work methods as well as to put an emergency plan to face risks if it's necessary.
7. He shall maintain a special record that includes the following data:
  - a) A description of each dangerous waste group delivered and its quantity, quality as well as method and date of its storage, treatment or disposal, besides the place and quality of each dangerous waste at the site.
  - b) Search results and periodical supervision reports data of air quality, subterranean water and cases of emergency.
  - c) Copies of waste transportation documents and reports related to them as well as all wastes security data.
8. An annual report introduce environment public authority about wastes activities, which includes :
  - a) The name and address of the site and environment public authority site identification number and the period that the report covers.
  - b) Identification numbers of the site from which wastes were received.
  - c) The description and quality of each amount of dangerous wastes received from each generator separately.
  - d) Method of storage, treatment or disposal of dangerous wastes.

### **ARTICLE (30)**

Conditions for storing hazardous waste:

1. Separate substances either by isolating them in a separate facility or separate them in the same building by using insulated fireproof walls, or by leaving enough space or placing fireproof inert substances in between.
2. Isolate the storage area away from building and other installation by erecting a proper fence, and forbid entry to everyone except to persons working in the area. Substances must be stored far from the fence area and in a well organized way, by leaving enough space for easy movement between the stored materials. Open storage areas must be used to store secure substances only. Covering flammable waste must be done with as little as flammable covers as possible.
3. Storage sites must be in cold, dry and ventilated areas.
4. Waste must be stored in containers with edges so that it can preserve any spillage.
5. Storage areas must be emptied of flammable sources. A separate storage must be supplied to liquid waste with glow less that 32<sup>0</sup> C Highly flammable waste should be stored in refrigerators and cold storages.

6. Substances should be classified according to their nature. Clear labeling with large letters so that substances can be distinguished.
7. Labels should be placed on stored containers so that flammable, oxidized or poisonous material can be easily distinguished. Labels should indicate nature of substances, degree of toxicity and the right way of dealing with the substances in case of accidents or spillage. Labels should indicate the chemicals name as well as the commercial name and proper storage indicators.
8. Separated oxidized waste from other, which it can react to. It must be stored in dry areas clear of flammable or acidic material.
9. Unstable chemical substances that are easily solvent must be stored in airtight containers and dark cold areas. Large quantities of these substances must be stored in separate areas that are uncovered so in case of explosions, waves can be absorbed. Temperature and humidity at this storage facility must be controlled.
10. Gas cylinders must be stored away from flammable and heat sources.
11. Waste must be stored in protected containers not prone to breakage or damage. Containers should be closed with covers that do not allow gas leakage and should be made easy to open.
12. Glass containers that contain highly hazardous waste must be placed inside bigger containers, which will not react to the stored material.
13. Contaminated stores or containers should be cleaned when closed.
14. It is necessary to install an alarm system that will operate during emergencies. The alarm sound must be recognized and staff working in the stores must handle its mode of operation. It is necessary to supply the facility with a fire fighting system and necessary fire fighting equipment to resist fire spillage.
15. Daily record of stored substances must be supplied where the kind, quantity and area of storage must be recorded.

### **(ARTICLE 31)**

The carrier (transporter) that is storing hazardous waste for a period exceeding five days will be subjected to the special conditions as the owners and ones who are using storage areas as included in the previous article.

### **(ARTICLE 32)**

The carrier (transport) of hazardous waste must adhere to the following:

1. Identification number must be obtained from the environment public authority.

2. Instruction on loading hazardous waste and delivery must be followed through transportation document.
3. Different specification substances must not be mixed
4. Emergency plan must be planned so that emergency cases can be countered. This has to be certified by the environment public authority. Necessary equipment must be supplied to execute this plan.
5. Distinctive plates must be fixed to the sides and back of the vehicle, plates must include nature and kind of cargo and the international symbol which must be obtained by permission from the local authorities. Plated should be removed when transportation is over.
6. Records and documents of hazardous waste must be kept so that they can be presented to the authorities when asked.

### **(ARTICLE 33)**

Driver of transportation vehicle must keep the following documents:

1. The documents and the notification of the cargo according to the Appendix No. (11-7) and (11-8) and present them to the specialized authority in the country or other countries, when exporting hazardous substances according to the exception included in Article 25 of this document.
2. Notarized copy of the insurance certificate against fire accidents individuals and property.
3. Training certificate on hazardous waste transportation by safely means and on handling hazardous waste during emergencies.
4. Detailed logbook on the vehicles route.

### **(ARTICLE 34)**

Hazardous waste transportation vehicle must be subjected to specific conditions according to the type of cargo:

- a) ACIDS AND ALKALINES:** Vehicles container must be resistant to corrosion resulting from transportation or leakage.
- b) WASTE INCLUDING HAZARDS (TOXIC) DUST:** Room ceiling must be clean and smooth and must be utilized to put covering on cargo.
- c) FLAMMING AND OILY WASTE:** Vehicle must be supplied with electric separation instrument and a fire extinguisher chemical powder cylinder with capacity of no less than 10 kg. exhaust must be vertical.

- d) HIGHLY REACTIVE SUBSTANCES:** Vehicle must carry appropriate fire extinguisher. Cargo must be safely carried in order to avoid vibration during transport.
- e) HEALTH CARE WASTE:** Vehicles container must be of an appropriate size with a height of 1-2 meters and must include a partition between drivers compartment and the rest of the vehicle so container can withstand collision at the speed of 30km/ph. Container should be smooth from the inside and must be able to withstand cleaning with steam or other chemicals. Containers with upper cover should not be used.
- f) LIQUIDS:** Vehicles container must be able to carry spill substances of the same size as of the biggest container (barrel).the volume should not be less than 10% of the total cargo. And when transferred to a reservoir or similar containers, it should be closed and discharge pipes must be fixed to stop leakage.

### **(ARTICLE 35)**

The licensee is obliged to build an incinerator with the following specifications:

#### **A: SPECIFICATIONS OF BUILDINGS AND INSTALLATION:**

1. All buildings and installations and special services with regard to the generator as well as the fire fighting system must comply with specification set out by the government authorities.
2. Incinerator must be inside an open room for ventilation purposes and must have a ceiling to protect incinerator from climate changes. Particular location must be designated for waste collection and incineration. This area must be covered with reinforced concrete resistant to corrosion. Special points must be designated to and linked to sewage discharge. Special plans and specifications for construction of incinerator must receive prior approval from the environment public authority.
3. Incinerator building must be provided with a spare parts storage area and another storage area for temporary waste storage where all safety procedures are implemented. Rest rooms for staff must also be provided. Incinerator doors must be made of iron or other metal and locked safely after working hours
4. An adjacent building next to the incinerator must be provided specifically for washing and cleaning cars and containers carrying contaminated waste material. Steam or hot water must be used then discharged through a public sewage system in the area after making certain that physiological and chemical specifications of the water complies to the specifications of the Ministry of Public Works and the Environment Public Authority. Special treatment unit must be built if specifications do not apply.

5. Fuel ground storage and daily services must be provided according to Kuwait National Petroleum Company and Kuwait Fire Service Directorate, relevant documents must be presented.

## **B: TECHNICAL SPECIFICATIONS FOR INCINERATOR:**

1. Incinerator must be designed to incinerated hazardous waste, metal waste, medical, solid, liquid and gas waste such as organic compounds as halogens, chlorine, and different waste from chemical and microbiological laboratories.
2. Incinerator capacity must not be less than 500kg/Hour
3. Incinerator must be supplied with two Incineration rooms. First room incineration must not be less than 1000° C, second room not less than 1200° C.
4. Design of Incineration room must allow gases in the second room more than 2 second; percentage of extra oxygen must not be less than 3 % during the incineration period.
5. Temperature of gas emissions from the incinerator must be in the average of 150° C so to avoid problems of condensation and corrosion in the chimney.
6. Efficiency rate incinerator should not be less than 99.99%
7. Incinerator must be equipped with mechanical system to feed solid waste. Must also be equipped with automatic lifting containers of different sizes for emptying purposes in the feeding area. Systems parts must be resistant to corrosion.
8. Incinerator must be equipped with feeding system for liquid and gas waste. The system for liquid waste must contain separate reservoirs. Each reservoirs capacity must not be less than 30 liters. Each reservoir must separately feed incinerator so as to avoid mixing waste before the incineration. The whole system must be resistant to corrosion. Feeding system must be equipped with automatic washing system.
9. Incinerator must be equipped with control systems for contaminant emissions such as filters with an efficiency rate no less than 99.99 % of gas halogens and flying particles during incineration.
10. Incinerator control room should be equipped with a main control board that should be supplied with the following :
  - a) Open and close switch
  - b) Separate open and close flame (torch) switch
  - c) Digital thermometer to record temperatures in the two incineration rooms
  - d) Concentration of carbon monoxide and oxygen must be recorded, to make sure of incineration efficiency

11. Incineration flames must work on natural gas, an alternative switch must work on diesel fuel.
12. Insulation layer in incineration units around diameter and the partition between substance and outer brick must be of appropriate thickness to minimize outer later rising temperature. Brick must withstand temperatures no less than 1400° C in the second incinerator unit.
13. Metal objects of incinerator must withstand temperatures for no less than 1600 ° C.
14. The main (first) incineration unit or room must be equipped with a sprinkler system especially when temperatures are increased so as to limit effects on metal interior.
15. Incinerator must be equipped with a continuous control and measurement system as follows :
  - a) Flow and temperature of gas emissions
  - b) Total particulate matter
  - c) Concentrations of carbon monoxide
  - d) Concentrations of nitrogen oxides
  - e) Concentrations of sulfur oxides
  - f) Concentrations of hydrofluorides
  - g) Opacity
  - h) Concentrations of total hydrocarbons
  - i) Ammonia
  - j) Hydrochlorides

All measures equipment must be linked to the main incinerator control room.

16. Incinerator in the first room must be equipped with mechanical equipment for getting rid of ash residue. Organic substance left in ash must be less than 2 % in weight.
17. Incinerator must be equipped with appropriate chimney whose design and material must depend on incinerator capacity. Total chimney height must not be less than (12) meters from found level. Chimney height must exceed the nearest building no less than three meters
18. Chimney must be equipped with opening (hole) to collect samples of gas emissions. It must be within an appropriate radius and height from the chimney. Safely procedures must be provided collecting samples.
19. Contaminated emissions from chimney must be within the limits allowed by the environment public authority and must comply with the following values:

### Table of allowed averages of Emissions from hazardous incinerators

Pollutant	Maximum limits	Pollutant	Maximum limits
Total particulate	34 mg/dscm	Mercury	0.05 mg/m <sup>3</sup>
Carbon monoxide	40 ppm	Arsenic	4ug/m <sup>3</sup>
Dioxin / furan	0.1 ng/m <sup>3</sup>	Chromium	0.5 mg/m <sup>3</sup>
Hydrogen chloride	70 mg/m <sup>3</sup>	Selenium	0.05 mg/m <sup>3</sup>
Sulfur dioxide	50 mg/m <sup>3</sup>	Antimony	0.5 mg/m <sup>3</sup>
Nitrogen oxide	250 ppm	Copper	0.5 mg/m <sup>3</sup>
Hydrogen fluoride	1 mg/m <sup>3</sup>	Cobalt	0.5 mg/m <sup>3</sup>
Total hydro carbons	40 mg/m <sup>3</sup>	Manganese	0.5 mg/m <sup>3</sup>
Ammonia	10 mg/m <sup>3</sup>	Nickel	0.5 mg/m <sup>3</sup>
Volatile organic compounds	10 mg/m <sup>3</sup>	Vanadium	0.5 mg/m <sup>3</sup>
Lead	0.5 mg/m <sup>3</sup>	Tin	0.5 mg/m <sup>3</sup>
Cadmium	0.05 mg/dscm	Opacity	5% Or less

#### **(ARTICLE 36)**

Management of the incinerator must be applied by the following:

1. Incinerator must be managed in a way that does not endanger the safety of working staff and citizens. Continuous cleanliness of incinerator must be followed.
2. Operation and maintenance of incinerator must be carried by qualified technicians with enough experience in this field. Operating and maintenance staff will be subjected to periodical technical attests by the environment public authority to access their competence.
3. Getting rid of ash resulting from incineration must be carried in dumping areas specially for dumping hazardous waste. Standards for dumping must be applied according to the environment public authority.
4. Incinerator must be maintained periodically according to a maintenance program. Spare parts must always be supplies and periodical reports on operating and maintenance must be presented to the environment public authority.
5. Workers must be trained correctly to operate incinerator and equipment prior to operation. Staff must be subjected to follow safety rules.
6. Masks and appropriate clothing and footwear must be supplied and must be in good condition in order to protect staff. Periodical health check must be carried to avoid work-related diseases. First aid kits must be available.

### **MANAGEMENT OF HEALTH CARE WASTE**

#### **(ARTICLE 37)**

Each term is accompanied by following meaning:

- **Health Care Waste:** All waste that is produced by government or non-government installations that provide different health care such as hospitals, clinics, blood banks, dental clinics, laboratories and health institutes, medicine and antidote production facilities, veterinary centers, research organizations, nursing from homes. It is divided into:

- **A - Non-hazardous Health Care waste:** All house hold waste such as produced by cleaning works inside health installations. This includes the larger part of total health care waste.

- **B - Hazardous Health Care Waste:** Waste that is produced by contaminated sources or possible contamination by liquid or chemical or radioactive contaminants which are considered hazardous to individuals and society and to the environment during its production, usage, storage or movement or when trying to get rid of it, and they are classified as follows:

- **Infectious waste:** Waste that contains disease causes such as (bacteria, virus, parasites, or fungi) and has enough concentrations to cause disease such as biological cultures, surgery waste, and Intensive care units waste, dialysis waste of patients contacting infectious diseases
- **Waste from Human and Animal Residue:** Waste that contain cells, human organs, genetic cells, animal carcasses, blood and its derivatives and bodily liquids.
- **Poisonous Genetic and Cell Material:** Highly hazardous pharmaceutical material such as (medicine, radioactive material chemical substances) which has the capacity's to kill or stop cell division and gene structure and can cause health problems such as physical deformity in the gene and cancer. Some substances are used to treat some cancers and transplants in the nuclear medicine department, tumor treatment, diagnosis by radiation or any material used in the preparation of such substances, in addition to the patient's excretion such as stool or urine or vomit when treated with the above substances. Also toilet water after use by such patients.
- **Sharp Object Waste:** Waste that contains sharp objects such as syringes, scalpels, surgical gauze, saws, blades, broken glass or any sharp object that can cause body puncture or tear.
- **Chemical Waste:** Chemical waste that is solid, liquid, or gas as a result of diagnosis or treatment or from laboratories or material used in cleaning and sterilization.
- **Pharmaceutical Waste:** Waste resulting from production and preparation of medicine and compounds, expired or damaged medicine, contaminated medicine, serums and vaccines as well as containers used for the manufacture, packing and distributing of the above substances.
- **Waste which contains High Concentration of Heavy Metals:** Highly poisonous waste like (mercury residue, cadmium residue, lead residue).
- **Radioactive Contaminated Waste:** Waste that contain all solid liquid and gas substances contaminated with nuclear material resulting in the diagnosis of human cells as well as liquids, and tumor diagnosis.
- **Waste from Pressurized Gas Cylinders:** Empty or damaged gas cylinders in addition to cartridges, sterilization containers and aerosols.
- **Incinerator Alternatives:** Techniques to treat waste other than incineration.

### **(ARTICLE 38)**

All rules apply in the first clause of this chapter on handling of health care waste outside health installations.

### **(ARTICLE 39)**

Handling health care waste requires license from specialized authorities after getting approval from the Environment public authority.

### **(ARTICLE 40)**

Every health installation must have a specific program to manage health care waste: this must include the responsible individual for managing health care waste and ways of dealing with it and ways of handling and getting rid of waste. There must be continuous training program for all workers in the installation.

### **(ARTICLE 41)**

The following must be implemented when gathering and moving waste inside a health care installation:

1. Bags should not be filled with waste for more than three quarters of its size, they must not be pushed down nor have bodily contact nor handled from the bottom when carried. It must be handled from the top, and care must be taken to close all waste containers before it is transferred for storage. Containers must be labeled and waste details must be written on label. Containers containing hazardous or toxic waste must be labeled, under the supervision of nursing staff.
2. Waste bags and containers must be collected on a daily basis or periodically by trolleys with safely specifications for this purpose by trained staff.
3. Hazardous health care waste products resulting from infectious diseases rooms and departments and from intensive care units must be collected under direct supervision of the health care waste official.
4. Cleaning and sterilizing trolleys carrying waste must be done on a daily basis in a special location within the health installation. Residue must be treated before disposal.
5. Labels of the following information must be attached:
  - a) Name of waste product (health installation or research lab)
  - b) Name of location (wing or department)
  - c) Product type
  - d) Weight and amount of stored waste in container
  - e) Date of collection
  - f) Time and date of storage

## **(ARTICLE 42)**

The following conditions must be applied when storing health care waste within a health installation:

1. Designate a specific location to store untreated waste before transfer, making sure that unauthorized personnel are prohibited from entering, the location must be far from health care installations and offices, food storage and preparation as well as from restaurants. Location must be within easy reach for vehicle that is designated to transfer waste.
2. Storage location area must have solid floor, resistant and easy to clean. Area must be supplied with water, disinfection and sterilization substances and a proper sanitary system. Suitable lighting system and ventilation and refrigeration and its must be tightly closed.
3. The location must be supplied with cleaning material, protective clothing, safety equipment, fire-fighting system, and disinfection and sterilization substances. Specialized officials must run the location.
4. Bags or waste containers must be stored at separate locations such as large rooms or buildings suitable for the amount of waste storage and the number of times and collection. Hazardous health care storage should not exceed 24 hours during the summer and 48 hours during the winter. As for waste from human organs and limbs, these must be treated or gotten rid of within seven days or refrigerated at temperature between (0.5 to minus  $-9^{\circ}$  C). Or they must be frozen at less than zero centigrade, since this waste can be stored after refrigeration for one month before treatment. It is necessary to store hazardous waste at a specified location for that purpose away from the rest of health care waste.
5. Storage of radioactive waste with the coordination of the authorities must be collected in lead containers covered with lead tops in order to prevent the leakage and spread of radiation during the period of radioactive disintegration. These containers must be stored at special locations specially for this type of waste with the following specification:
  - a) Storage location must be in a specially designed building furnished with fireproof walls and resistant non-porous floors.
  - b) The location must be equipped with sample air collection instrument, alarm system, and control system to monitor radiation leakage.
  - c) Location must be equipped with resistant movable curtains placed in appropriate spot.

## **(ARTICLE 43)**

Plastic bags waste and health care waste containers must have the following specifications:

### **FIRST: PLASTIC BAGS SPECIFICATIONS:**

1. Thickness must not be less than 150 microns, it must be supplied with cords for tying the bags.

2. The total volume should not be less than 100 liters. Bags should be of size suitable to fit in container.
3. The color of these plastic bags will suit the required color mentioned in Appendix (11-9).
4. Highly hazardous infectious diseases waste must be put in bags that can withstand high temperatures and cannot melt made of polyethylene-polyamide composite.

### **SECOND: SPECIFICATIONS OF CONTAINER WHERE BAGS ARE LEFT DURING USAGE:**

1. Must be equipped with tightly shut cover that can be opened with the foot. Must be of a size that can withstand waste bags and must be equipped with handles for easy movement.
2. Must be easy to clean and made of material capable of withstanding sterilization, also must be easily movable and equipped with wheels.
3. That containers used for yellow colored bags must be labeled with "hazardous medical waste" on all its sides and cover.

### **THIRD: SPECIFICATIONS OF SHARP OBJECT WASTE CONTAINERS**

Containers must be made of non-puncturable, non-porous material. Must be equipped with a tight cover and an opening that permits entry of sharp instruments. Container size must be suitable for carrying with one hand and must be equipped for a handle for that purpose.

#### **(ARTICLE 44)**

Rooms and locations specifically equipped, as alternative to incinerators must have the following specifications:

1. Must be away from air conditioning fresh air ventilation openings connected to the hospital, also must be far away from hospital kitchen, operating theatres and intensive care units.
2. Floors should be made of non-absorbent material, non-porous and resistant to sterilization substances.
3. Interior walls must be non-porous, crack resistant, covered with a layer of porcelain or any similar material that can easily facilitate cleaning. Must be concave at area connected to ceiling and floor.
4. Ceilings must be rust resistant and equipped with heat resistant material.

5. Must be equipped with suitable controls systemic order to minimize emission of contaminant gases and foul odors to the environment. Must be equipped with high efficiency filters.
6. Must be equipped with a surveillance and observation system to monitor contaminant gases as well as alarm system.
7. Must be equipped with air conditioning system also equipped with air purified filters. Must have separate air-conditioning system.
8. Air-conditioning system in the room must be equipped with negative pressure.
9. Suitable natural and artificial light must be provided
10. Locations where liquid waste emanates must be connected to a nearest drainage network to drain treated waste according to standards applies in appendix (14) of this regulation. Location must have its own drainage system.
11. Location must be equipped with cleaning equipment and water hoses to be used by staff in case of chemical spillage on skin.
12. Location should be equipped with fire alarm system and fire fighting equipment.
13. Staff personally on location must be equipped with suitable protective instruments.

#### **(ARTICLE 45)**

All government, participants and private body wishing to import or use know-how and system of health care treatment waste must be committed to acquire a license from the Ministry of Health and specialized authorities after approval from the environment public authority.

#### **(ARTICLE 46)**

The following procedures must be applied when using know-how technology alternative to incineration:

**FIRST: STERILIZATION BY AUTOCLAVE:** This method entails effects resulting from saturated steam with increased pressure at the correct period of time needed to kill minute living organisms found in waste. This following must apply when using this system:

1. The system must be equipped with waste shredding units and a mechanical feeding system. It must also be equipped with a mechanical control board with indicators to observe and monitor heat and pressure. It must also be equipped with a logbook citing time of operation for each cycle. It is necessary to equip system with special filters to minimize emission of contaminants and foul odors in to air.
2. A trained and qualified sterilization technician must operate autoclave.

3. Heat and high pressure resistant bags must be used
4. Bags should be inserted in autoclave in order to enable all waste to be exposed to steam and heat throughout treatment period.
5. Should not be used to treat hazardous, chemicals or radioactive waste or body organs and body parts.
6. Biological test must be conducted to confirm efficiency of sterilization by using a challenge test and bacillus stereo thermopiles spores. Minimum test result must be 4 long 10 reduction. This test should be conducted periodically at least once a month according to appendix (11-10) of this list.
7. Autoclave should not exceed its capacity.
8. Incase of damage, health and environment authorities must be informed during a time frame not exceeding 24 hours.

**SECOND: TREATMENT BY MICROWAVE:** This method entails that waste should be showered with water, than damp waste should be exposed to microwave within a sealed system. Where water will be heated to sterilization resulting in heat inside waste because of microwave. This system entails the following:

1. Must be equipped with one or more than one shredding unit.
2. Period of sterilization and degree of heat and length of wave and frequency must be suitable for efficient sterilization.
3. Efficiency test must be carried out periodically; the rate of surviving bacteria in waste must not be less than 99.99%.
4. Must be equipped with system to absorb foul odors.
5. Must not be used to shred tissue and hazardous chemical waste.
6. Radioactive element used by system after its supposed end of lease of life end must be disposed of in an environmentally safe manner.

**THIRD: CHEMICAL TRETMENT:** This method depends on applying strong disinfectants such as (Sodium hypo-chlorite, chlorine dioxide, and parasitic acid).

The following system should be applied:

- 1 The concentration of chemical disinfectants, degree of temperatures and period of sterilization must be suitable.
- 2 Efficiency test must be carried out by using suitable disinfectants for the system. Suitable amounts of disinfectant solution must be applied to suitable disinfection period at the third level. Rest of disinfectant solution must be treated before disposal in sewage according to the standards listed in this regulation.
- 3 Toxicity characteristic leachate procedure (TCLP) must be carried out on treated waste residue. Results must comply to permit standards mentioned in appendix (11-11 of this regulation.
- 4 Instrument must be of chemical and heat resistant material. Oxidized substances must be piped through sealed pipes that are resistant to chemicals.

**FOURTH: HEAT DISINTEGRATION TREATMENT:** This method of heat disintegration through plasma occurs when very high temperature results in the disintegration of waste to dust and gases. This procedure occurs in two stages: in the first stage waste is passed to the first room by plasma in the absence of oxygen. In the second stage waste is passed to the second room in the presence of oxygen so that organic modification occurs resulting in sterilized waste to dump in health waste dumps. The following should apply when using this system:

1. System shredder must be at the third level as clarified in appendix (11-10) of this regulation.
2. There must be compliance with permitted amounts of emissions produced by hazardous waste incinerators as determined by table of article (35) of this regulation
3. System must not be used to treat tissue and hazardous chemical waste residue.

**FIFTH: RADIATION TREATMENT:** This method depends on subjecting infectious waste to ionized radiation, infrared or ultraviolet radiation for a specific period to dispose of minute living organisms. Compliance with ministry of health standards must be applied when using this system as follows:

- 1 An alarm system to monitor radiation leakage and radiation measurement equipment must be fixed.
- 2 Floors must be covered with non-porous material and must be easy to clean.
- 3 Ceilings and walls must be non-porous and easy to clean.
- 4 Location must be equipped with insulation made from an absorbent material such as lead or cement.
- 5 Location exterior must be equipped with cautionary signs to forbid entry of unauthorized personnel.
- 6 Staff on location must wear protective gear made of lead and must carry radiation measurement instruments.
- 7 Location staff must be subjected to periodical medical check-ops.

**SIXTH: SHARP OBJECTS WASTE SYSTEM PACKAGING:** Sharp objects waste must be packed in polymer cover and dumped at designated health care waste dump.

**SEVENTH: CONTINUOUS FEEDING SYSTEM:** This system entails that shredded infectious waste must pass through a heated room where a spiral cylinder is rotating and hot oil current must pass through it. This system is subjected to the same conditions as heat disintegration treatment.

## **SANITARY AND INDUSTRIAL SLUDGE**

### **A: SANITARY SLUDGE**

#### **(ARTICLE 47)**

What is meant by sludge in this chapter is any sticky semi-solid organic substance held by bacteria, viruses, poisonous metal, organic chemical and oily substances, in addition to solid sediment discharged by sanitary and industrial systems. It can also be produced by water treatment installations and from industrial installation.

#### **(ARTICLE 48)**

In all cases, sanitary sludge must be treated before usage.

#### **(ARTICLE 49)**

when using sanitary sludge in agricultural areas, the level of contaminants must not exceed to the limits allowed in the appendixes (11-11, 11-12, 11-13, 11-14) of this regulation. When used in non agricultural areas, levels must not exceed appendix (11-15) of this regulation.

#### **(ARTICLE 50)**

The following conditions must apply before marketing and distributing sanitary sludge:

1. Obtain approval from the environment public authority to confirm it corresponds to environmental and health regulations. When used in agriculture, approval must be obtained from the agricultural and fisheries authority.
2. Treated sludge must be labeled as follows:
  - a) Name and address of product distributor
  - b) The product is produced by sanitary sludge and complies with local standards contaminant concentrations must be labeled.
  - c) Warning about product toxicity and must not be handled by children. Must be used in locations with distance not less than 10 meters (30 feet) of the level of surface water.

#### **(ARTICLE 51)**

Imported fertilizer must be tested at the agricultural and fisheries authority before release to be sure it complies with environmental standards included in (article 49) of this by regulation.

### **(ARTICLE 52)**

When moving or disposing or dumping sanitary sludge, conditions specific to household waste must apply as shown in the first clause of the fourth chapter of this regulation.

### **(ARTICLE 53)**

It is prohibited to use non dry sanitary sludge in other than tree planting (irrigation plant) or a forestation. When used in planting, trenches no deeper than 50 centimeters must be dug where sludge is deposited, then it should be covered with a layer of soil of 30 centimeters, making sure that planting should be done months after that.

As for dry sanitary sludge, it should be used in tree planting, landscaping except vegetables whose fruits are under the soil or which can be eaten fresh. The sludge must be turned over with a layer of earth no less than 30 centimeter in thickness or by gravels earth with total thickness of 30 centimeters.

### **(ARTICLE 54)**

The following should apply when collecting and drying sanitary sludge:

1. Designate a specific location far away from residential areas, must be enclosed by a fence and equipped with suitable health installations, separating and tossing over machine.
2. Sludge must be collected in designated location, spread to a 50 centimeter layer and periodically tossed over mechanically for six months at least to guarantee drying out bacteria.

### **(ARTICLE 55)**

Sludge treatment plants must designated an area of land within the plant and away from moist and saturated land, for the purpose of temporarily storing sludge for one day or shorter periods.

In case of sludge surface dumping in piles for less than a period of one year compliance with standards in appendix No. (11-16) of this list must be observed.

When disposing the sludge by incineration, suitable incinerators must be used where temperatures must not be less than 850-900 (Celsius degree) centigrade, and where conditions listed in (article 35) and article 36) of this regulation must apply.

## **B-INDUSTRIAL SLUDGE:**

### **(ARTICLE 56)**

Industrial sludge should be treated before disposal by turning it into non-harmful compounds, or it must be treated to minimize its danger when thrown in receivable location.

### **(ARTICLE 57)**

Industrial sludge must be disposed of according to the following:

**1 OILY SLUDGE:** Sludge and oil must be separated by heating it to 88 centigrade for (4-6) hours, and then it must be left for sedimentation for (12-24) hours or by chemical or biological means if possible. Clean oil must be collected and remaining sludge must be disposed of by the following method:

- a) **Incineration:** After burning oily sludge, remaining ash must be dumped at healthy dump location.
- b) **Dumping:** Oily sludge must be mixed with absorbent substances to avoid oil penetration in ground layer or underground water.
- c) **Spreading over agricultural land:** sludge must be spread at (10-5) centimeter thickness for one week in hot areas and some nutritional substances may be added to facilitate biological; disintegration of sludge.

**2 TOXIC SLUDGE:** Disposal of by the following:

- a) **Dumping:** dumping ditched must be dug according to environmental conditions or dumping hazardous waste listed in this regulation.
- b) **Surface dumping:** sludge must be covered with layer of soil and pressed.
- c) **Incineration:** non-disintegrating organic compounds will be destroyed in suitable incinerators.
- d) **Sludge solidification:** By adding substances which will help it to solidify, such as silicates, cement or lime.
- e) Spreading over agricultural land.
- f) Chemical or biological methods.

**3 CHEMICAL SLUDGE:** disposed of by the following:

- a) **Incineration:** where organic compounds will be destroyed in suitable incinerators.
- b) **Dumping:** this method should be used specifically for sludge containing alum.
- c) **Spreading over agricultural land:** this method is applied when sludge contains large qualities of lime and alum,. Must be spread on land on an average of 2.5 cm per year.
- d) **Recovery:** lime and alum can be recovered from sludge by applying chemical procedures

## **CHAPTER V**

### **Protection of Marine and Coastal Environment**

#### **FIRST: PROTECTION OF MARINE ENVIRONMENT**

##### **(ARTICLE 58)**

Ambient seawater quality must be preserved according to specifications listed in appendix (12) of this regulation.

##### **(ARTICLE 59)**

Liquid- effluent discharge into the marine environment should not exceed levels listed in appendix (13) of this regulation.

In any case, it is not allowed to discharge treated liquid waste in the marine environment expects at a distance no less than 500 meters from the coast. Liquid effluent should not be discharged in fishing areas, swimming area and sanctuaries.

##### **(ARTICLE 60)**

Industrial liquid discharge into public drains should not exceed allowed limits listed in appendix (14)

##### **(ARTICLE 61)**

Treated liquid wastewater must not exceed limits allowed listed in appendix (15) of this regulation when used for irrigation.

##### **(ARTICLE 62)**

Unbolted water must have the specifications listed in appendix (16) of this regulation.

#### **SECOND: PROTECTION OF COASTAL ENVIRONMENT**

##### **(ARTICLE 63)**

The following must apply when burying beach:

1. Verify maximum efficiency of the drying density of sediment area before and after burying coastal line.

2. Place coastal barriers before starting the digging and burying operation so that vital locations close to the project can be preserved from the effects of contaminated substances that accompanies such an operation.
3. A homogeneous and suitable burying substance must be used with the area sediment, care must be observed with regard to the nature of the coast and the type of waves and currents in the area.
4. Same coast sands or sand from delicate environment (such as gulfs, swamps, and areas close to the coast) must not be used.
5. Coast must be buried with sand close to its nature. Sand size must exceed 0.25 millimeter. At high activity coasts sand size must not be below 0.4 millimeters. Levels of mud and in sand must be from 5 % to 10%.

#### **(ARTICLE 64)**

The following should apply when building jetties:

1. obtain approval from the authorities to build jetty
2. Jetty must be constructed on concrete or steel or wooden foundations on condition it is not linked so that water and moving sands can pass through. Level of foundation height must be suitable to natural coast level. Jetty must face the sea on the high tide and sanctuaries or boards must not be built on the jetty sides. There should be one jetty for every five kilometers on the southern coast.
3. Coastal jetties must not be constructed near areas where mangroves grow.
4. Jetties must be maintained periodically. Packed sand around concrete foundations must be moved.

#### **(ARTICLE 65)**

Wave breakers, concrete rock walls must be built according to the suitability of the speed and direction of marine waves and tides. It is prohibited to build from debris. Periodic maintenance must be observed.

#### **(ARTICLE 66)**

Pulling out rocks, gravels or disposing of coastal sands is prohibited expect by permission from the authorities.

#### **(ARTICLE 67)**

Coastal installations must be far from the coast at a distance of no less than 150 meters from coastal sand line and around the Bay and at a distance no less than 50 meters from a stable coast. Approval and other specialized authorities. Design and construction must comply with the nature of Kuwaiti environment and must be prevented.

### **(ARTICLE 68)**

A complete survey must be conducted for the desired area before obtaining a building license to contract touristic projects on the coastal line. The following conditions must apply:

1. Nature of waves, tides, coast declination, type of sediment, water depth must be determined in order to illustrate the effects of wave movement toward the possibility of coast erosion or sand sedimentation.
2. designate suitable areas for sport activities such as swimming and fishing, divide different marine sport activates in order to preserve delicate marine flora.
3. declare the level of distance of the location from industrial or drainage dumping.
4. Touristic projects must conform to the coastal nature and architectural style of the State of Kuwait.
5. Microbiological results of the touristic coasts project must be done at the microbiological laboratory affiliated with the environment public authority to make sure it is safe for swimmers.

### **(ARTICLE 69)**

The following conditions must be complied with for obtaining a license to build a port or harbours:

1. The location must be a long distance from oil pipelines, cables, sewage outlet and delicate environment areas such as fish, shrimp and bird nurseries. The location must conform to waves, water currents tided and sediment movements.
2. The environment public authority must be informed about digging and debris in order to locate a location for its disposal
3. All procedures should be taken to preserve seawater quality and fish.

### **(ARTICLE 70)**

When building a water distillation plant and electricity power station, all environmental and natural aspects must be observed when choosing a location, in order to guarantee that the surrounding environment will not be affected.

## **CHAPTER VI**

### **Protection of Earth Crust and Pollution**

#### **FIRST: PROTECTION OF EARTH CRUST AND DESERT AREAS**

##### **(ARTICLE 71)**

Either normal people or campers or any other must observe the following conditions when visiting desert areas:

1. Obtain prior approval from Kuwait Municipality to set up camp after paying insurance fee and retrieving the amount in case all conditions are observed in this article or deduct the amount according to the amount of damage to the environment. Law No. 21/95 as amended to law 16/96 must be breached as well other valid laws.
2. Camps must be away at a distance no less than five kilometers from neighboring borders, government, military and oil installations. As for public roads, electricity lines sanctuaries, vital installations the distance should not be less than one kilometer. Camps must be away from agricultural land and tree planting areas. It is prohibited to set up camps in residential areas and close to animal or plant sanctuaries.
3. Sand barriers or fences or any barriers that may damage the environment around the camp is prohibited.
4. Paved and specified roads established by the authorities must be followed.
5. Camping areas must not be paved with asphalt or the ground leveled with heavy machines. Camp area must be cleaned and area must be leveled after use.
6. All conditions must be followed as stipulated in this regulating with regard to the preservation of plants and wild animals.

##### **(ARTICLE 72)**

The following conditions must be complied with when extracting gravel, sand, and limestone from specified locations designated by the Kuwait Municipality:

1. Locations must be far from residential, agricultural and industrial areas. Also from areas of unique natural environment. It is necessary that the distance must not be less than five kilometers from high voltage lines. It is important to choose locations designed by Kuwait Municipality to extract sand.

2. Groundwater depth in the area must not be less than fifty meters, the height between the bottom of the whole and groundwater layer should not be less than ten meters. The distance between the location and the nearest groundwater well should not be less than two kilometers.
3. Lorry drivers must drive on paved roads leading to the sites and must cover the lorry box to avoid flying objects.
4. Sand fences should not be placed, and it is necessary to level the roads and not to leave any litter or equipment at the sites after finishing work. The area must be environmentally rehabilitated by spraying it with a stabilizer.
5. Necessary procedures that will guarantee workers health should be taken, by supplying masks and protective clothing.

### **(ARTICLE 73)**

Without breaching decrees of law number 41 for the year 1988 with regard to organizing livestock and pertaining rules, in order to graze the following conditions must be complied with:

1. It is important to comply with the conditions started in article 71 of this regulation with regard to setting up camps.
2. It is prohibited to uproot plants or collect wood in tree planted areas.
3. Grazing animals is prohibited in the southern part of the country beginning from January until the end of June and in the northern part from the beginning of July until the end of December.
4. It is necessary to comply with the set program with regard to organization or grazing land and the proper distribution of animals in grazing areas. Animals should not gather around water wells.
5. Fragile grazing land must be distributed and fenced into specific areas, where grazing is forbidden without permission. The authorities must provide animal feed and designated grazing areas must be fenced.
6. Small fenced areas must be established within the grazing area and must be in a relatively good condition where grazing must be prohibited so that natural reproduction can occur giving a chance for natural seeding in areas around fences.
7. grazing movement should be organized within grazing grounds by implementing a grazing period that depends on dividing the grazing area into two: an area where grazing is allowed and another where grazing is not allowed, but year after year grazing should be rotated between the two areas.

## **SECOND: EXPLOITATION OF LAND IRRIGATED FARMING**

### **(ARTICLE 74)**

For exploiting the irrigated land, the following conditions should be conformed thereby:

1. Refrain from the use of fragile characteristics in irrigated or rainy farming
2. Reforming of the brackish lands via the construction of drainage networks with the implementation of modern irrigation means and the use of soil ameliorations.
3. Growing the plants that suit the climate, earth quality, rationalization of water consumption, restriction of brackish water use, and construction of biological brackish which match wind blowing, direction and speed.
4. Refrain from the use of insecticides such as DDT and Aldrin.
5. The used of the suitable fertilizers which maintain the following specifications of soil:

<b>Hydrogen Number</b>	<b>pH</b>	<b>7.5-8.5</b>
The electro conduct of Saturated soil specimen	E.C	< 6.0 mmhos
Sodium harm	SAR	<13.0
Percentage of circulated sodium	ESP	<15%
Depth till "Gatch" lay or the Land water level		>1.5 meter
Calcium carbon ratio	CaCO <sub>3</sub>	<15%
Gypsum	GYPSUM	<5%
Bulk density	Bulk density	1.4+ 1 gm/cm <sup>3</sup>

6. Disposal of the agricultural remnants through bury thereof in natural holes like successive strata should be under the supervision of the public authority for agriculture affairs and fish resources as well as the environment public authority. Disposal of drainage water through surface sewage or using it in irrigation shall not be allowed except upon permission by the concerned authority. In case there were sewage water purification plants, approval from the environment public authority should be obtained concerning the location of the drainage prior to the construction of these plants.
7. When using the liquid remnants in irrigation, the following criteria should be followed:
  - a) For the sandy lands: The suspended matter should not exceed 1 cm<sup>3</sup> per liter (Volume) and lubes, grease and resins should not be above 10 part per million and the Sulfide (estimated on the base of S) must not be above 1 part per million.
  - b) For the Muddy lands: The hydrogen number should not be less than 6 and not above 9. the Biological Oxygen Demand (B.O.D) must not exceed 80 part per million (ppm) and chemical oxygen demand (C.O.D) should be at 50 part per million (ppm), the sulfides (estimated on the base of S) must not be over 0.1 part per million (ppm), grease lubricants and resins should be less than 5

part per million, melted salt must be 2000 part per million (ppm) and cyanide must not be above 0.1 part per million (ppm).

**(ARTICLE 75)**

Wind drift and earth erosion phenomena in non-agricultural land imply the stabilization of soil according to the location nature and the drift degree via the use of the appropriate stabilization means.

**CHAPTER VII**

**Protection of the Ambient Air from Pollution**

**(ARTICLE 76)**

All air pollutants emitted from their sources should be within limits that may not affect the quality of the ambient air at the residential or industrial areas shown in the Appendix. (17-1) (17-2) successively included herein.

The concerned parties should take the all necessary measures if the criteria of ambient air quality were breached.

**(ARTICLE 77)**

All facilities or individuals should not upon proceeding the various activities – exceed the community noise levels (leq) specified in the tables Nos. (18-1) (18-2), (18-3), (18-4) of these regulations.

The concerned authorities should take the necessary measures when noise may surpass sound intensity specified in appendix No. (18-5) of these regulations for maintaining public peace.

**(ARTICLE 78)**

Vehicles with exhaust produce substances above the maximum limits shown in Appendixes Nos. (19-1), (19-2) of this by-law should not be used.

The concerned parties should protect the environment against contamination in coordination with environment public authority.

**(ARTICLE 79)**

Air pollutants emit from any fixed facility should not exceed the allowed limits specified in Appendix No. (20) of this by-law.

The facilities owner should keep a sealed and numbered record from environment public authority for scoring emissions and their quality. He should notify the authority in case such emissions exceed the aforementioned limits.

## **CHAPTER VIII**

### **Biodiversity Diversification**

#### **ARTICLE (80)**

The following terms shall have the meanings as explained against respective terms:

**National Conservation land:** They are geographical areas demarcated by environment public authority. They are classified, organized and managed to achieve specified goals with the aim of maintaining the natural heritage and the biological diversification. Other authorities may establish parks for specific purposes upon approval of the environment public authority

**Trading:** Covers import; export; sale; offer for sale; bargaining and exchange.

**Endangered rare species:** Means any animal or plant or other creatures which live in their natural habitat, and rate of their interbreed is less than their perish rate which may lead to drop in their number below the normal ratio.

#### **(ARTICLE 81)**

Catching hunting, killing, collecting or causing harm to all primitive land or marine species are banned as well as their youngsters, eggs, nests, or shelters for two years as from the date of this bylaw. Uprooting or causing harm to the coral reef and their compound is also prohibited. Hunting for the scientific purposes for the public interests and what is allowed by the public authority for agriculture affairs and fish resources is exempted from the above.

#### **(ARTICLE 82)**

Practicing any activity within the parks supervised by the environment public authority or any other party which may damage or destroy the ecological environment or causing how to wild or marine life, or hurt their aesthetic value, or break the natural balance.

Parties permitted by the authority to carry out some activities for scientific and security purposes are released from the above.

### **(ARTICLE 83)**

Any works, activities or acts performed at the areas surrounding the game parks which may have effects on the game park or the natural phenomena are prohibited except upon the environment public authority approval.

### **(ARTICLE 84)**

The environment public authority in coordination with the other concerned parties shall handle the operations of continuous monitoring and supervision to ensure the implementation of plans. Decisions and regulations concerning the execution of the programs related to the protection and reproduction of animals and plant especially those endangered with extinct, and the rehabilitation of the extinct species.

### **(ARTICLE 85)**

Trading with primitive extinct creatures, or any part or products thereof is prohibited. Their lists are specified by the environment public authority in agreement with the concerned parties and also those mentioned in CITES treaty and other valid international agreements. Cases licensed by the concerned authorities upon the approval of the authority and related to scientific or treatment purposes or for zoos or fairs, is exempted from the above.

## **CHAPTER IX**

### **General Provisions**

#### **FIRST: LEGAL CONTROL**

### **(ARTICLE 86)**

Employees who are mandated by the general manager of the environment public authority shall have the capacity of legal control pertaining the execution of the provisions of the law No. 21/1995 concerning the establishing of the environment public authority, modified by law No. 16/1996. for that purpose, they will investigate and vindicate the breach of the said law regulations, and what would be needed of steps such as access to violation venues, drafting reports and referring them to the convened investigation power, taking specimen, and measurements and carrying out the necessary studies in order to determine the range of environment pollution, sources thereof, and ensuring the implementation of rules regarding environment protection. They may also resort to policemen to implement the above if necessary. They may carry out medical checks including taking biological specimen from any person had been vulnerable to contamination after obtaining his written approval thereon.

## **SECOND: RECONCILIATION RULES**

### **(ARTICLE 87)**

The general manager of the authority or any of the employees mentioned above or appointed by the general manager may accept; reconciliation for the breaches specified in law No 21/1995 modified by law No.16/1996 and the successive executive regulations and decisions concerning the establishment of the environment public authority. They may notify the violator of his contravention and confirm the reconciliation in a report. The violator who may accept reconciliation pay within one week as from the date of the petition Kuwaiti Dinars ten thousand, the penal case and effects thereof shall be ruled out by reconciliation and the payment of the said amount.

Anyone of the above may reject reconciliation if that was justifiable through the conduct of the violator or repetition of the law provisions or the executive decisions thereof.

Reconciliation request shall not be accepted unless the violator removed the pollution sources or damages thereof at his own expense.

## **THIRD: INDEMNITY FOR THE ENVIRONMENTAL DAMAGE**

### **(ARTICLE 88)**

The authority, board and other specialized parties may claim for compensation for the environmental destruction in accordance with the rules specified in the civil law, and the international treaties in effect.

## **FOURTH: PENALTIES**

### **(ARTICLE 89)**

Acts that contravene the provisions specified in this bylaw shall be punished by the penal defined in Article (8,10,13) of Law No. 21/1995, amended by Law No. 16/1996 concerning the establishment of the environment public authority.

## **CHAPTER X**

### **APPENDIXES**

#### **APPENDIX NO. (1)**

#### **Development and Environment** **The Environment Impact of the Development Projects** **Projects List**

#### **APPENDIX NO. (2)**

#### **Engineering and Environmental Requirements of Industrial Sector**

#### **FIRST: ENGINEERING AND ENVIRONMENTAL REQUIREMENTS OF INDUSTRIAL CHEMICAL SECTOR**

##### **1-1 Petroleum And Refineries Industry Activity**

1. The use of the most advanced technologies to control the gas pollutants emerging from the industrial processes which is harmful to environment; the continuous monitoring and the periodical maintenance of these equipments must be carried on.
2. The use of closed system for chemical substances mixing to prevent the emission of the compounds which are harmful to public hygiene and environment, and which come out of the industrial processes.
3. Paint and smoldering operations should be carried in special cabinets equipped with effective local ventilation to protect paint workers against paint or dye pollutants.
4. Providing tightly closed cabinets for isolating furnaces tubes and other sources, which produce radiation inside them, and equipping them with adequate conditioning means to protect workers during their shift.
5. Taking the necessary precautions against the damages of the radiological elements specified by the international bodies especially when detecting leakage from pipes.
6. Supplying the analytical labs and lubricant quality measurement labs with local ventilation equipment; "Gas chambers of high effectiveness in order to discharge of gas pollutants" and to limit the bad effects thereof on the staff of these labs.
7. The use of appropriate advanced technologies in order to limit the industrial noise through isolating the high level noisy places in special enclosures, or applying

suitable engineering solutions to minimize the noise produced by machines to the allowed limits by 85 (dBA) for a period of not more than (8) hours daily. It is recommended that purpose and compressors which produce high noise to erected on rubber sound and vibration aborting bases.

8. Installation of sound silencer for high noise sources such as vapor exist points from pipes.
9. Providing chambers for monitoring workers who work at places of high level of noise during working hours. Also, guide signs must be placed at the entrance indicating to the use of protection means against high noise.
10. Providing adequate lightening with periodical maintenance of the lamps, replace the damaged ones or increase them in order to improve the level of lightening.
11. Furnishing the work venue with modern alarum means of high sensitivity detecting any concentration  $\text{SO}_2$ ,  $\text{H}_2\text{S}$  and  $\text{NH}_3$  dangerous pollutants.
12. Radioactive waste should be discharged in the healthy appropriate.
13. Taking the necessary precautions when storing radioactive substances.
14. Sticking to the level of doses approved internationally regarding the vulnerability of workers who used radiography gauges.
15. Non-specialized personnel in radioactivity detectors are strictly prohibited from using such means. And workers must be warned against their existing in the places of radioactive substances storage.
16. Refrain from the use of toner in cleaning workers hands or clothes.
17. Personnel of radioactivity detectors should attend condensed training courses, and must have environmental awareness with focus on the way of avoiding the dangers of the radioactive materials.
18. Providing workers with the appropriate personal protection means with concentration the use of them such as:
  - a) Nozzles with special air filter, which should be periodically changed.
  - b) Tanks of compressed air to be used in emergency conditions
  - c) Safety appropriated overalls, gloves and shoes
  - d) Personal challenging means such as soaps, and the like.
19. Workers should be subject to medical checkup and audiography.

## **1-2 Activity of Chemical and Organic Fertilizers**

1. Installation of appropriate control means in order to curb the emission of gas pollutants and nasty smell to the industrial and external environment. Such devices should be equipped with filters suitable to the type of pollutants emitting from the industrial operations. In additions, periodical maintenance and continuous control of the efficiency of these means should always be performed.
2. Installation of necessary general ventilation means for refreshing the work atmosphere as an A/c units especially at the processing section near the sieve and the garbage cutting machine.
3. Performing the continuous periodical maintenance to the machines to confine the intensity of the high noise emerging there from.
4. The height of composite piles at the fermentation section should not be above two meters, with the necessity of increasing the times of rolling over to restrain the emission of nasty smells.
5. Performing periodical examination of composite piles specimen to ensure that plants are free from poisonous substance or harmful bacteria.
6. Refrain from pumping of cleaning and grounds washing water to the public drainage network, with the possibility of re-using this water after treatment thereof.
7. Forestation of the area round the plant to curtail the emission of smells and dust to the nearly inhabited areas.
8. Providing the factory's workers with the personal protection means such as:
  - a) Nozzles with filters against gases and dust
  - b) Overalls, gloves, high neck shoes – leather vests
9. Factory workers should undergo medical check up.

## **1-3 The Activity Of Chemical Non-Organic Fertilizer**

1. Installation of control equipment and means in the industrial pollutants equipped with filters suitable to the "quality emitting from the industrial operations taking into account carrying out the periodic maintenance and continuous control of these means in odder to maintain their efficiency in restraining the emerging the harmful pollutants to the industrial and external environment.

2. All equipment used in operation and production lines, the automatic mixing machines and the cylos should be tightly closed in order to prevent the harmful effects of the gas and dust pollutants to industry workers.
3. Use of total or partial isolation for the emergence of the gas or dust pollutants and also for furnaces and compressors places.
4. Isolation of places where workers face high temperature such as furnaces and smelters in air conditioned cabinets.
5. Ceilings, walls and floors of the factory should be fire proof and fire alarm devices should be provided.
6. Sound silences should be installed at high sound sources such the emissions of gases or steam in the conveying pipes.
7. Replacement of the torn out machines and operation equipment by new machines of suitable engineering design to restrain noise emerging there from.
8. Extensions and connections of the factory should be made of anti high pressure and erosion materials.
9. Chlorofluoro hydro carbonate 'Freons" should not be use in the industrial operations as such chemical compounds have environmental effects and harm especially on the atmospheric. (Ozone).
10. Discharge the solid and liquid industrial waste in the appropriate way, and at the places specified therefore by the municipality. Such garage should not be left for a long time inside or outside the factory in order to avoid the existence of additional source of pollutants harmful to health and environment.
11. Allocation of warehouses appropriately equipped according to the quality of the stored chemicals. And fast evaporation chemicals warehouses should be provided with suitable cooling means.
12. Guided warning labels against smoking or setting fire should be placed around and inside the stores of inflammable chemicals, to avoid breaking out of fires.
13. Substitute system or (transfer) should be applied with workers who work under high temperature such as at furnaces and smelters. This system shall be used to protect workers against long exposure to high temperature and health harms resulted from the radioactivity effects, which lead to thermal fatigue
14. Plants workers should be provided with the personal protection means, like
  1. Nozzles equipped with filters protecting against gases and dust.

2. Hand preventive gloves and leather vests to protect them against acids and alkalis.
  3. Long neck shoes for all workers
  4. Protective earpieces and spigots against high uproar.
  5. High temperature- proof clothes for furnaces workers.
15. Workers should undergo medical check up and audiography.

#### **1-4 Activity of Adhesive Materials Industry**

1. Sponge manufacturing should be done within tightly – closed lines.
2. Installation of suitable control means for pollutants diffusion from sponge manufacturing lines in order to curtail the emergences of harmful gas pollutants in the work venue. Such means must have filters suit the type of the emitted contaminants, with a chimney from 3-5 meters higher than the roofs and the buildings nearby the plant. Periodic and continuous maintenance control should be applied to avenue the efficiency of this equipment.
3. Isolation of raw materials mixing places, and furnishing them with local ventilation means in order to hinder the diffusion of contaminants to the industrial environment.
4. Packing and organizing the raw and finished materials and providing pathways for workers.
5. Cleaning the plants floors, and discharging the industrial liquid and solid wastes in an appropriate way.
6. Plants workers should always be reminded of the use of their personal protection means, such as:
  - a. Nozzles equipped with preventive filters against gases and dust.
  - b. Anti uproar spigots and earpieces
  - c. Overalls and long neck shoes
7. Plants workers should undergo medical checks especially of lungs functions.

#### **1-5 Plastics Industry Activity**

1. Local ventilation systems of high efficiency should be installed at raw materials addition and blending places which needed for plastic bottles and pipes manufacturing. Such equipment should connect with filters for collecting dust diffused from the industrial operations. Periodical maintenance of these systems as well as continuous of filters should be carried on.

2. The use of local control means and technologies with the gas and solid pollutants, such as local ventilation system to be installed at of the plastics bags manufacturing which produce harmfully pollutants to restrain such diffusion with high effectiveness. These equipment are:
  - a) Equipment to be fitted on the top of the extruder to withdraw the gas contaminants resulting from the manufacturing operations.
  - b) Equipment to be fitted on the top of chemical compound mixing tanks such as P.V.C. powder in order to limit the diffusion of these dust compounds to the industrial venue and the external environment.
  - c) Equipment to be fitted at the plastics remnants mincing section for the aim of restraining the spread of dust pollutants to the industrial environment. The local control equipment and the ventilation systems should be always operated over the work period with periodical maintenance and filter change.
  
3. Places of ink and organic solutions used in printing plastic products should be tightly closed. Workers should strictly notify not to open these covers except upon necessity.
  
4. Gasoline with high rate of benzol should be replaced with white spirit since it is less dangerous when used in washing and cleaning printing machines
  
5. Grinding machines of plastic remnant, pumps and compressors used in manufacturing and production lines should be confined in chambers or cabinets equipped with sound absorbing walls to prevent the spread of the manufacturing noise to the work venues.
  
6. Organizing and putting in order the containers of raw and finished materials containers or bottles with labels showing the content type inside the refills.
  
7. Providing suitable place where workers rest, and have drinks and meals
  
8. Providing maintenance and chemical workers with refreshing creams for skin so that they would not develop skin diseases.
  
9. Providing workers with the following personal protection items.
  - a) Nozzles with preventive filters against gases and dust.
  - b) Earpieces and spigots against high noise
  - c) Gloves and vests for all workers.
  
10. Workers should have periodical medical check up and audiography.

### **1-6 Activity of Industry Aerosols and Detergent**

1. Installation of local sucking equipment to all the manufacturing lines. Such equipment should be equipped with filters and be connected with a chimney in

order to restrain the diffusion of pollutants to the industrial and external environment.

2. chlorofluoro hydro carbonate (Freons) must not be used into h industrial operations due to their harm on health and their bad effects on the atmosphere (Ozone layer)
3. Control of fresh air inside work venue should continue taking into account that fresh air should be sufficient to the number of workers in one place in order to limit the effect of the harmful gas pollutants.
4. Discharge of solid and liquid wastes should be in an appropriate way and not leaving them in the corridors or nearby the factory exists.
5. Refrain from storing raw chemicals used in industrial operations inside workplace in order to avoid additional source of pollution to allocate for chemicals storage.
6. Refrain from releasing chemicals to sanitary sewage network. Liquid wastes should be collected in special barrels and to be discharged appropriately
7. Applying substitute system on workers who work at aerosols filling machines to be not more than 4 hours each shift daily.
8. Workers should be warned against haring snacks, drinks or smoking inside the workplace. Special room should be specified for this purpose.
9. Workers should use the following personal protection means at the time of work.
  - a) Earpieces and ear caps against industrial turmoil.
  - b) Preventive garments and gloves against chemicals.
10. Workers must undergo medical check up and audiography.

### **1-7 Activity of Industrial Marble Manufacturing**

1. A CABINET should be allocated for spraying the items with jelly coat inside them. There should be local control systems at the product drying place. These systems must be connected with filters, which should be frequently cleaned or totally changed if necessary.
2. Installation of local ventilation systems at emergence pollutant gases places of the raw materials harmful section when poured on the models. These systems should be fitted as follows:
  - a) On top of the raw materials section.
  - b) On top of the vibration to such dust and prevent if from spread to the industrial environment and the outside venue. These systems should

undergo continuous maintenance to keep them efficient in discharging the contaminants.

3. Workers are obliged to use the following personal protection means:
  - a) Nozzles with filters protecting against gases and dust
  - b) Gloves, shoes and overalls
  - c) Preventive eyeglasses against flying objects
  - d) Earpieces and ear caps against industrial noise.
4. Workers should undergo periodical medical check up and audiography.

### **1-8 Sponge Industry Activity**

1. Use of advanced local control means and technology at gas pollutant places in order to restrain the diffusion of pollutants, which are harmful to health, industrial and external environments.
2. Application of total closing at the raw materials mixing places.
3. Refrain from using fluorochloro hydro carbonate (Freons) in the industrial operation due to their health and environment damages, especially on the atmosphere (Ozone)
4. Storage of raw chemicals should be at cooled warehouses equipped with fire extinguishers.
5. Substantiated system should be applied on the workers of raw materials mixing owing to their harm on public health.
6. Workers should be warned against the use of chemical in cleaning their hands and clothes.
7. Providing personal protection means to mixing and spraying workers as follows:
  - a) Nozzles equipped with filters frequently changed against gases.
  - b) Preventive gloves, long neck shoes and leather vests.
  - c) Preventive earpieces and ear caps.
8. Workers should undergo periodical medical check up and audiography.

### **1-9 Fiberglass Industry Activity**

1. Use of advanced local control means and technologies at the gas and solid pollutant places to curtail the diffusion of these pollutants which are harmful to health, industrial and external environment the following places:

- a) Use of local ventilation system at the scraping off and cutting places, composed of veil connected to ventilation pipe then a chimney. Such system should be furnished with bag filter to collect the fiber glass. The control systems of dust pollutant at the scraping off and cutting section should be fitted on the highest point at the work place not far from the emergence of dust in order to curb the harmful effects of the fiberglass.
  - b) Use of mobile ventilation system at all instable scraping off and cutting systems.
  - c) Installation of local ventilation system along resin painting lines of high efficiency to prevent the spread of harmful gas pollutants.
  - d) Installation of local control equipment at the manual formation places of resin materials. These places should be isolated.
  - e) Providing the raw materials mixing "poly styrene" N.E.K.P." With harmful effects of the pollutants emerging from the mix operations.
  - f) Allocation of places inside the plant equipped with local control devices and filters to collect fibreglasses resulting from painting cooperation's, which should not be done at external yards of the factory.
2. While grounds should be leveled to avoid accidents. Packing and organizing the raw and finished materials inside the manufacturing section.
  3. Storing the raw materials at special warehouses equipped with A/C equipment to prevent the high temperature effect on refills particularly during summer season.
  4. Workers should strictly warn against organic solutions such as toner in cleaning hands and clothes.
  5. Providing factory workers with their personal protection means such as:
    - a) Nozzles equipped with filters against dust and gases.
    - b) Earpieces and ear caps against high noise.
    - c) Protective eyeglasses and gloves
    - d) Overalls and high neck shoes.
  6. Workers should undergo periodical medical check up.

### **1-10 Paint and Varnish Industry Activity**

1. Installation of high efficiency local ventilation systems to restrain the diffusion of gas and dust pollutants resulting from industrial processes, provided that such systems are linked with appropriate filters that suite the emerging pollutants ingredients.
2. Installation of local control equipment at the unloading and opening places of lead titanium and other oxide in order to prevent the diffusion of pollutants to work atmosphere.

3. Fitting covers to the raw material tanks and mixes to restrain the diffusion of pollutants during addition, mixing and grinding processes.
4. Continuous periodical maintenance should be carried out to all manufacture machines and equipment as well as to the noise control devices.
5. The organic solutions workers should be provided with the gas nozzles equipped with filters against solutions pollutants.
6. Providing personal cleaning means and water closet with all their requirements
7. Providing the workers with the personal protection means such as:
  - a) Nozzle with filters against dust and gas
  - b) Overalls, gloves and high neck shoes
  - c) Earpieces and ear caps against high noise
8. Workers should undergo periodical medical check up.

### **1-11 Insulators Industry Activity**

1. Providing local ventilation means on the machine, which produce gas pollutants.
2. Providing mobile ventilation system to be used at the instable mixing and leveling points.
3. Allocation of isolated place equipped with local ventilation equipment for the chemical mixing operations.
4. Control of the filters connected with the chimney in order to ensure continuous discharge of gas pollutants
5. Carrying out continuous periodical maintenance of all manufacture and local sucking equipment to restrain dust and gas pollutants as well as the industrial noise coming out there from.
6. Fluorochloro hydro carbonate "Freon" should not be used in insulators manufacturing and to be replaced by another compound, which does not have effects on environment especially on ozone.
7. Liquid and solid wastes should be discharged gradually in an appropriate ways.
8. Workers should be warned against standing at furnace for long time to avoid high temperature.
9. Workers should be warned against smoking or having food and drinks at all sections of the plant. A special room must be allocated for this purpose.

10. Workers should be provided with the following personal protection means:
  - a) Nozzles equipped with preventive filters against gas and dust.
  - b) Shoes, globes and overalls.
  - c) Earpieces and ear caps to protect workers against industrial uproar
11. Workers should undergo periodical medical check up and audiography.

### **1-12 Activity of Medical and Personal Care Compounds Industry**

1. Installation of pollutant control system at all mix and manufacture machines connected to filters and a chimney in order to prevent the diffusion of gas pollutants to the industrial and external environment.
2. Raw material tanks must be tightly closed to prevent the emission of gas and liquid to the venue of work and the external environment.
3. High noise machines and work points should be isolated, and engineering solutions should be proposed in order to minimize uproar that emerges from such machines.
4. Taking care of the periodic maintenance of the manufacture lines, machines equipments and replacing the old ones wit more advanced technologies in order to limit the spread of the industrial contaminants.
5. Continuous cleaning and maintenance of the factory ground with the necessity of using vacuum cleaners in cleaning the floor.
6. Taking care of packing and organizing of the finished products and raw materials, and leaving pathways for facilitating workers movement and avoiding accidents.
7. Storing the finished products and the raw materials within the warehouse specified therefore, which should be furnish with cooling and ventilation means that suit the nature of the stored materials.
8. Providing workers with the personal protection means which they should use such as:
  - a) Nozzles equipped with filters against gas and dust
  - b) Shoes, gloves and overalls.
  - c) Earpieces or ear caps to prevent industrial noise.
9. Workers should have periodical medical check up and audiography.

### **1-13 Batteries Industry Activity**

1. Use of suitable control equipment to curtail the spread of gas pollutants especially the smoke of the harmful lead and the steam of sulfide acid, provided such

equipment be provided with filters that suit the type of the pollutants, taking into account that regular periodical maintenance should be done to these equipment in order to maintain their efficiency.

2. Installation of local ventilation equipment at the sulfide acid batteries charging section in order to prevent the diffusion of harmful gas pollutants.
3. Installation of general ventilation means needed to refresh the atmosphere at all smelting sections to protect the workers against high heat taking into consideration that temperature inside the plant should not exceed the permitted limits.
4. Carrying out the periodical maintenance for the manufacture, general and local ventilation equipment to limit the pollutants produced therefrom.
5. Taking care of the plant cleanness through discharging the wastes gradually in order not to hinder work running.
6. Workers should be strictly warned to take care to their personal cleanness and change their contaminated clothes continuously.
7. Workers must not have food or drinks inside all factory sections.
8. Workers should be provided with the following personal protection means:
  - a) Earphones or ear cps against high noise.
  - b) Preventive nozzles against gas dust and vapor
  - c) Leather vests high neck shoes and gloves
  - d) Protective eyeglasses to welding workers
  - e) Workers should not periodical medical check up and audiography.

### **1-14 Lubricants Re-Manufacturing Activity**

1. Use of the most advanced gas and liquid pollutants control means to restrain the diffusion of the harmful pollutants to industrial and external environment.
2. Installation of local ventilation means at the machines that produce gas pollutants harmful to environment
3. Local control and desperation equipment should be subject to periodical maintenance to maintain their capacity in desperation the containments and purifying the work atmosphere.
4. Total close up method should be applied on operation lines curtail the diffusion of harmful gases to work atmosphere.

5. The chimney, which is connected to local ventilation equipment and exit of gases, should be between 3-5 meters high above the roofs of the buildings nearby the plant. Its diameter must be not less than half meter above the roof of the building.
6. Preparing entrances and exits and maintenance of stairs to facilitate the escape of workers quickly in case of fire breaking out. Fire extinguishers must be provided inside the factory.
7. Allocation of suitable place for storing industrial wastes (tar). Such containers must be tightly capped.
8. Well-equipped warehouses should be allocated for storing the fills of the raw materials. The fills bags should be tightly twisted and kept on wooden stands above the ground. Such warehouses must be furnished with appropriate ventilation and cooling means.
9. Workers must be warned against smoking inside work places, and a suitable corner should be allocated for this purpose.
10. Workers must adequately take care of their personal cleanness. Water closet should be provided with personal cleaner's means.
11. Workers must have the following personal protection means:
  - a) Preventive nozzles with filters against dust
  - b) Earpiece or ear caps against uproar
  - c) Gloves, overalls and safety shoes
  - d) Protect eyeglasses
12. Workers must undergo periodical medical check up and audiography.

### **1-15 Industrial Gases Manufacturing Activity**

1. Use of the most advanced local control means and technologies for limiting the diffusion of pollutants, which are harmful to health and environment.
2. Providing the drums tests section with local ventilation system
3. Allocation of a cabinet equipped with local control system for drums manufacturing operations.
4. Periodic maintenance should be done pollutants control equipment to keep their efficiency in purifying the work atmosphere.
5. Refills of Aston overflowing from filling operations at the drums filling section must be covered in order to prevent the spread of the gas pollutants.

6. Covering the liquid wasted beds (hydroxide calcium) remained from the manufacturing of Acetylene, the discharging them in appropriate way.
7. Flurochloro hydro-carbonate "Freons" must not be used in filling cooling gas tanks, and should be replaced with other gases harmless to environment especially to ozone layer.
8. Allocation of appropriately equipped warehouses for storing oxygen, Acetylene and cooling gas drums as well as other gases.
9. Workers should use the following personal protection means:
  - a) Preventive nozzles with filters against dust.
  - b) Earphones or ear caps against noise.
  - c) Gloves, overalls and safety shoes.
  - d) Protective eyeglasses.
10. Workers must have periodical medical check up and audiography.

## **SECOND: ENGINEERING AND ENVIRONMENTAL**

### **Requirements of wood industries sector**

#### **2-1 General engineering and environmental requirements of wood industries**

1. Sufficient ventilation should be provided inside the factory, and the average rate of air charge in the plant and the production halls must be increased in the appropriate way.
2. If welding or smith works or others are carried in factory, the related environmental requirements should be applied.
3. Covering the mobile saws and belts and other carpentry machines should be covered in order to avoid accidents.
4. Replacement of old manufacturing lines with modern ones. Imported machines of modern technology should be installed for limiting environmental problems resulting from old machines.
5. Adequate distance must be maintained between the various machines. Wooden pieces should be removed for smooth movement and to prevent accidents.
6. Taking care of the packing of the finished products and raw materials used in manufacturing.

## **2-2 Specific engineering and environmental requirements of the wood industries sector**

1. Installation of local ventilation systems to the electrical saws, thickness and other manufacturing machines, which produce wood dust. Such machines must be of high efficiency to limit the spread of dust in the work atmosphere. The ventilation systems must be linked to dust accumulator.
2. Periodical maintenance must be carried to the carpentry machines for raising their capacity of sucking dust.
3. Painting works should be done in special room inside the factory and outside it.
4. Painting rooms should be furnished with special ventilated cabinets of high capacity for sucking pollutants resulting from painting and accumulation them in special filters. They should be periodically maintained to ensure their efficiency.
5. Allocation of isolated corner equipped with local control systems for painting wooden products with paste and other substances. Such place should be well ventilated for preventing the diffusion of painting pollutants.
6. Periodical maintenance of local ventilation systems must be carried to keep their efficiency in sucking pollutants with periodical replacement of the filters related with them.
7. Refrain from the use of organic solutions containing dangerous substances with the same industrial specifications.
8. Replacement of the old carpentry machines, which produce high noise with more advanced machines which produce noise less than 85 dBA. Such machines should have periodic maintenance to control the uproar intensity within the permitted limits.
9. High uproar machines must be isolated in a special chamber or within sound absorbent partitions. The base of machines must be flat and solid to prevent operation vibration. Also, rubber pillows should be installed below the machines to reduce noise emerging there from.
10. Providing the factory with adequate lightening windows or holes.
11. Increasing the lightening intensity especially at the places and machines, which require accuracy in the work through installing lighting means, which suit the activity type.
12. Use of automatic vacuum cleaning of the plant floor to prevent the fly of dust in the work atmosphere.

13. Taking care of the general cleaners of the factory with the necessity of discharging wastes resulting from manufacturing daily after end of work directly through putting them in the special containers outside the factory in order not to be an additional source of pollutants emission.
14. Painting workers must be warned against the use of organic solutions (Toner) in hands washing due to their harmful effect on the skin.
15. Taking care of personal cleanness of the workers who should wash after the end of work. Cleaning means should be furnished.
16. Providing suitable place where workers may take food and drinks. Workers must not take food while working.
17. Providing a room for clothes change furnished with wardrobes and personal belongings of the personnel.
18. Workers at cutting shearing and smoothening machines must be furnished with caps to protect them during work.
19. Painting workers must be furnished with the following personal protection means:
  - a) Nozzles equipped with filters against organic solutions vapor, and painting materials, with frequent change of filters.
  - b) Vests, gloves, eyeglasses.
20. Workers of carpentry machines must be provided with the following personal preventive means:
  - a) Preventive nozzles against dust
  - b) Gloves
  - c) Protective eyeglasses for cutting and shearing workers
  - d) Safety shoes
21. Workers who work under wood dust at the carpentry should undergo periodical medical check up and audiography periodically.

### **THIRD: ENGINEERING AND ENVIRONMENTAL**

#### **Requirements for press sector and paper industry**

##### **3-1 Paper Industry Activity**

1. Installation of general ventilation equipment at all the plant section so that air change rate is sufficient to refresh and improve work atmosphere.

2. Allocation of a chamber of ink drum and colors washing equipped with local ventilation devices fitted on the basin same like at other factory sections for protecting workers from the solid and liquid pollutants.
3. Use of less dangerous substances like white spirit in washing and cleaning printing machines instead of gasoline and other petroleum products.
4. All industrial machinery should have periodic maintenance to reduce uproar intensity to the permitted limits.
5. Providing adequate lightening at production sections with regular maintenance of the lighting equipment particularly the lamps of the warehouse.
6. Packing the raw materials and the furnished products in appropriate way inside the plant with pathways for workers movement and to prevent vocational accidents.
7. Storing raw materials and finished products on wooden bases to avoid insects and rats access thereto.
8. Taking care of the factory cleanness and using vacuum cleaners in cleaning the factory's floor.
9. Workers should be provided with the following protective means:
  - a) Protective nozzles with filters frequently changed.
  - b) Ear caps against high noise
  - c) Long neck shoes.
10. Workers should undergo periodical medical check up.

### **3-2 Printing Press Activity**

1. Installation of general ventilation equipment such as A/C units in order to refresh the atmosphere.
2. Installation of local ventilation system at the processing section in order to suck out the chemical pollutants vapor from work atmosphere.
3. Erecting a chimney between 3 to 5 meters above the roof of the building to be connected with air desperators fitted at the printing section.
4. Carrying out the periodic maintenance of the general and local ventilation systems to provide suitable work atmosphere for the workers.
5. Carrying out regular maintenance to printing machines in order to keep noise within the permitted limits.

6. Covering the belts of the uncovered machines with preventive covers and providing the machines with safety devices to stop immediately at accidents occurrence.
7. Replacement of old lead printing method by computerized printing machines and electronic photocopiers instead of the old ones.
8. Replacement of organic solutions containing benzyl in cleaning presses machines with less dangerous substances such as white spirit.
9. Re-use of the depreciated zinc boards and not discharging them by burying or treatment except upon consulting the environment public authority.
10. Extra unused paper is preferably sold to local companies instead of damaging it.
11. Liquid waste (ink-acids) should be collected in special containers, and should be discharged at places specified by the municipality and not thrown in the drainage network.
12. Providing people with the fire extinguishers.
13. Allocation of suitable place where workers can change their clothes.
14. Cleaning workers should spray the ground with water to prevent dust from diffusion in the work atmosphere, or they should use vacuum cleaners in cleaning the ground of the factory.
15. Having meals and drinks or smoking inside the place of work is prohibited. Workers should wash their hand with water and soap after end of work immediately.
16. Photocopying workers should wear dark eyeglasses to prevent glowing.
17. Providing press workers which the following personal protection means:
  - a) Preventive earpieces against uproar.
  - b) Overalls.
  - c) Gloves and long neck shoes.
  - d) Nozzles equipped with filters especially for processing workers.
18. Workers should undergo periodical medical check-up.

### **3-3 Newspaper and Publication Activity**

1. Installation of filters within the sucking equipment fitted on the heat dryer to absorb vapors and gases. Such filters should be furnished with absorbing

substances and active coal granules as well as high efficiency. These filters should be maintained regularly and be changed when necessary.

2. A chimney between 3 to 5 meters higher than the building roofs nearby the press should be fitted to curb the spread of pollutants to the neighborhood.
3. Machines should undergo periodical maintenance in order to reduce noise to the permitted limits.
4. Providing the safe and adequate lighting at the halls of production with regular maintenance and installation of reserve lightening in case of power cut.
5. Refrain from the use of lead letters printing, and be replaced by computers due to their significant health harms.
6. Replacing gasoline, which is used in cleaning machines from ink with less dangerous substances with the same efficiency such as white spirit.
7. Refrain from releasing of liquids resulting from processing operations except after chemically neutralized to maintain hydrogen number within (pH=7).
8. Removal of paper garbage continuously and regularly with taking care of the factory's general cleanness.
9. Workers should be strictly warned against having any food or drinks at work sites, especially at the processing section.
10. Workers should be warned against long exposure time to computer screens. They have frequent breaks during work in order to avoid eyes fatigue.
11. Providing the workers of newspapers printing the "main machine" with preventive earphones against high noise dangers.
12. Photocopying workers must wear preventive dark eyeglasses against intensive glowing of photocopying.
13. All personnel should undergo periodical medical check up.

### **3-4 Film Processing Activities**

1. Improving the general ventilation needed for refreshing work atmosphere through increasing the A/C units in production sections with continuous maintenance and repair.
2. Installation of solutions control system on the operation machines. These equipments should be able to drive vapor out of the plant by 3 to 5 meters chimney higher than the building near the factory.

3. Fitting plastic screen at the processing chamber.
4. Continuous periodic maintenance of the pollutants control equipment and the used machines therefore.
5. Preparing processing system for photocopying water in order to extract the silver melted in this water and to avoid discharging it in the public sewage.
6. Refrain from releasing water containing chemical to the public sewage except after treating it and neutralizing (pH) to prevent any effect on the public sewage network.
7. Maintaining the general cleanness of the plant with quick discharge of the liquid and solid wastes and continuous washing of the production hall.
8. Organized packing of the empty gallons and the boards of printing.
9. Refrain from storing film processing water inside workplace. A special place should be allocated for these dangerous chemicals.
10. Processing workers must be warned against the dangers of these chemicals.
11. Workers must not have drinks or meals at work places or inside the processing chamber.
12. Workers should wash their hands with water and soap after end of work directly.
13. Providing protective dark eyeglasses against strong lighting.
14. Workers must undergo periodical medical check up especially eyes examination.

### **3-5 Soft Tissue Industry Activity**

1. Installation of general ventilation equipment adequate to refresh workplace atmosphere such as A/C units.
2. Providing local ventilation systems on the soft tissue packing with regular maintenance therefore.
3. Raw materials mixing through boiling operations should be carried in an isolated chamber to protect workers against high degrees of temperature.
4. Allocating a special chamber for boiling chamber operation and control. This chamber must be air conditioned, sound isolated, and suitable for control in order to protect the operator against high temperature.

5. Carrying out periodical maintenance of the machines to control the noise intensity to (85) dBA.
6. Use of best ways in treating water used in paper manufacture in order to be used again and to putrefaction of water.
7. Finding and appropriate way for disposal of the remained boxes waste.
8. Storage of chemical and solution must be at a place isolated from other raw materials warehouses.
9. Workers should not be present at the machines section unless they are equipped with earpieces against high noises.
10. Workers should take care of their personal cleanness including hand washing with water and soap after work directly.
11. Workers must use the following personal preventive means:
  - a) Earpieces especially for production workers section – overalls – safety shoes – gloves for all workers.
  - b) Preventive eyeglasses for scissors workers.
  - c) Nozzles with filters for the kneading machines and basins workers.
12. Workers should undergo periodical medical check up regularly.

### **3-6 Nylon Bags Manufacturing Activity**

1. Providing a room equipped with local ventilation systems to keep washing basin of ink and colors drums as well as color printing equipment inside it, and also to protect other sections of the factory against gases and vapor. These systems should be fitted on the top of ink drums washing basin.
2. Providing suitable control equipment inside press section to curb the diffusion of gas pollutants resulting from materials.
3. Replacing of (benzene, Kerosene, toner) and other petroleum products used in washing and cleaning of painting machines with less dangerous substance of the same efficiency like white spirit.
4. Periodic maintenance of all plastic and nylon bags machines as well as printing machines in order to curtail the diffusion of noise intensity produced by these machines.
5. Continuous regular maintenance of lighting equipment and change of the damaged ones.

6. Packing and organizing the raw and the finished materials inside the plant, and leaving pathways of workers movement to void vocational accidents.
7. Taking care of the factory's cleanness and applying safely system in storing raw materials and finished products.
8. Workers must be furnished with the following personal protection means:
  - a) Nozzles equipped with anti gas filters and should be frequently changed.
  - b) Preventive ear caps against high uproar.
  - c) Long neck shoes to protect workers against chemicals
9. Workers must undergo periodical medical check up.

### **3-7 Paper Filters Industry Activity**

1. Installation of general ventilation means on the sides of the production shed in order to maintain an appropriate temperature and humidity in the work atmosphere.
2. Installation of local ventilation systems on the top of the furnaces to such the pollutants resulted from the industrial operations.
3. Preparing cabinet equipped with A/C units at the places of product carton filling.
4. Providing air-conditioned cabinet to offer healthy appropriate atmosphere for the personnel due to high heat and humidity resulting from processing and drying operations, which may have effect on workers health.
5. The machinery should undergo periodic maintenance to limit noise intensity within the permitted level.
6. Carrying out regular maintenance to lighting means to keep it in good condition.
7. Providing workers with personal protection means such as overalls, shoes, gloves and earphones.
8. Personnel should undergo periodical medical check up.

### **3-8 Cartons and Boxes Industry Activity**

1. Installation of A/C units at the sides of the production halls sufficient to suck our temperature, humidity and dust from work atmosphere.
2. Increase of natural ventilation holes such as (windows, ceiling holes) to minimize heat intensity and entrance light intensity.

3. Carrying out periodic maintenance of the machines to keep uproar intensity within the permitted limits.
4. Taking care of the factory's cleanness with the necessity of getting rid of wastes resulting from production operations gradually.
5. Trying to get use of the sealed carton waste as possible or driving them away in suitable ways.
6. Providing a special chamber for ink boxes storage and never leaving them open besides printing machines.
7. Furnishing workers with the following personal protection means:
  - a) Ear caps against uproar.
  - b) Overalls, gloves and longneck shoes.
  - c) Nozzles with anti-gas and dust filters for press workers.
8. Workers must go to periodical medical check up.

### **3-9 Paper Covers Industry Activity**

1. Installation of high efficient control system of the processing chamber in sucking out the chemical vapor.
2. Installation of local ventilation system at printing chamber to take out the materials vapor used in printing such as Methanol.
3. Continuous maintenance of the control systems found on top of the processing basin in order to raise the efficiency of pulling out chemicals vapor in processing.
4. Replacing of methanol and kerosene used in cleaning printing machines with other ones of less danger and in the same specifications, like "white Spirit".
5. Carrying out regular maintenance of the machines to keep noise level at 85 (dBA) for 8 hours.
6. Workers should wash their hand with water and soap after the end of work directly.
7. Workers must not eat at workplace. A restroom should be specified for this purpose.
8. Providing workers with personal protection means such as overalls, shoes gloves and earphones.
9. Workers should undergo periodical medical check up.

### **3-10 Paper Plates Industry**

1. Isolation of plates picturing place from other parts of the plant equipped with local desparation equipment to prevent eh diffusion of pollutants to the workplace.
2. Carrying out periodical maintenance of the manufacturing machines to keep noise within the permitted levels.
3. Taking necessary precautions to avoid the pouring of chemicals such as acids and alkaline used in picturing operations on the factory's floor.
4. Taking care of the factory leanness. Resulting wastes should be disposed of daily after the end of work.
5. Disposal of solid wastes gradually at the public garbage containers.
6. Isolating raw materials storage from finished products. Pathways should be free from any obstacles that may hinder workers movement inside the warehouse, and to avoid work accidents.
7. Raw materials should be stored on wooden bases of 30- cm. above the ground. Warehouses should be furnished with insects traps.
8. Workers must wash their hand with water and soap after work directly. A restroom must be specified where workers may have food at.
9. Providing workers with personal protection means such as overalls, shoes, gloves and earphones.
10. Workers must have periodical medical check up.

## **FOURTH: ENGINEERING AND ENVIRONMENTAL**

### **REQUIREMENTS OF THE METAL INDUSTRY**

#### **4-1 Iron Industry Activity**

1. Installation ventilation systems on the whetting machine and the saw with periodical maintenance to these systems in order to preserve their efficiency in purifying workplace.
2. Providing adequate control systems fitted on top of the washing basins in order to dispose of compounds vapor used in cleaning operation.
3. Installation of suitable control system on the top of each furnace in order to pull out largest diffusive smoke during unloading and smelting operation.

4. Installation of local installation system consisted of hood, pipe and fan for sucking and filtering air before driving it out during welding and molding operations.
5. Painting works should not be carried in an open place in order to avoid the diffusion of eh organic solutions, which are harmful to environment. A special closed room must be allocated for painting equipped with local; ventilation system of high efficiency in order to suck out vapors and solutions resulted for painting.
6. Ventilation system inside the painting room should be furnished with special filters that purify air and reduce the concentration of the harmful organic vapor in the outside air.
7. Welding, cutting or whetting operations must not be done inside the painting chamber in order to avoid fire or explosion occurrence.
8. Regular maintenance of the local ventilation and control equipment to preserve their efficiency.
9. Making sure that materials used for shearing or welding are free from any fatty or organic substances on their surface to avoid work accidents and prevent gas pollutants diffusion.
10. Partitions must be placed around welding operations to protect workers against glaring resulting there from.
11. Welding smoke pollutants should not exceed the permitted limits stipulated in this by-law.
12. The organic vapor and colors ingredients inside the painting room must not exceed the permitted limits specified this by-law.
13. Liquid overflows from the industrial operations shall be controlled in order not to cause disorder in the ecological balance upon releasing them to the external environment. Such process should be done through periodic measures to ensure that rated would not trespass the values listed in this by-law.
14. Finding the best engineering methods that curb the heat effect which furnace section workers are exposed to, to the acceptable limits that minimize their productive efficiency.
15. Use of appropriate means that reduce the uproar intensity resulting machines operations in order to be at 85 (dBA) for 8 hours exposure a day.
16. Carrying out the periodical maintenance to the equipment and machines for preventing an increase in noise intensity, and change of the damaged ones right upon damage occurrence.

17. Preserving safe lighting level inside the factory through carrying out regular maintenance, and changing of the damaged one immediately upon damage occurrence.
18. Disposal at the wastes of materials washing through suitable ways, and not release them to the public sanitary with treating them prior to getting rid of them.
19. Maintenance of the electrical extensions, covering them and replacing the damaged ones in order to avoid fires and accidents.
20. Providing fire fighting equipment and the tools used in emergency cases which should be kept at an easily accessible place.
21. Workers should not clean their hands with toner or organic solution. They must use water and soap for personal cleaning purposes.
22. Workers should take care of their personal cleanness after work hours in order to get rid of the pollutants and the suspending sediments resulting from the industrial operations. Cloths should be changed after work hours.
23. Providing guide signs to prevent damages and increase of environmental awareness of the workers.
24. Workers must undergo periodical medical check up.
25. Providing workers with the following preventive means:
  - a) Overalls and protective shoes.
  - b) Gloves and nozzles for welding, whetting and painting workers.
  - c) Protective eyeglasses and ear caps against high noise.
26. Substances containing chlorinated hydrocarbon should not be used near heat, fire or electrical spark especially upon welding. Also, such substances must not be exposed to sunrays directly.

#### **4-2 Aluminum Industry**

1. Installation of local ventilation means on aluminum acid washing basins to such out the diffusive vapor from washing operation.
2. Use of appropriate control means and technologies to prevent dispersion of aluminum pieces.
3. Placing fixed and mobile partitions in order to protect workers near shearing and whetting operation against the aluminum filings.

4. Pollutants rate in the liquid wastes resulting from industrial operations should not exceed the permitted limits listed in this by-law. In addition to that, best mechanical and chemical treatment methods must be used in order to dispose of pollutants prior to releasing them to the external environment.
5. Covering the walls opposite to the electrical saws with a substance that reduce rate of turmoil pollution.
6. Isolation of noisy equipment such as electrical saws in places that prevent sound reflexion as possible or placing sound absorbing partitions to reduce the spread of uproar provided that these partitions should not be less than two meters high above the ground.
7. Periodical maintenance should be carried to the machines so that noise intensity should not exceed 85 (dBA) for a period of exposure of not more than 8 hours daily.
8. Regular maintenance should be carried the lighting equipment. Damaged lamps must be replaced to raise lighting level and efficiency thereof.
9. Regular measurement operation should be performed to preserve the rate of the hydrocarbon and fluoride in the air within the allowed limits listed in this by-law.
10. Taking due care of the general cleanness of the factory. Pathways and workplaces should be free from obstacles and remnants with a special place for collecting them and disposing them gradually to avoid accidents.
11. Maintenance of the electrical extensions cover and replacement of the damaged parts in order to avoid accidents.
12. Erecting sufficient number of iron stands for storage of raw materials provided that they should not be less than 30 cm. with spaces between them.
13. Allocation of a suitable accessible place for storing manual kits.
14. Leaving suitable spaces around machines to allow east movement of the workers.
15. Workers should take care of their personal cleanliness after work hours to get rid of suspending pollutants.
16. Preventing eating food inside work venue, and allocation of suitable place for that purpose.
17. Providing guide signs that increase environmental awareness of the workers.
18. Providing a special room for clothes change equipped with wardrobes.

19. Workers of formation and preparation must be furnished with personal protection means which they should wear during work hours, such as:

- a) Earpieces against high noise
- b) Protective eyeglasses against flying aluminum piece during shearing and formation operation
- c) Suitable wears and protective shoes for all workers

20. Workers should undergo periodical medical check up and audiography.

### **4-3 Industry of Home Utensils**

1. Installation of ventilation system equipped with filters resistant to acids on the boiler used in cleaning products from grease after pressing and formation operation.
2. Installation of local ventilation systems annexed with the (brushing-polish) machines of the product in order to prevent alkaline polishing substances.
3. Providing sufficient number of A/C units in the polishing section to reduce the heat effect resulting from the drying furnace, with continuous maintenance and filter change thereof.
4. Regular maintenance of the filters connected with the local ventilation system, which are installed on the drying furnace chimneys to preserve them efficient in purifying the work atmosphere from pollutants and acids that are harmful to environment.
5. Periodical maintenance of the air sucking fans fitted on the top of the alkaline treatment basin and polishing section.
6. Isolation of the organic solution used in greasy substances cleaning existing on the products at the polishing chamber away from any fire source in order to avoid accidents.
7. The boiler should be tightly capped to avoid accidents.
8. The ground must be resistant to erosions or reaction with acids especially at the washing chamber.
9. Air compressor must be isolated in a separate room resting on rubber pillows to reduce the ground vibration and high noise resulting therefrom.
10. Placing soundproof partitions around the noisy machines such as the compressor and the whetting machines to protect workers against high noise.
11. Maintenance of machines continuously to preserve noise intensity within the permitted level.
12. Regular maintenance of the lighting equipment, and replacement of the damaged ones to preserve lighting level within the acceptable levels inside the factory.
13. Maintenance of the electrical extensions, covering and replacing the damaged ones in order to avoid accidents.
14. Finding the best engineering methods to dispose liquid remnants resulting from the industrial operations in order not to cause disorder in the ecological balance upon discharging thereof.
15. Measuring and neutralizing of the S Hydrogen of water resulting from the industrial operations.

16. Accumulation of aluminum remnants gradually than getting use of them through recycling.
17. Taking care of the general cleanliness of the factory with disposal of wastes in appropriate ways and not in the public sewage in order not to cause harm to environment and public hygiene.
18. Storing of acids in glass bottles stand and non-erosive bases. These bottles must be isolated in a separate corner at the factory.
19. Packing the raw materials and the finished products with leaving pathway to facilitate workers movement.
20. Workers must not put their hands in sodium solution and acid. They should be protective gloves and leather overalls when handling with those substances.
21. Workers must pay attention to their personal cleanliness after end of works with the provision of a special place for having meals.
22. Providing a special room for clothes change furnished with wardrobes.
23. Providing guide sign aiming at increasing workers environmental awareness.
24. Workers must be provided with the following personal protective means:
  - a) Nozzles, gloves and eyeglasses of whetting, polishing and cleaning workers.
  - b) Special clothes and preventive nozzles for acid cleaning workers.
  - c) Anti-noise ear caps and preventive eyeglasses against dispersing pieces from industrial operations.
25. Workers must undergo periodical medical check up and audiography.

## **FIFTH: THE ENGINEERING AND ENVIRONMENTAL**

### **STIPULATIONS FOR CONSTRUCTION INDUSTRIES SECTOR**

#### **5-1 Manufacturing of Hallow Ceilings and Prefabricated Concrete Units Activity**

1. Installation of highly efficient general ventilation systems in the place of manufacturing in order to decrease the temperature and moderate business atmosphere.
2. Appropriate control systems must be installed upon galvanization directly above zinc melting basin, provided that it must be connected to a filter in order to purify the emitting smokes before being spread in the places of work.
3. Closed room must be allocated for painting. This room should be provided with highly efficient spot ventilation system connected with 3-5 meters chimney above the roof of the building.
4. Periodical maintenance of the spot ventilation system must be carried out in the painting cabinet. Further, filters should be replaced in closer intervals and it must be operated during painting works.

5. Drainage system must be available in the floor of the cabinet to collect the material resulting from painting.
6. Special cabinet should be made for welding operation. This cabinet must be provided with spot ventilation system and movable partitions must be installed beside welding operations in order to prevent the exposure of the other workers of his factory to the sparks resulting from welding operation.
7. The places allocated for welding, cutting, smothery and whetting must be provided with sufficient air conditioning units. Further, doors and windows must be left open to circulate air and to prevent the accumulation of the health harmful gases.
8. Automatic mixing operations must be employed so that the employees may not suffer from skin diseases resulting from manual mixing operations.
9. Air-compressing machine must be isolated in a private room supplied with sound reducers in order to decrease the noise witnessed by the worker of the premix concrete unit's production section.
10. Periodical maintenance must be made for machines in order to maintain the limits of noise within the allowed limits.
11. Stickers must be placed indicating the places of high noise.
12. The severity of noise should not exceed the allowed limits (85dBA) for 8 hours of daily work.
13. The factory must be maintained clean and solid waste must be disposed on timely basis.
14. A place should be allocated for raw materials and produced materials. These materials should be arranged and organized, leaving appropriate corridors to enable the workers to move freely.
15. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
16. The thinner must not be used in cleaning the hands of the worker due to its dangerous effects on health.
17. Workers must be advised that they should not come closer to evaporation room in order to avoid high temperature resulting from evaporation operations.
18. Workers must be advised of the necessity of using earplugs upon getting access to the compressor. Further, the internal door of the room must be closed throughout the period of operation to prevent the exposure of workers to high noise.

19. It is prohibited for any worker to get access to the place of work in case the machines are working, unless he provided with earplugs in orders to protect him/her from unnecessary high noise.
20. Earplugs must be provided and the workers must be advised for the necessity of using these plugs. Further, they should be instructed about the danger of high noise it their hearing.
21. Medical examination and tests as well as audiometry must be carried for the workers who are exposed to high noise. The results must be recorded in a special file.

### **5-2 Manufacturing Cement Bricks and Tiles**

1. Appropriate control systems must be employed in order to restrict the emitting of dust resulting from manufacturing provided that these systems must be supplied with appropriate filters, to be continuously cleaned and maintained.
2. A number of highly efficient air conditioning units must be installed in the ambient environment of business to purify the atmosphere form dust inside the production hall.
3. Due to increase concentration of dust inside the area of manual mixing beyond the allowed limit, a matter that may expose the workers in this area to this dust and the pollution of the neighboring sections, and due to the fact that the workers mix these materials by hand, a matter that may cause them skin diseases; hence manual mixing operation must be replaced by automatic mixing operation to protect the workers from being expose to this dust. Further, the area where raw materials are mixed must be closed.
4. The conveying belts and the places from which dust arises must be covered to limit the spread of dust.
5. Continuous periodical maintenance of the presses, grinders, the machines that pull raw materials and all other machines must be made in order to decrease the severity of noise resulting from the same. Further, old machines must be replaced by new ones.
6. The distribution of machines, especially press and printers in carefully selected and engineering designed areas will restrict the noise. Rubber pillows must be placed under the presses to limit the noise and vibration resulting from operating these machines.
7. Stickers must be made indicating the places of high noise. Further, access to these places must be banned unless the protection systems are used.

8. The factory must be cleaned and the floors must be washed on daily basis. Further, waste must be continuously removed from different places of work in order to avoid accidents.
9. A tanker connected to a strainer to separate mud and cement sediments from water must be used before disposing these materials to the sanitary drainage network.
10. Drainage systems of the water coming from the grinder and saws must be covered with metal covers in order to prevent accidents.
11. Raw materials must be organized and arranged. Further, passages must be left a=to facilitate the movement of the workers inside the factory.
12. All workers of the factory must be advised that they must not stay in the sieves area and beside the conveying belts.
13. The workers of the automatic press must be replaced in order to restrict their exposure to high noise for long periods. Further, they should be advised of the necessity of using earplugs.
14. The workers must be advised that they must not stay in the drying hall or near the door of the evaporation room in case of opening this door in order to protect them from being exposed to excess temperature and humidity.
15. Personal protection uniforms must be provided for workers and they must be advised of using the same. These uniforms include:
  - a) Leather gloves for grinding machines workers, leather boots, aprons for mixing workers.
  - b) Ear plugs door protecting the workers of the pressing and grinding operations from high noise.
  - c) Masks provided with dust filters to protect concrete mixing workers from the emitting dust.
16. Audiometry must be made every two years and the result must be recorded in a special register for this purpose.
17. Periodical medical examination and tests must be made for all workers of the factory.

### **5-3 Asphalt Industries Business**

1. The asphalt factory must be at least 1 km. far away from the residential and urban areas.

2. Control system must be installed to dispose air pollutant resulting from asphalt industry, such as bag filter in order to restrict the emitting of dust, particularly small particles (10 micron) as it is harmful to health and environment.
3. The height of the chimney should not be less than 12 meters from the roof of the neighboring buildings in order to restrict the spread of air pollutants to the nearby areas.
4. The conveying belt must be covered and totally isolated in order to restrict the spread of harmful pollutants.
5. Periodical maintenance must be made for the conveying ducts and belts that convey raw materials. Further, the cracked ducts and belts must be repaired.
6. Continuous maintenance of the pollutants control system must be made. Further, used filters must be replaced in order to maintain the efficiency of the system and to restrict the spread of fine dust.
7. Gravels transport tractor must be supplied with closed and air conditioned cabinets to protect the workers of the tractor from high temperature and from being expose to harmful pollutant.
8. Increasing the combustion temperature of the fuel used in heating the burner in order to limit the spread of black smoke in the work and the external environment.
9. The floor of the factory must be cast and leveled to limit the emitting of dust during the entry and exit of trucks.
10. The road connecting the factory to the public street must be asphalted and leveled.
11. Covered or total gravels must not be stored in exposed areas. Further, appropriate stores must be allocated for this type of materials.
12. The waste resulting from the manufacture of asphalt must be dumped in the places allocated for the same by Kuwait municipality. These materials must not be dumped in places that constitute an additional source for emitting of pollutants.
13. The worker of the factory must be supplied with personal protection devices, such:
  - a) Masks that provide protection from dusts and other masks that provide protection from gases.
  - b) Glasses that protect the eye from dust
  - c) Ear plugs protect the ears from high noise
  - d) Covers that protect the head and neck
  - e) Safety boots
  - f) Hand gloves to deal with asphalt product

14. The workers must be advised of the necessity of isolating work uniforms from their private cloths and the necessity of washing it on daily basis.
15. Periodical medical examination and tests must be conducted to all workers of the factory.

#### **5-4 Imports and Grinding Gravels activity**

1. Dust control system must be employed by using water sprinkling systems, sedimentation of dust arising during unloading or loading gravels in order to prevent the spread of this dust in the atmosphere.
2. All necessary precautions must be taken to insure that the gravels will not fall in the sea during unloading or loading gravels in the ports. In case the gravels fall it must be immediately removed.
3. A number of piers must be allocated for the anchorage of vessels loaded with gravels.
4. Gravels must not be stored in the port except upon necessity and provided that the storage should be for temporary period. Further, the stores must be isolated and prepared for this use.
5. Due efforts must be made in order to prevent the emitting of any dust from the trucks during the transport of gravels on different roads. The gravels must be covered with tightly closed and effective cover.
6. Appropriated and suitable means of transport must be used for the transport of gravels.
7. All necessary precautions must be taken during transport in order to prevent the fall of gravels on roads and pavements of the port. The scatter of dust during loading the trucks must be avoided.
8. Truck drivers and importers must be advised of strict and absolute compliance with the traffic rules and regulations. Further, they should observe the allowable weight for moving on roads.
9. Importers gravels stores located at crusher locations or site locations must be far away from the residential areas so tat it may not pollute these areas with fine dust.
10. All conveying belts must be tightly closed in order to limit the emitting of dust during the operation of the crusher.
11. Engineering control system must be installed to control the emitting of dust coming from the industrial operations during crushing of gravels. In this respect

the filters used for gathering fine dust, such as bag filters must be used in the crusher.

12. The places where gravels are crushed must be far away from the residential areas in order to expose the citizens to fine dust that is harmful to health.
13. The roads linking the crushers with the public road must be asphalted.
14. The waste resulting from crushing operations must not be thrown in desert or other areas except in the places allocated for the same by Kuwait Municipality. Further, the owners of the crushers should not leave the waste inside the plot so that it might not be an additional source for emitting of dust into the atmosphere.
15. Raw gravels must be washed before being imported, if possible, or before crushing operations.
16. The concentration of the suspended particles must not, in all cases, exceed the following ratio:
  - a) 90 microgram/ m<sup>3</sup> in the atmosphere on annual average basis.
  - b) 350 microgram/m<sup>3</sup> in the atmosphere on daily average provided that this concentration must not be repeated twice within very 30 days.
17. The severity of noise should not exceed 85 dBA, under any circumstances, for 8 hours working exposure per day.
18. To advise all workers existing in the storage places of he importers that they should observe the use of personal protection methods.
19. All workers must be advised that they should not stay near the crusher or the sieves except upon necessity.
20. All precautions must be taken to protect the workers existing in the crusher and all places where the gravels are stored. Further, they must be supplied with the personal protection devices, such as:
  - a) Dust masks
  - b) Eye glasses
  - c) Earplugs to protect ears from high noise
  - d) Helmets
  - e) Safety boots
21. Periodical medical examination and tests must be conducted for factory workers.

## **5-5 Cement Industry Business**

1. Spot ventilation systems must be provided in the cement sacks packaging section. These systems must be highly efficient to withdraw the dust existing the work atmosphere and to decrease concentration of the same to less than  $10 \text{ mg. / m}^3$
2. Ventilation openings existing on the storage cells must be connected to appropriate number of filters.
3. Periodical maintenance of his spot ventilation systems installed on the convey8ing belts must be affected.
4. Annual periodical maintenance system of he electrical sedimentation machines and filters existing in the factory must be made in order to maintain its efficiency and operation in the required manner.
5. The concentration of the dust emitting to the atmosphere after passing from the filters must not exceed  $10 \text{ mg/ m}^3$ .
6. New designs must be used in manufacturing in order to decrease the percentage of dust coming from the industrial operation. In this respect dust recycling must be effected via the injection of the dust into the raw material along with the addition of some solidity retardants.
7. Water sprinkling source must be provided to be used upon being directly exposed to cement dust.
8. Appropriate solutions to get rid of NOx and SOx resulting from the burning of fuel during manufacturing process must be provided.
9. Raw materials and fuel that contains the least percentage of silver must be used as an essential step to decrease the percentage of the gases emitting from industrial operations.
10. The temperature inside the factory should not exceed the allowed limits in order to maintain public health.
11. The noise inside the factory must be limited and it should not exceed the allowed limits (85 dBA) for 8 hours per day.
12. Automatic sucking technique must be used in cleaning the floors of all sections of the factory.
13. The workers engaged in this industry must be fully aware of the danger of the material, how to handle it, and the damages resulting from direct exposure to the same.

14. The workers must be obliged to use personal protection devices on continuous basis during working hours, such as: Dust masks, gloves, safety boots, helmets, ear plugs.
15. Periodical medical examination and tests must be conducted for the workers, especially relating to lung and skin diseases.

## **SIXTH: ENGINEERING AND ENVIRONMENTAL**

### **STIMULATIONS FOR ENGINEERING INDUSTRIES SECTOR**

#### **6-1 Production of Fridges and Water Coolers Activity**

1. Installation of a number of exhaust fans in the production hall in order to renew the air inside the factory.
2. Installation of movable ventilation systems on the locations where chemicals are poured.
3. Carpentry machines that cut and soften wood must be supplied with appropriated spot ventilation systems, provided that the dust must be collected in special sacks.
4. Carpentry section must be isolated from the remaining parts of the factory in order to prevent the spread of wood dust. Further, appropriate ventilation must be provided.
5. Insulate material casting room must be isolated from the remaining parts of the factory. Further, appropriate ventilation must be provided.
6. Carpentry machines must be isolated from the remaining parts of the factory in order to prevent the spread of the wood dust to remaining parts of the factory.
7. Closed room must be allocated for painting works. This room must be supplied highly efficient spot control systems. Further, air pushing fans must be operated during undertaking painting operations.
8. Periodical maintenance of the spot control system existing in the painting cabinet must be made. Further, associated filters must be replaced on closer intervals.
9. Water drainage systems must be provided into the paint works cabinet in order to collect the falling painting materials, in case a close control systems is used.
10. The water collected from paint works cabinet must be treated before being disposed.

11. Special cabinet for welding operations must be made and provided with sport ventilation systems.
12. Movable partitions must be installed besides welding operations to prevent the other workers from being exposed to the sparkles resulting from welding operations.
13. Welding places must be supplied with appropriate exhaust fans and the doors and windows must be left open in order to circulate air and prevent the accumulation of health harmful gases.
14. Cutting and whetting machines must be isolated from the remaining sections of the factory in order to reduce high noise resulting from the operation of these machines.
15. FCC containers (Ferrion gas) must be suitable and it must stand high internal pressure upon high temperatures.
16. Ferrion gas must be used in well ventilated place in order to prevent the accumulation of high concentrates of vapor inside the atmosphere of work.
17. Gas containers must be stored in cool and dry place away from being exposed to direct sunrays in order to avoid the dissolution of gas to acid components due to high temperature.
18. Periodical maintenance of the machines must be made in order to maintain the severity of noise within the allowed limits.
19. The severity of noise should not exceed the allowed limits (85 dBA) according to the hours of exposure, i.e. 8 hours of daily work – the working period every shift.
20. Lighting systems must be periodically maintained. Further, damaged lampas must be replaced to increase lightening in the different sections of the factory.
21. The corridors of the mechanical maintenance unit must be evacuated from all metal and solid waste hindrance. Further, other places of work must be evacuated from waste to facilitate the movement of the workers and to prevent accidents.
22. The factory must be cleaned and arranged in order to prevent the accumulation of raw materials and wastes resulting from manufacturing process. Further, solid waste must be removed.
23. Raw material s and produced items must be arranged and organized inside the factory, leaving appropriate passages to facilitate the movement of workers.
24. Caution must be observed in order not to inhale FCC vapor (Freon gas) even though for short period so as to avoid accidents of faint.

25. FCC should not contact skin, eye or garments in order to save the workers suffering from the frozen of tissues, eye liquids or the removal of the skin fat strata.
26. The thinner must not be used in cleaning the hands of the worker due to its dangerous effect on health. Further, ordinary personal cleaning materials must be used.
27. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
28. Toilers must be provided for workers and it must be maintained and kept clean.
29. Personal protection devices must be used by workers. These uniforms include:
  - a) Appropriate mask for industrial operations and the pollutants
  - b) Ear plugs for protecting the workers of the pressing and grinding operations from high noise.
  - c) Eye glasses
  - d) Hand gloves
  - e) Overalls
  - f) Safety boots.
30. Periodical medical examination and tests must be conducted for all workers of the factory.

### **6-2 Production of Air-Conditioning Units and Central Air-Conditioning Machine Activity**

1. Providing necessary public ventilation in the different department of production in order to cool work atmosphere.
2. Installation of air withdrawal system on Trichloroethane cleaning basins and continuous maintenance of these systems to increase its efficiency as well as to replace Trichloromethane with Trichloroethane.
3. To allocate close room for painting and to provide this room with highly efficient spot control systems along with the operation of exhaust fans.
4. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
5. (not mentioned anything)
6. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.

7. Treatment of the water collected from paint cabinet before disposal.
8. Construction of special cabinets for welding operations provided with spot ventilation systems.
9. Installation of movable partitions besides welding operations to prevent the exposure of the other workers of the factory to the sparks resulting from welding operation.
10. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
11. welding operations must not be conducted bear the basins allocated for cleaning steel tools as phosgene dangerous substance may result due to the existence of Trichloroethylene that is used in cleaning.
12. Isolating cutting and whetting machines away from the remaining sections of the factory to reduce high noise resulting from operating the same.
13. Periodical maintenance of the machines so that the severity of noise should not exceed the allowed limits.
14. Giving due care to general cleaning in the factory, particularly the floor and maintenance work shop.
15. Arranging and organizing the raw materials and the produced materials inside the factory. Further, appropriate passages must be left to facilitate the movement of workers and to prevent the accumulation of raw materials and the waste resulting from manufacturing operation that may cause accidents.
16. Evacuation of the passages inside mechanical A/C maintenance unit from all steel hindrance and solid waste through collecting the waste in special containers till disposing the same.
17. Observing sound applicable conditions relating to handling, storing, transport and packing of CFC containers that are used in filling A/C systems and fridges. This can be made by observing the following recommendations:
  - a) It must be made sure that CFC containers are appropriate and can bear with internal pressures at high temperatures.
  - b) Containers must be stored in cool and dry place away from fire or direct sunrays.
  - c) Freons gas must be used in good ventilated place to prevent the concentration of the vapor resulting from the gas in the work atmosphere.
  - d) Due care must be taken to prevent the inhalation of CFC vapors and compounds even though for short periods in order to avoid fating.

- e) Due care must be taken to prevent the existence of any flame or hot objects in the place where Freons gas is used in order to prevent the breakup of vapor to acid components and consequently pollution of the ambient atmosphere.
  - f) CFC compounds must not contact skin, eyes or garments. So skin protecting materials, gloves, protecting garments must be used in order to avoid liquid materials or that harmful eyes or skin.
18. All workers should be advised that they must not eat or drink any food or drinks or keep the same inside the place of work or in the paint room.
  19. The thinner must not be used in cleaning the hands of the worker due to its dangerous effect on health.
  20. Personal cleaning materials must be provided and workers must be advised of the necessity of washing hands with water and soap and they must take a shower after work
  21. Toilets must be provided for workers and it must be maintained and kept clean.
  22. Medical examination and tests must be conducted to all workers of the factory, particularly when they are newly engaged. Further, periodical medical examination must be made every year for paint workers and the workers who are exposed to the vapor of Trichloroethylene. Results of the medical examination must be kept in records and should be prepared for this purpose.
  23. First aid kits must be provided with necessary tools and materials. The kit must be opened and it should not include other things rather than first aid materials.
  24. The materials that contain Chlorinated Hydrocarbon must not be used near the sources of heat, fire or any electrical spark, particularly upon conducting welding operations. Further, it must not expose to direct sunrays.
  25. Workers must be provided with personal protection devices and they must be advised of using it continuously during work, such as:
    - a) Gloves for the workers who transport steel sheets and those who maintain A/C units.
    - b) Masks appropriate for the industrial operations and the type of pollutants existing in the ambient atmosphere. These masks must be provided with filters with regard to the workers who are exposed to the vapors coming from Freons gas during filling A/C units with gas and the vapors of Trichlorofluoromethane.
    - c) Glasses for lathe workers in the maintenance workshop.
    - d) Earplugs for protection from noise, particularly for the workers engaged in cutting, whetting and welding operations.
    - e) The workers must dress in overalls.

f) Safety boots must be used.

26. Initial and periodical medical examination must be conducted for all workers.

### **6-3 Steel Moulds and Steel Reinforcement Manufacturing Activity**

1. Necessary general ventilation must be provided using exhaust fans at the top of the mould and steel works factory. Further, many side openings must be made to increase the efficiency of general ventilation system.
2. Special cabinets must be made for welding operations and it must be provided with spot ventilation systems, either fixed or movable.
3. Special cabinet should be made for welding operation. This cabinet must be provided with spot ventilation system and movable partitions must be installed beside welding operations in order to prevent the exposure of the other workers of the factory to the sparks resulting from welding operations.
4. The walls of manufacturing shed must be provided with appropriate exhaust fans at the places that are allocated for welding in order to purify the atmosphere from pollutants. Further, windows and doors must be left open to circulate air and to prevent the accumulation of gases that are harmful to health.
5. Cutting and whetting machines must be isolated from the remaining sections of the factory in order to reduce high noise resulting from the operation of these machines.
6. Periodical maintenance of all machines, including steel extrusion machine, wires cutting machine, meshes cutting machine, meshes welding machines and vibrators that produce high noise in order to decrease the level of noise resulting from the same to the allowed limits.
7. The factory must be kept clean, so raw materials and wastes of production must not be left accumulated as the same may cause accidents.
8. Raw materials and produced items must be arranged and organized inside the factory, leaving appropriate passages to facilitate the movement of workers.
9. Workers must be advised that they shouldn't eat or have any drink inside the place of work. Further, a place for eating must be provided to keep and maintain their health.
10. Special cupboards must be provided so that the workers keep their garments in the same.
11. Enough toilets must be providing for workers and it should be maintained.

12. Workers should be advised that they shouldn't approach or get access to the compressor room unless in case of necessity. If they are obliged to do so earplugs must be used and the internal door of the room must be closed throughout the period of operation to prevent the exposure of the workers of the factory to high noise.
13. Personal protection devices, such as:
  - a) Earplugs must be used to protect the ears, especially in whetting, cutting etc. operations. Further, all workers who are exposed to high noise must use these plugs and they must be advised of the danger involved in this noise.
  - b) Protecting garments, such as aprons, gloves, masks, glasses etc must be used.
  - c) Appropriate masks and safety boots must be used.
  - d) The workers engaged in cutting insulating materials – upon production of fire proofing doors – must be provided with masks to protect them from the dust of the glass fibers.
14. The materials that contain chlorinated Hydrocarbon must not be used near the sources of heat, fire or any electrical spark, particularly upon conducting welding operations. Further, it must not be exposed to direct sunrays.
15. Periodical medical examination and tests must be conducted for all workers of the factory.

#### **6-4 Galvanized Activity (Coating steel items with a coat of zinc)**

1. Closed control system must be installed to withdraw the vapors coming from zinc melting basin during galvanizing operations.
2. Providing necessary general ventilation to cool work atmosphere.
3. Providing air-conditioned room with glass walls to supervise the workers from the same.
4. The factory must be kept clean and the accumulation of raw materials and production waste that may cause accidents must be prevented.
5. Raw material and produced items must be arranged and organized inside the factory, leaving appropriate passages to facilitate the movement of workers.
6. Personal protection devices, such as:
  - a) Aprons, safety boots, helmets, glasses and gloves.
  - b) Masks provided with special filters for galvanization workers and other filters that protect from the dust resulting from cleaning and abolishing the product, must be provided and the workers must be advised of using it.

7. The materials that contain Chlorinated Hydrocarbon must not be used near the sources of heat, fire or any electrical spark, particularly upon conducting welding operations. Further, it must not expose to direct sunrays.
8. Periodical medical examination and tests must be conducted for all workers of the factory.

### **6-5 Guiding Boards Manufacturing Activity**

1. Providing necessary general ventilation in the different sections of production to cool the ambient atmosphere.
2. Installing exhaust fan at the developing room provided with a filter to collect gases and a pipe connected with 3-5 high chimneys above the roof of the building in order to prevent the spread of harmful gases inside the developing room.
3. Closed room provided with highly efficient spot control systems must be allocated for painting. Further, exhaust fans must be operated during painting operations.
4. Periodical drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
5. Treatment of the water collected from paint cabinet before disposal.
6. Treatment of the water collected from paint cabinet before disposal.
7. Construction of special cabinets for welding operations must be provided with spot ventilation systems.
8. Installation of movable partitions beside welding operations to prevent the exposure of the other workers of the factory to the sparks resulting from welding operations.
9. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
10. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same
11. The severity of noise must not exceed the allowed limits according to the hours of exposure.
12. Periodical maintenance of the machines so that the severity of noise must not exceed the allowed limits.

13. Raw materials must be organized and arranged. Further, passages must be left to facilitate the movement of the workers inside the factory
14. The factory must be kept clean and raw materials as well as production waste, such as paint containers, inks .... Etc. must not be left and it should be soundly disposed. Further, solid waste must be timely disposed.
15. Inks must not be disposed in the drainage network; rather it must be collected in containers, then disposal.
16. The thinner must not be used in cleaning the hands of the worker due to its dangerous effects on health.
17. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
18. Enough toilets must be provided for workers and it must be maintained.
19. Workers must be advised of the necessity of using personal protection devices such as:
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations.
20. Glasses, gloves, overalls and safety boots must be used.
21. Periodical medical examination and tests must be conducted for all workers of the factory.

### **6-6 Chassis and Vehicle Accessories Manufacturing Activity**

1. Providing necessary general ventilation in the different sections of production to cool the ambient atmosphere.
2. Closed room provided with highly efficient spot control systems must be allocated for painting. Further, exhaust fans must be operated during painting operations.
3. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
4. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
5. Treatment of the water collected from paint cabinet before disposal.
6. Constructing special cabinets for welding operations provided with spot ventilation systems.

7. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
8. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
9. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
10. It must be made sure that there is no grease or organic materials are existing inside the tanks to be cut or welded in order to avoid explosion or poisoning.
11. Periodical maintenance of the machines, including smothery machines on continuous basis, so that the severity of noise must not exceed the allowed limits.
12. Periodical maintenance of lighting system and replacement of the damaged lamps to maintain the level of lighting in the different sections of the factory.
13. Severity of lighting must not exceed the allowed limits (85 dBA) according to the daily hours of exposure, which are 8 hours of daily works, the period of daily shift.
14. The factory must be kept clean and raw material s as well as production waste must not be left to avoid any accidents.
15. Raw materials must be organized and arranged. Further, passages must be left to facilitate the movement of the workers inside the factory.
16. Welding workers must not enter huge tanks for welding operations unless it is provided with highly efficient ventilation system to withdraw vapors and gases harmful to health.
17. The thinner must not be used in cleaning the hands of eh worker due to its dangerous effect on health.
18. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
19. Enough toilets must be provided for workers and it must be maintained.
20. Workers must be advised of the necessity of using personal protection.
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations.

- c) Glasses.
- d) Gloves.
- e) Overalls.
- f) Safety boots.

21. Periodical medical examination and tests must be conducted for all workers of the factory.

### **6-7 Boilers Manufacturing Activity**

1. Providing production hall with necessary general ventilation in the different sections of production to cool the ambient atmosphere.
2. Closed room provided with highly efficient spot control system must be allocated for painting. Further, exhaust fans must be operated during painting operations.
3. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
4. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
5. Treatment of the water collected from paint cabinet before disposal.
6. Constructing special cabinets for welding operations provided with spot ventilation system.
7. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
8. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
9. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
10. Periodical maintenance of the machines, including smothery machines on continuous basis, so that the severity of noise must not exceed the allowed limits.
11. Giving due care to general cleaning in the factory and preventing accumulation of the raw materials and the production wastes to avoid any accidents.
12. Raw materials must be organized and arrange. Further, passages must be left to facilitate the movement of the workers inside the factory.

13. The thinner must not be used in cleaning the hands of the workers due to its dangerous effect on health.
14. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
15. Enough toilets must be provided for workers and it must be maintained.
16. Workers must be advised of the necessity of using personal protection devices such as:
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations.
  - c) Glasses.
  - d) Gloves.
  - e) Overalls.
  - f) Safety boots.
17. Periodical medical examination and tests must be conducted for all workers of the factory.

### **6-8 spark plugs manufacturing activity**

1. Providing production hall with necessary general ventilation in the different sections of production to cool the ambient atmosphere.
2. Installation of spot ventilation systems and pollutants control systems on:
  - a) Lathing machines
  - b) Cleaning machine that uses 1,1,1- Trichloromethane
  - c) Cleaning basins – organic solvents treatment basins
  - d) Presses with insolents.

Periodical maintenance of these systems must be continuously conducted and the associated filters must be continuously changed.

3. Closed room provided with highly efficient spot control systems must be allocated for painting. Further, exhaust fans must be operated during painting operations.
4. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
5. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, incase of using closed control system.
6. Treatment of the water collected from paint cabinet before disposal.

7. Constructing special cabinets for welding operations provided with spot ventilation systems.
8. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
9. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
10. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
11. Periodical maintenance of the machines, including smothery machines on continuous basis, so that the severity of noise must not exceed the allowed limits.
12. Giving due care to general cleaning in the factory and preventing accumulation of the raw materials and the production wastes to avoid any accidents.
13. Raw materials must be organized and arranged. Further, passages must be left to facilitate the movement of the workers inside the factory.
14. The thinner must not be used in cleaning the hands of the workers due to its dangerous effect on health.
15. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
16. Enough toilets must be provided for workers and it must be maintained.
17. Workers must be advised of the necessity of using personal protection devices such as:
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations
  - c) Glasses.
  - d) Gloves.
  - e) Overalls.
  - f) Safety boots.
18. Periodical medical examination and tests must be conducted for all workers of the factory.

## **6-9 Electrical Tools and Connections Manufacturing Activity**

1. Providing production hall with necessary general ventilation in the different sections of production to cool the ambient atmosphere.
2. Industrial operation of resin isocyanides filling section and stabilizer section must be isolated and appropriate ventilation systems must be provided on the machines that are used in manufacturing.
3. Periodical maintenance of the ventilation systems that are installed on cables covering and isolating machines as well as for ventilation system at resin and isocyanides filling section and stabilizer section.
4. Closed room provided with highly efficient spot control system must be allocated for painting. Further, exhaust fans must be operated during painting operations.
5. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
6. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
7. Treatment of the water collected from paint cabinet before disposal.
8. Constructing special cabinets for welding operations provided with spot ventilation system.
9. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
10. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
11. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
12. Periodical maintenance of the machines, so that the severity of noise must not exceed the allowed limits.
13. Stabilizer section should not be manually cleaned; rather automatic sucking machines must be used to prevent the pollution of the place with lead dust.

14. Giving due care to general cleaning in the factory and preventing accumulation of the raw materials and the production wastes to avoid any accidents.
15. Raw materials must be organized and arranged. Further, passages must be left to facilitate the movement of the workers inside the factory.
16. The workers must not stay beside the furnaces for long period unless they are dressed in personal protection uniforms in order to protect them from being exposed to the heat resulting from the furnaces and from CO and CO<sub>2</sub>.
17. The thinner must not be used in cleaning the hands of the workers due to its dangerous effect on health.
18. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
19. Enough toilets must be provided for workers and it must be maintained.
20. Workers must be advised of the necessity of using personal protection devices such as:
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations
  - c) Glasses.
  - d) Gloves.
  - e) Overalls.
  - f) Safety boots.
21. Periodical medical examination and tests must be conducted for all workers of the Factory.
22. The materials that contain Chlorinated Hydrocarbon must not be used near the source of heat, fire or any electrical spark, particularly upon conducting welding operation. Further, it must not be exposed to direct sunrays.

### **6-10 Smithery Activity**

1. Installation of highly efficient exhaust fans at the top of the ceiling of the factory to reduce the concentration of the fine suspended dust and gases existing in the ambient atmosphere of the factory.
2. Periodical maintenance of the ventilation system of the factory to guarantee its continuous efficient works.
3. Welding workers must not enter into huge tanks for welding operations unless it is provided with highly efficient ventilation system to withdraw vapors and gases harmful to health.

4. Closed room provided with highly efficient spot control system must be allocated for painting. Further, exhaust fans must be operated during painting operations.
5. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
6. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
7. Treatment of the water collected from paint cabinet before disposal.
8. Constructing special cabinets for welding operations provided with spot ventilation system.
9. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
10. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
11. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
12. Periodical maintenance of the machines, so that the severity of noise must not exceed the allowed limits.
13. Providing appropriate and safety lighting suitable for this activity.
14. Giving due care to general cleaning in the factory and preventing accumulation of the raw materials and the production wastes to avoid any accidents.
15. Raw materials must be organized and arranged. Further, passages must be left to facilitate the movement of the workers inside the factory.
16. Leveling the floor of the factory and to prevent the occurrence of any accidents.
17. The thinner must not be used in cleaning the hands of the workers due to its dangerous effect on health.
18. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
19. Enough toilets must be provided for workers and it must be maintained.

20. Workers must be advised of the necessity of using personal protection devices such as:
- a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations
  - c) Glasses.
  - d) Gloves.
  - e) Overalls.
  - f) Safety boots.
  - g) Periodical medical examination and test must be conducted for all workers of the factory.
  - h) The materials that contain Chlorinated Hydrocarbon must not be used near the source of heat, fire or any electrical spark, particularly upon conducting welding operation. Further, it must not be exposed to direct sunrays.

### **6- 11 Metal Pipes Manufacturing Activity**

1. Installation of control systems to control production waste and to withdraw Celica dust and gases that are spread in the factory
2. Providing general ventilation by using exhaust fans to be installed at the top of the ceiling of the factory to cool the ambient atmosphere of the factory.
3. Periodical maintenance of the ventilation system of the factory to guarantee its continuous efficient works.
4. A system for withdrawing the dust from pipes cleaning room must be installed and this system must be periodically maintained to preserve its efficiency.
5. Closed room provided with highly efficient spot control system must be allocated for painting. Further, exhaust fans must be operated during painting operations.
6. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
7. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
8. Treatment of the water collected from paint cabinet before disposal.
9. Constructing special cabinets for welding operations provided with spot ventilation system.

10. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
11. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
12. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
13. Periodical maintenance of the machines, so that the severity of noise must not exceed the allowed limits.
14. Sand blasting may be not used in cleaning metal pipes and it should be replaced by steel blasting in order to avoid pollution of the ambient atmosphere of the factory.
15. Providing appropriate and safety lighting suitable for this activity.
16. Giving due care to general cleaning in the factory and preventing accumulation of the raw materials and the production wastes to avoid any accidents.
17. Raw materials must be organized and arrange. Further, passages must be left to facilitate the movement of the workers inside the factory.
18. The thinner must not be used in cleaning the hands of the workers due to its dangerous effect on health.
19. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
20. Sufficient toilets must be provided for workers and it must be maintained.
21. Workers must be advised of the necessity of using personal protection devices such as:
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations
  - c) Glasses.
  - d) Gloves.
  - e) Overalls.
  - f) Safety boots.
22. Periodical medical examination and tests must be conducted for all workers of the factory.

23. The materials that contain Chlorinated Hydrocarbon must not be used near the source of heat, fire or any electrical spark, particularly upon conducting welding operation. Further, it must not be exposed to direct sunrays.

### **6-12 Shipbuilding and Repair Activity**

1. Providing the place of galvanization with a system for withdrawing the vapors resulting from cleaning and galvanization operations.
2. Installation of spot ventilations system associated with cutting and polishing machines along with periodical maintenance of these systems to guarantee withdrawal of the dust resulting from these operations.
3. Closed room provided with highly efficient spot control system must be allocated for painting. Further, exhaust fans must be operated during painting operations.
4. Periodical maintenance of the spot control system at paint cabinet along with replacement of the associated filters on short intervals.
5. Providing drainage system in the floor of the paint cabinet to collect the dropping paint materials, in case of using closed control system.
6. Treatment of the water collected from paint cabinet before disposal.
7. Constructing special cabinets for welding operations provided with spot ventilation system.
8. Installation of movable partitions besides welding operations to prevent the exposure of other workers of the factory to the sparks resulting from welding operations.
9. Providing welding places with appropriate exhaust fans along with opening doors and windows to circulate air and to prevent the accumulation of the gases that are harmful to health.
10. Isolating cutting and whetting machines from the remaining sections of the factory to reduce high noise resulting from operation of the same.
11. Periodical maintenance of the machines, so that the severity of noise must not exceed the allowed limits.
12. Sand blasting may be not used in cleaning metal pipes and it should be replaced by steel blasting.
13. Providing appropriate and safety lighting suitable for this activity.

14. Giving due care to general cleaning in the factory and preventing accumulation of the raw materials and the production wastes to avoid any accidents.
15. The thinner must not be used in cleaning the hands of the workers due to its dangerous effect on health.
16. Paint workers should be advised that they must not have any food or drinks or keep the same in the painting room.
17. Sufficient toilets must be provided for workers and it must be maintained.
18. The workers engaged in galvanization must be obligated to wear gas masks.
19. Workers must be advised of the necessity of using personal protection devices such as:
  - a) Masks provided with appropriate filters for the industrial operations and the existing pollutants.
  - b) Earplugs, especially for the workers engaged in cutting, whetting and welding operations
  - c) Glasses.
  - d) Gloves.
  - e) Overalls.
  - f) Safety boots.
20. Periodical medical examination and tests must be conducted for all workers of the factory.

## **SEVENTH: ENGINEERING AND ENVIRONMENTAL STIPULATIONS FOR GARAGE, CAR WASHING AND GREASING STATIONS SECTOR**

### **7-1 Auto Repair Garages Activity**

1. All sections of the garage must be provided with comprehensive ventilation system so that the air inside the garage should be continuously renewed during the appropriate period of time. Further, there should be fans to cool the atmosphere in the summer in order to save the workers from exhaust and fatigue.
2. Periodical maintenance of the spotted ventilation systems in all cabinets of the different sections of work. In this respect the filters associated to vapors withdrawal system must be cleaned and renewed. Further more, air must be periodically pumped to maintain the efficiency of the systems and its ability to purify work atmosphere from pollutants of the industrial operations.
3. The level of severity of noise in the garage should not exceed 85 (dBA) during 8 hours of daily work.

4. Providing necessary industrial and natural lighting all over the garage, especially in the lathe room.
5. Creating special hall for paint works, provided that it should be separate and tightly closed from the remaining sections of the work. Within this room a place for preparing paints and another place for spraying paints, third place for preparing vehicles with paste and another section for car polish must be allocated.
6. Exhaust fan should be installed, provided that it should be associated to the spot ventilation system and provided also it should be connected with a stack of three meters high above the roof of the garage.
7. A room within electricity workshop should be made to prepare the water of batteries and to mix water with sulfuric acid. This room should be completely isolated from auto-electricity repair workshop.
8. Work places should be supplied with a table and a board above which manual tools should be arranged in an accessible and save money.
9. Gas cylinders must be fixed in a manner that prevent fall of the same on the ground or it must be placed in rooms allocated for this purpose.
10. Movable welding partitions and preventive barriers should be fixed on the built of the lathe.
11. Appropriate means should be created to withdraw the vapors resulting from the dilution of the sulfuric acid within batteries maintenance and charge unit. In this respect highly efficient ventilation systems proportionate with the size of the room must be installed to withdraw the vapors resulting from the dilution of the sulfuric acid.
12. The conveying belt should be covered with protective covers
13. All waste lubricants of the garages must be collected in special containers.
14. Machine parts should not be cleaned with organic solvents containing dangerous benzene and it should be replaced with lesser dangerous substance, provided that cleaning should be carried out in places supplied with appropriate ventilation systems to withdraw the vapors.
15. All workers, particularly paint workers, should be advised that they must not eat or drink or store the same in the different places of work inside the sections of garage. Further, a room should allocate as rest room for the workers and this room should be provided with a canteen for light meals.
16. Guiding stickers must be placed in all dangerous machines indicating that this machine is dangerous and how this danger can be avoided.

17. Personal protection devices should be provided and used by all workers of the garage, such as :
  - a) Gas mask for the welding workers, other mask relating to the withdrawal of organic solvents for paint workers, provided that these masks must be highly efficient and it must be continuously cleaned and its filters must be replaced on short intervals.
  - b) Leather gloves for paint workers, and the worker engaged in washing the machines and welding to protect their hands from being exposed to grease and lubricants.
  - c) Protective gloves aprons and safety boots for all workers.
  - d) Goggles for whetting workers to protect them from the materials resulting from whetting operations.
  - e) Electric and oxygen welding workers should be provided with protective shields and glasses and they should be advised of the necessity of using the same.
  - f) Ear plugs to protect the welders and smith crafts and whetting the workers from the noise resulting in Smithery and plumbing section.
  - g) Toilets with hand wash basins must be provided to the workers to wash their hands from the traces of the manufacturing operations, particularly in the paint section.
  - h) Dressing room with cloth cupboard must be provided, keeping in view that these garments must be continuously cleaned from lubricants and grease that may result in skin disease.
18. Periodical medical examination and tests should be conducted for all workers, particularly the workers who are exposed to professional disease, namely Smithery workers and the workers who are exposed to the paint and welding vapors. Furthermore, the audiometry should be made for them.
19. The material that contains chlorinated hydrocarbon must not be used near the sources of heat, fire or any electrical spark, particularly upon conducting welding operation. Further, it must not be exposed to direct sunrays.

### **7-2 Auto Wash and Greasing Stations Activity**

1. Periodical maintenance of all spot ventilations systems of all different sections of the work.
2. Providing necessary industrial and natural lighting all over the garage, especially in the lathe room.

3. Proving the machines that are used in cladding vehicles carpets with a system for withdrawing dust.
4. In case the plot is allocated as auto washing and greasing station, no welding and painting operations be carried inside the same. Further, no chemical should be stored in its stores. Furthermore, used lubricants must not be disposed in the public drainage network and the plot should be used for the purpose it is allocated for.
5. Car consumable items should be properly stored.
6. Providing and continuously maintaining lubricants separation systems at car washing stations to guarantee the efficiency of these stations.
7. Solid waste must be timely and properly disposed in accordance with the stipulations of the municipality.
8. Drainage canals inside the station must be continuously maintained so that it should be utilizable. Further, used lubricants resulting from maintenance operations and replacement of engine lubricants must not be disposed in the public drainage network; rather it must be properly dumped.
9. The room should be cleaned and passages should be cleared from all hindrances and solid wastes resulting from the repair and replacement of motor parts and it should be dumped in the place allocated for this purpose.
10. The floors of the station must be rough and leveled to prevent slippery. Further, periodical cleaning of the same must be observed using steel and industrial detergents so that it should always remain free of grease.
11. The workers of the station should be advised that they should not use benzene or diesel while washing the hands to remove lubricants or grease as such materials may cause irritations and it may be harmful to the efficiency of the respiratory system.
12. A room should be allocated as rest room for the workers and this room should be provided with a canteen for light meals. Further, workers should be advised of the necessity of washing their hands with water and soap before eating these foods.
13. Personal cleaning items must be provided for workers and they must be advised of the necessity of washing their hands with water and soap after completion of work.
14. A room should be allocated for first aid and it should be provided with first aid kit containing a complete set of medicine, bandages and disinfectants.
15. Stickers must be placed on the dangerous machines indicating different occupational hazardous that may be suffered by the workers of the car washing and greasing machine. Further, methods of avoiding these hazardous must be indicated.

16. Due care must be given to cleanness of the sanitary facilities, so that it must be always suitable for use. Further, the number of showers and toilets must be increased proportionate with a number of workers. Furthermore, it should be provided with industrial detergents, towels and creams that may be used after painting works.
17. Personal protection devices must be provided and used by all workers, such as safety boots, overalls, gloves and masks provided with filter to protect the workers from the occupational disease.
18. Periodical medical examination and test must be conducted for all workers of the factory, particularly washing and greasing workers.

## **EIGHTH: ENGINEERING AND ENVIRONMENTAL STIPULATIONS OF THE FOODSTUFFS INDUSTRIES SECTOR**

### **8-1 General Environmental Stipulations for Food Sector**

1. All walls of the factory and the raw materials stores must be covered with tiles at height, not less than three meters. Further, all walls and ceilings of all sections of the factory must be painted. The floors must be covered with tiles having suitable slope to allow the drainage of different waters resulting from the industrial operations and from cleaning the tools, motors and floors to circular manholes to prevent the blockade of these manholes.
2. The size and design of the factory must be suitable for the type of the operations that are necessary for food manufacturing purposes and the number of the workers engaged in the work. The severity of lighting and humidity always be maintained.
3. Appropriate control technologies and means are used in the places where raw materials are grinded and mix to restrict the emitting of gas and solid pollutants to the industrial and external environment.
4. To isolate the industrial operations that result in gas or solid harmful pollutants away from other food stuff manufacturing operations.
5. Production date and validity period of the product must be printed on prominent place on the cover of the can so that it must be clear and legible.
6. The machines, vessels and tools used in production and manufacturing operations as well as keeping, transporting and packaging food stuffs must be made of antirust source such as stainless steel to protect the food stuffs of the pollutants. Further, it should be continuously cleaned and not exposed to microbes and flies.
7. Replacement of manual packaging operations, if any, with other mechanical operations.

8. The space below the doors of entry and exist must be tightly closed. Further, these doors must be provided with double hinges to keep continuously closed. Furthermore, all spaces surrounding A/C systems, ventilation opening and exhaust fans in different sections must be covered with narrow meshes to prevent the entry of insects, dust and strange objects to production halls and in order to maintain the safety of the foodstuffs.
9. Installation of plastic curtains at the main entrance of the factory and at the odors of the production units to prevent the entry of insects and flies when these doors are opened during working hours. Further, the doors must be kept closed during manufacturing operations. Furthermore, the windows must be provided with stainless narrow meshes.
10. All sections of the factory and the places where raw materials are unloaded and packed must be provided with traps for flying insects and rodents. Furthermore, it must be periodically maintained and continuously cleaned.
11. Asbestos sheets may to be used in covering the ceilings of the factory or making partitions are asbestos fibers are dangerous to the health of the workers and the manufactured foodstuffs.
12. All production units of the factory must be provided with sufficient number of plastic containers that can be easily cleaned and tightly closed to collect solid waste resulting from different production operations and to soundly dispose the same. Further, it should not be left inside manufacturing sheds to avoid awful smells and microbes.
13. The severity of lighting inside the places of work must be appropriate for the type of the preparatory and productive operations. Periodical maintenance of the lighting systems should be carried and damaged lamps must be replaced to increase the level of lighting at different places of production.
14. Appropriate engineering methods and means must be used to restrict the noise resulting from operating the machines that are used. Further, periodical regular maintenance of these machines must be made to guarantee that the level of noise should not exceed the allowed limit (85 dBA) for 8 hours of daily work, taking into account that periodical maintenance must be made for the machines and old machines must be replaced by new ones.
15. Gas connections to cooking ranges, furnaces and ovens must be checked and exposed electric connections must be covered. Further, all electric connections in the A/C ducts must be isolated to prevent fire, explosives and occupational injuries.
16. Fresh water filters that are used in manufacturing operations must be continuously cleaned and replaced whenever necessary.
17. To supply the rooms where industrial detergences are made, including acids and necessary alkaline substances that are used for washing the pipeline and

production line equipment with general ventilation system to improve work atmosphere.

18. Sound healthy means must be applied to disposal of liquid waste which must be treated before disposal.
19. Factory sections must be provided with sound drainage networks to dispose the water used cleaning production line machinery and floor of the factory. Further, it should be periodically cleaned, maintained, its covers should be replaced and tightly closed to prevent the spread of smells and insects in the production halls and to avoid any damage that could befall the same.
20. Adjustment of the electrical connection and the wires should be put in pipes. Further, electricity box should have tightly closed cover.
21. All sections of the factory must be supplied with all necessary guiding boards indicating the hazardous places (conveying belts, cylinder stores).
22. Foodstuff stores stipulations must be maintained.
23. Due care must be given to cleaning water tanks, water filters along with replacement of the water filter that are continuously used in the production operations.
24. The door of the chilling room must be made of antirust material and it should be supplied with internal handle to enable opening the same from inside. Further, it should be provided with warning bells that can be operated from within the room in case of emergency.
25. The temperature of the storing room should be suitable for the foodstuffs that are to be preserved.
26. Refrigeration for frozen rooms must be supplied with instruments to measure temperature and humidity.
27. All workers of the factory must dress in prescribed uniform. Further, there must be a distinction between food and cleaning workers. Furthermore, uniform should be allocated for the workers who are engaged in cleaning the floors and they should be advised not to interfere in the production operations. Moreover, another uniform should be allocated for production workers to easily identify them (they are to be supplied with overalls having color contrary to that of the cleaning workers).
28. The workers must be obliged to care for their personal cleanness before starting work and after completion thereof. They must wash and dry their hands before getting access to the places where food is prepared. Further, they must cut their hairs and their nails to prevent the spread of microbes. Further, they should be advised that they must not touch the product with hand.

29. Dressing room should be allocated for the workers to change their clothes therein. Room must be supplied with cupboards to enable the workers to keep their clothes in the places of work.
30. A restroom must be allocated for the workers when they can have rest and food.
31. Toilets having healthy specifications (supplied with siphons, exhaust fans) must be provided. These toilets must be continuously kept cleaned and necessary detergents and disinfectants must be used. Further, it should be supplied with necessary towels and soap, provided that toilets must not be opened to the places of work and drainage network must be covered, clean and permanently suitable for work.
32. The factory must be supplied with first aid kits that should contain medicine, disinfectants and bandages.
33. All workers must be supplied with personal protection devices, such as:
  - a) Helmets and white overalls, boots, disposal gloves for the workers who handle the food products.
  - b) Aprons and leather boots.
  - c) Masks that can provide protection from dust to the workers who are engaged in unloading and mixing food stuffs such as grains and flour.
  - d) Earplugs for all production workers.

And they must be obliged to dress in the same throughout the period of the work.

34. Medical examinations and tests must be conducted for all workers of the factory. Further, chest examination must be made to make sure that they are free of infectious diseases. Furthermore health certificate must be renewed and health card must be affixed on the chest of the workers throughout their period of work.

### **8-2 Flour Mills Activity**

1. General environmental stipulations of the food sector must be observed.
2. Spot ventilation systems must be provided for manufacturing machinery and it must be periodically maintained to guarantee its efficiency in withdrawing flour dust.
3. Periodical maintenance of all machines to restrict noise resulting from the same.
4. Factory floors must not be manually cleaned rather must be cleaned by using vacuum cleaners to clean the floors of the packaging section and in order to prevent the spread of flour dust in the work atmosphere.

5. Workers must be obliged to put on earplugs upon access to generators room, provided that the period of exposure should not exceed the allowed limits.
6. The preventive measures and particular stipulations relation to the use of insecticides must be applied. Further, strict system must be applied upon spraying the stored grains. Furthermore, filters must be used before the spread of these insecticides to the ambient atmosphere.
7. The workers must be supplied personal protection devices, such as:
  - a) Ear muffs for the grinding mill workers.
  - b) Helmets for all workers of the mill, particularly the workers who are engaged in packaging one Kg. capacity sack.
  - c) Special masks for the workers of the mill to protect them from the dust resulting from grinding operations.
8. Periodical medical examinations and audiometry test must be made for the workers who are exposed to fine dust in order to find out any skin or lung diseases.

### **8-3 Confectionary, Biscuits and Bakery Industries Activity**

1. General environmental stipulations of the food sector must be observed.
2. Sugar must be grinded in closed machines associated with a system for withdrawing the resultant fine sugar dust.
3. Appropriate means that restrict the exposure of workers to temperature must be provided (A/C units or central /C). These systems must be continuously operated and periodically maintained to remain efficient and so that temperature should not exceed 25° C.
4. Spot ventilation systems must be provided for ovens and it must be periodically maintained to raise its efficiency in the withdrawal and disposal of the gases that pollute the atmosphere. Further, the associated filters must be cleaned or periodically replaced.
5. Tightly close and isolate the conveying belts of the confectionary and biscuits. Further, it should be cleaned upon the completion of every shift.
6. The electric oven must be isolated in an appropriate place provided with a chimney to avoid any damage or fire.
7. The vessels used in manufacturing (paste, mixing and fermentation vessels) must be cleaned daily before starting production and after completion of the same. Further, the damaged vessels must be periodically replaced.
8. The water used in preparing confectionary or bread must be continuously clean.

9. Vacuum cleaners must be used in cleaning the places where unloading operations, grinding and packaging operations take place in order to prevent the spread of flour dust in the ambient atmosphere.
10. Production lines, floors and walls must be permanently kept clean through washing it with detergents and appropriate disinfectants that are suitable for foodstuff in order to prevent product pollution.
11. Organic raw materials, such as fats and oils that required low temperature must be kept in fridges.
12. No hindrances must remain in the passages or in the places where raw materials are handle.
13. Insect and rodent traps must be installed and appropriately distributed to cover different sections of the factory, particularly in the silos room.
14. The stipulations of storing compressed gas cylinders must be observed to avoid any damage or exposing.
15. Oven workers must be replaced within the same shift in order to prevent their exposure to thermal fatigue, (particularly during summer)
16. Periodical medical examinations and tests must be conducted for all workers.

#### **8-4 Chips, Snacks, Popcorn and Cotton Candy Activity**

1. General environmental stipulations of the food sector must be maintained.
2. Installation of spot ventilation systems supplied with filter and exhaust fan above the cookers and chips ovens to dispose the resultant vapors, provided that it should be supplied with 2-3 meters high chimney, above the roof of the building. Furthermore, exhaust fans must be installed to purify the production hall.
3. Periodical maintenance of the spot ventilation system, which are installed in the places where gas pollutants are emitting to restrict the vapors of frying oils in the ambient atmosphere.
4. Production halls must be provided with A/C units to control the temperature, especially in the frying room and to maintain appropriate temperature that suite the nature of business and the workers.
5. Production machinery and the vessels that are used as frying pans must be made of stainless steel. The vessels that are made of any materials liable to rust not be used.
6. Periodical replacement of the frying work on short intervals. The oil must not be filtered to be used once again in order to avoid the concentration of frying waste

and its harmful impact on the product. Frying oil should be properly disposed away from the drainage network.

7. Production machinery and lines as well as manufacturing equipment, such as popcorn, chips and cotton candy manufacturing equipment should be kept clean on periodical basis and the unsuitable vessels must be replaced by new ones.
8. Sound methods must be observed to dispose the waste of washing potatoes and frying oils. These materials must not be disposed in the drainage network.
9. The floors of the production hall must be continuously kept clean and the water that is used in washing must be timely disposed to prevent the spread of fungi and bacteria.
10. Raw materials of expired validity must be disposed and it must not be used in the industry or stored.
11. Air condition store must be allocated for raw materials and products. No items should be stored at the entrance of the factory or in the corridor.
12. Foodstuff storing conditions must be observed.
13. Periodical medical examinations and test must be conducted for all workers of the factory.

### **8-5 Canned Food (Canning Tomato and Legumes and Foodstuff Packaging Activity**

1. General environmental stipulations of the food sector must be maintained.
2. Fixing local ventilation system (providing with filters) on the welding machines to draw vapors and gases rising from welding process as well as making regular maintenance to them.
3. Fixing spot ventilation system (provided with filters) on preservative stabilizing oven to paint the cans and making regular maintenance on it to guarantee its quality in drawing vapors and smokes and preventing them from spreading in the working atmosphere.
4. It is necessary to connect the spot ventilation systems fixed on the different production lines, such as boilers and welding processes, to chimneys that must not be lower than the building root (3-5 m.) Vapors are draws through it to the external air.
5. Isolating the places where preparation and cooking processes are done, from other industrial processes in the production hall via screen.
6. Isolating grading and washing phases in different production units building from packaging and sterilization phases to prevent food substances pollution.

Packaging processes (such as tomato sauce packaging unit) must be isolated a way from the general passage leading to production divisions by setting black glass screens as usual, to protect the safety of food product.

7. Packaging food must be carried under high temperature (sterilization to prevent canned food bacterial pollution).
8. Replacing the method of sterilizing food and canned foods with ionized radiation when using steam sterilizer or boiling water sterilization. Acidic foods (such as tomatoes and fruits) are subjected to 100° C degree of temperature for 30 minutes, while non-acidic foods (such as dry legumes and vegetables except for tomatoes) are subjected to 120° C degree of temperature for 30 minutes.
9. After sterilizing foods they are temporarily kept frozen in refrigeration where temperature is between (0° C-8° C) degrees centigrade.
10. It is necessary to write date of production date and expiry on the products.
11. Avoid using diesel fuel in operating boilers and using electricity instead, to avoid the rising of pollutants to industrial and outer environment.
12. Avoid discharging oil from boilers or grease from workshop unless after separating them by adding all separator.
13. The production hall must have ground sinks (with semi circular section to make cleaning easier and to prevent blocking in discharging drainage water). These sinks are sieves to hinder wastes, and grounds must be sloping to the drainage place and not sliding to make cleaning it easier.
14. It is prohibited to discharge washing water unless after balancing its hydrogen factor.
15. It is necessary to separate the warehouse of the materials used to spraying cans (locker) from the rest of the factory and produced materials.
16. Providing workers in the food canning department with ear plugs and conducting ear scanning test for them to discover any early disability in hearing.
17. Providing special masks to the workers of painting department to protect them from harmful effects of chemical materials.
18. Periodical medical tests and analyses for all factory workers.

### **8-6 Soda Water, Soft Drinks and Juice Activity**

1. General environmental stipulations of the food sector must be maintained.
2. Providing suitable ventilation i.e. Air-conditioning units, to improve general ventilation in the working atmosphere.

3. Providing general and spot ventilation systems in the unit of bottles washing and regular continuing maintenance, to increase its efficiency in drawing industrial cleaner vapors (such as caustic soda).
4. Commitment to use closed automatic system and spot ventilation systems on the following production site lines:
  - a) Ink printing on cans.
  - b) Spraying the can from inside with isolating materials.
  - c) Washing cans with chemicals.

Taking into account to make regular maintenance to it.

5. Using chimney that must not be lower to the building roof, from (3-5) meters. These chimneys are :
  - a) Drying ovens provided that vapors should pass through high quality filters before discharging them into the outer air.
  - b) Boilers chimneys.
6. Mixing and packaging process must be done automatically, and workmen's hands must not touch the foods to avoid subjecting such foods to pollution.
7. Performing regular maintenance to all mechanical parts and the places of connection between carbon dioxide gas tankers and its generating source in the gas preparation unit, as well as providing masks for workers to use them, when it is necessary.
8. Providing regular maintenance for all machines in different manufacturing departments to limit high noise.
9. Appropriate engineering methods must be used to overcome the noise resulting from the fraction of the bottles and from stacking the filled up bottles inside the boxed at the end of the production life.
10. Necessary precautionary measures must be taken to prevent the leakage of the harmful ammonia gas. Maintenance engineer and technicians must be strictly instructed to test the places where this gas may leakage.
11. Closed pipes having safe valves must be used to maintain chlorine that is injected in the water, which is used in washing the cans. Further, the percentage of the chlorine must be according to the internally accepted percentage.
12. The leakage of the steam from steam joints to pasteurization system must be avoided.