وزارة البيئة والمياه والزراعة
Ministry of Environment Water & Agriculture
Kingdom of Saudi Arabia المملكة العربية السعودية

Executive Regulation

For Air Quality

For the Environmental Law issued by Royal Decree
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***** Note: In the event of any discrepancy between the Arabic original version of this Executive Regulation and its English translation, the Arabic version prevails *****

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Article (1) - Definitions

The following terms and expressions - wherever they appear in this executive regulation – shall have the meanings set forth below, unless the context requires otherwise:

Law: Environmental Law.

Executive Regulation: Executive Regulation for Air Quality.

Ministry: Ministry of Environment, Water and Agriculture.

Minister: Minister of Environment, Water and Agriculture.

Center: National Center for Environmental Compliance.

Competent Authority: The Ministry or any of the national environmental centers, within their jurisdiction.

Person: Any public or private natural or legal person.

Activity: Any industrial, commercial, or service-related facility, project, business, or other activities that are expected to have an environmental impact.

Supervising Authority: Any government body that is legally authorized to supervise the activity, and that is mandated to issue licenses for the undertaking of activities under its jurisdiction.

Permit: Document issued by the center to a person before undertaking an activity.

Permittee: Person who is granted a permit in accordance with the provisions of this executive regulation.

License: Document issued by the center authorizing a person to undertake an environmental activity.

Licensee: Person who is granted a license in accordance with the provisions of this executive regulation.

Service Provider: Person licensed by the center to provide environmental services.

Environment/Environmental Media: All that surrounds man, animals, plants, or any other living organism, such as water, air, land, soil, organisms, biodiversity, atmospheric gases, waterbodies and all the contents of these milieus such as inanimate objects, various forms of energy, habitats, and natural processes, and their interaction with each other.

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Environment Protection: Preservation of the environment, which includes preventing pollution and mitigating its severity, reducing environmental degradation, and ensuring sustainable development; through the compliance with standards, requirements and preventive or remedial measures related to the environment in accordance with the provisions of the law and the executive regulations.

Air Quality: Air characteristics, assessed according to the standards and norms set by the competent authority to protect the environment and human health.

Ambient Air: Atmospheric air where all life activities occur, not including indoor air.

Air Pollutants: Presence of one or more substances in certain quantities or characteristics, over a period of time, that directly or indirectly lead to damaging the air quality.

Environmental Degradation: Severe damage to the environment due to the depletion of natural resources, or the destruction of habitats, or the extinction of wildlife, or the pollution of environmental media and the decline of air, water and soil quality.

Compensation: What is paid by the person causing damage, pollution, or environmental degradation; to repair or remove the deterioration resulting from such damage, pollution, or environmental degradation. This includes rehabilitation costs to be paid in case rehabilitation works cannot be carried out by the person causing damage, pollution, or environmental degradation.

Emissions: Release of gases or airborne particles from a specific source into the air.

Point Sources: Permanent or semi-permanent activities resulting in the emission of air pollutants, such as industrial stacks, energy production plants, and the dust resulting from mining activities and construction works, amongst others.

Fugitive Emissions: Gas, liquid, vapor, smoke, drizzle, or dust released from equipment or devices used in any activity.

Environmentally Sensitive Areas: Areas that have environmental significance and whose degradation leads to adverse environmental consequences. They include protected areas, parks, forests, wetlands, significant areas for birds, mangroves, landscaped sites, watersheds, water catchment and run-off areas, beaches, waterways, aquifers, or any area(s) identified or declared by the State, the Ministry, or national environmental centers as environmentally sensitive areas.

Sensitive Receptors: Receptors that are likely to be significantly affected by an activity or project due to their geographical proximity or sensitive nature. They include environmental

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elements, living species, archaeological, cultural, and religious sites, and community groups (such as endangered species, hospitals, elder care centers, schools, residential complexes, and others).

Standards: Maximum allowable limits or percentages of pollutants or emissions to ensure the quality of environmental media.

Article (2) – Application Scope

The provisions of this executive regulation shall apply to all persons within the Kingdom's territory.

Article (3) – The Center's Scope of Work regarding Air Quality

The center shall undertake the tasks related to air quality and its protection against pollution, including:

(1) Proposing environmental standards, requirements, and controls related to air quality and its protection against pollution and submitting them to the Ministry for approval.
(2) Tracking and evaluating air quality as well as sources and levels of air pollutants in accordance with environmental standards and requirements.
(3) Obtaining – from individuals, governmental and non-governmental entities – information and data related to air quality and emissions from various sources, and what is needed to perform their tasks.
(4) Developing national project plans and implementing them with the aim of reducing and mitigating air pollution.
(5) Tracking air quality indicators.
(6) Developing the necessary controls, procedures, and measures required to be taken when persons are about to exceed air quality standards and monitoring their implementation when necessary.
(7) Developing and reviewing national studies and reports related to air quality.
(8) Cooperating with universities, research centers, and institutions for matters related to air quality.
(9) Adopting rules, requirements, and controls for permits and licenses related to air quality.
(10) Issuing permits and licenses related to air quality and collecting the corresponding financial dues.

(11) Approving vocational training programs and specialized training entities that grant certifications in the field of taking measurements and installing equipment for measuring air quality and emissions from sources.

(12) Coordinating with the Ministry to implement the provisions of international and regional agreements related to air quality of which the Kingdom is a state party.

(13) Proposing and implementing studies and research related to air quality.

(14) Organizing environmental awareness activities related to air quality, including organizing courses, seminars, specialized workshops, and media campaigns.

(15) Inspecting and apprehending violations to the executive regulation; and coordinating with the Ministry of Interior when necessary regarding the apprehension of violators.

Article (4) - Ambient Air Quality

First: Ambient Air Quality Standards

(1) Appendix (1) of the executive regulation sets air quality standards for primary pollutants.

(2) Appendix (2) of the executive regulation sets air quality standards for dangerous pollutants.

(3) Natural disasters and events shall be excluded, such as sandstorms, wildfires, volcanoes, and the like in relation to ambient air quality standards.

(4) The center may exempt cases resulting from environmental incidents and disasters, provided that such exclusion does not include residential areas.

(5) The center shall document exception cases including the causes, dates, durations, and sites of such exceptions as well as the excluded standards.

Second: Ambient Air Quality Tracking and Monitoring Program

(1) The center shall develop and implement a comprehensive program for monitoring and tracking ambient air quality across the Kingdom, provided that it includes - as a minimum - the following:

a. Monitoring indicators.
b. Monitoring and tracking sites and periods.
c. Monitoring and tracking timetables.
d. Specifications and locations of ambient air quality tracking stations and the devices and equipment used.
e. Requirements of the verification and analysis of results.
f. Staff responsibilities and required qualifications.

g. Requirements for documentation and management of records and data.
h. Quality monitoring and assurance procedures for data and monitoring processes.
i. Reporting requirements.

(2) When tracking violations to the ambient air quality standards, the center shall inspect them and conduct technical studies to identify the source(s) of ambient air pollution.

(3) If it appears that these violations are caused by specific and known source(s), suitable penalties shall be imposed on the violator.

(4) If it appears that these violations result from multiple point sources in one location, while such sources are operating within the limits of the permit requirements and the limits of point sources pollutant standards, then the center shall take the following procedures in coordination with the supervising authority(s) of these sources:

a. Implement a monitoring program to identify all related sources.
b. Develop an action plan in coordination with the persons concerned with reducing emission levels to the limits that ensure not exceeding the ambient air quality standards.
c. Follow up on the implementation of the action plan.

Third: Licenses for Ambient Air Quality Monitoring and Tracking Networks

(1) Persons must not install and operate ambient air quality monitoring and tracking networks without obtaining a license from the center.

(2) Persons specified in clause (1) of this section must ensure that all installation, operation, and maintenance of the ambient air quality monitoring and tracking networks must be carried out by a service provider licensed by the center.

(3) Each license applicant must submit an application to the center in accordance with the template approved by the center, accompanied by a technical study showing the following:

a. Boundaries of the area covered by the monitoring and tracking network.
b. Specifications and components of the area included in the monitoring and tracking network (e.g., number, types, and locations of activities in case it is an industrial zone).
c. Specifications of the tracking stations as well as the equipment and devices to be used.
d. Maps clarifying the locations of tracking stations and devices.

e. Quality monitoring and assurance procedures for data and tracking processes.

(4) The center may request additional relevant data and documents.

(5) The center shall issue its decision on license applications within fifteen (15) working days counted from the date of registration of each completed application; the center may, if needed, extend this period by ten (10) additional working days.

(6) The center shall issue the license including its validity and any requirements stipulated.

(7) The licensee must periodically provide the center with the data and digital reports related to the results of ambient air quality tracking as per the license requirements along with full supporting documents of quality assurance measures, data, and technical analyses. The center may request access to data from the monitoring networks through linking them directly to the tracking systems of the center.

(8) The licensee must notify the center of any violations tracked and must provide information - whenever possible - that would contribute to assessing the causes and sources of violations in order to set up necessary procedures and measures to avoid exceeding ambient air quality standards.

(9) The licensee must comply with the license's requirements.

(10) The licensee may not disclose any data, records, or indicators on ambient air quality without the written consent of the center.

Article (5) - Emissions from Point Sources

First: Requirements and Standards of Point Source Emissions

(1) All persons are prohibited from exceeding the following emission standards from point sources:

a. The general standards for emissions of pollutants from point sources listed in Appendix (3) of this executive regulation, unless these pollutants are listed in the standards that are specific for pollutant emissions from point sources – based on the industrial activity - listed in Appendix (4) of this executive regulation.

b. The standards that are specific for pollutant emissions from point sources – based on the industrial activity - listed in Appendix (4) of this executive regulation.

(2) The Ministry shall review these standards on a periodical basis and add any new industrial activities.

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(3) Persons must comply with the plans, procedures, and measures set by the center for lowering point source emissions to the limits that ensure not exceeding the standards of ambient air quality.

(4) All persons who are operating point sources must comply with the regular maintenance works for machinery, equipment, and pollutant control systems, in addition to taking all the necessary precautions to prevent any leakage or emissions resulting in any violation of standards.

(5) All persons must notify the center immediately upon the occurrence of emergency cases, or upon the initiation or shut down of operations, which may result in violation of point sources emission standards.

(6) The cases mentioned in Table (1) of this section shall be exempted from the emission standards of point sources, and the center may verify and ensure that the emergency violations do not result from environmental violations; the center may also define any other exceptional cases as deemed suitable.

Table (1) - Exemptions from Emission Standards of Point Sources

Case	Comments
Firefighting operations	At all times
Emergency cases as well as partial or full shutdown, either permanent or temporary	Subject to the center's evaluation in case it exceeded six (6) hours
Excesses allowed by the center	Subject to the permit requirements in accordance with section "second" of this article

(7) The center may assess and monitor emergency cases or partial, permanent, or temporary shutdown, and take the suitable procedures in case of continuous violation to the point source emission standards for more than six (6) hours, including the approval or rejection of requests to extend the exemption, in accordance with the cases specified by the center.

Second: Temporary Permits for Exceeding Point Source Emission Standards

(1) All persons must submit a request to the center for an exemption to temporary exceed the point sources emission standards, if necessary.

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(2) Applicants for a temporary exemption request must attach a technical study showing the following:

a. Tracking data showing the characteristics of current emissions.
b. Assessment of the locations of environmentally sensitive areas that might be affected by emission excess according to the results of the pollution dispersion models.
c. Assessment of ambient air quality and the natural impact factors.
d. Assessment of the impact of violations to the point sources emission standards on ambient air quality based on the results of the pollution dispersion models.
e. Age of the facility and design of operations therein.
f. Technologies used to control emissions and violations.
g. Tangible technical evidence proving that it is technically impossible to comply with point sources emission standards as specified in the executive regulation.
h. Economic analysis showing the ineffectiveness of reduction procedures during the temporary exemption period.
i. Proposed action plan to return to compliance with point sources emission standards, including timelines and implementation costs.

(3) The center may request additional relevant documents or information.

(4) The center shall issue its decision on temporary exemption requests after collecting the financial dues for studying the completed request within fifteen (15) working days counted from the date of registration of the request. The center may, if needed, extend this period by five (5) additional working days.

(5) In case the exemption request is rejected, the rejection shall be justified, and the applicant must comply with the standards specified in the Executive Regulation.

(6) In case the temporary exemption is approved, the center shall issue a permit including all the requirements, controls, and permitted emissions limits.

(7) The permittee must comply with the specified requirements and controls, and must submit periodical reports (as per the frequency specified by the center) on the achieved progress in implementing the proposed action plan for compliance with point sources emission standards.

Third: Monitoring and Tracking Emissions from Point Sources that are Subject to Continuous Monitoring

(1) All persons that are operating point sources listed in Appendix (5) of this executive

regulation must install systems (equipment, devices, technologies... etc.) that are approved by the center for continuous monitoring of the emissions specified in Appendix (5) of this executive regulation depending on each source.

(2) The center may request operators of point sources not listed in Appendix (5) of the executive regulation to install systems (equipment, devices, technologies... etc.) approved by the center for continuous monitoring of the emissions specified by the center based on the results of the environmental impact assessment studies, environmental audit studies, or the environmental inspection results of these sources.

(3) The center may specify any pollutants other than those listed in Appendix (5) of this executive regulation for continuous monitoring.

(4) The center may develop lists of activities that require linking the continuous monitoring systems of point source emissions with the center's monitoring systems as well as developing the controls and procedures required therefor.

(5) The activities specified in clause (4) of this section shall comply with the controls and procedures established by the center with regard to linking continuous monitoring systems with the center's tracking systems.

(6) The center shall issue updated lists of the approved systems for tracking, including continuous emission monitoring system (CEMS) and predictive emission monitoring system (PEMS).

(7) All persons mentioned in clauses (1) and (2) of this section who wish to use the predictive emission monitoring system (PEMS) must obtain approval from the center by submitting an application with the following documents attached:

a. List of all the operational procedures used to predict emissions of each pollutant.
b. Comprehensive design of all the experiments showing all the requirements to be tested and all the loads to be measured, as well as other related information on how to verify the source and the modelling process.
c. The tests that shall be conducted (number of tests for each load, test conditions... etc.).

(8) The center may request additional studies and documents from the persons in clause (7) of this section.

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(9) The center may reject the request for using the predictive emission monitoring system (PEMS), provided that proper justification is provided, and the applicant, in case of rejection, must use the continuous emission monitoring system (CEMS).

(10) All the persons mentioned in clauses (1) and (2) of this section must develop the operational procedures of the continuous monitoring systems and present them to the center within ninety (90) days counted from the date of installing the approved monitoring systems, including the following:

a. Activity description.
b. Specifications of the tracking devices, equipment, and techniques.
c. Tracking sites.
d. Monitoring indicators.
e. Operational procedures that include daily procedures.
f. Data processing and acquisition system.
g. Requirements for documentation and management of records.
h. Reporting requirements.
i. Methods and procedures of data analysis and acquisition.
j. Calibration and maintenance procedures.
k. Quality assurance/ observation of tracking operations.
l. Measures taken to ensure continuous operation and minimize disruptions.

(11) All the persons mentioned in clauses (1) and (2) of this section must provide the center (on a regular basis and in accordance with the frequency specified by the center) with data and reports related to the continuous monitoring of the specified pollutants.

(12) The continuous emission monitoring system (CEMS) shall be subject to Relative Accuracy Audits (RAAs) or to Cylinder Gas Audis (CGAs) on a quarterly basis - i.e., every three (3) months - for three consecutive quarters out of four, provided that it is subject to a Relative Accuracy Test Audit (RATA) in the fourth quarter - i.e., once a year.

(13) The predictive emission monitoring system (PEMS) shall be subject to Relative Accuracy Audits (RAAs) on a quarterly basis - i.e., every three (3) months - for three consecutive quarters out of four, provided that it is subject to a Relative Accuracy Test Audit (RATA) in the fourth quarter - i.e., once a year.

(14) The predictive emission monitoring system (PEMS) must be audited in accordance with the latest edition of the U.S. Environmental Protection Agency (USEPA) on continuous

emission monitoring systems. Reference methods shall be used in the annual audit, and the center may define other methods based on circumstances.

(15) The center - upon the request of persons mentioned in clauses (1) and (2) of this section - may decrease the Relative Accuracy Audits (RAA) time periods for the continuous emission monitoring systems based on the results of previous years.

(16) Audit operations shall be conducted by a service provider that is licensed by the center. All the audit reports must be electronically submitted to the center within forty (40) working days counted from its completion date if the reference method is used, or within (10) working days if other methods are used.

(17) Persons must fix any defects tracked during the audit process within a maximum duration of ten (10) working days counted from the date of report issuance; and the center - as required - may take any appropriate measures against violations, if any.

(18) Persons must comply with the controls and requirements set by the center on the installation and auditing of the continuous monitoring system of emissions from point sources.

Fourth: Monitoring and Tracking Emissions from Point Sources Not Subject to Continuous Monitoring Systems

(1) All persons operating point sources not subject to the continuous monitoring systems must conduct measurements and annual analyses on all their stack emissions for the primary pollutants specified in Appendices (3) and (4) of this executive regulation in accordance with the controls and requirements set by the center.

(2) The center may request conducting additional measures and analyses.

(3) If the point sources have several stacks:

a. Measurements and analyses must be conducted for each stack separately.

b. The person, upon the center's approval, may reduce the number of stacks subject to measurement and analyses on an annual basis, provided that these stacks are compliant in terms of design, type, size, emission sources, and operational durations as per Table (2) of this section. Conducting such measurements and analyses on all stacks shall take place at least once every four (4) years.

c. Primary measurements and analyses must be conducted on all stacks within a duration of one hundred twenty (120) days counted from the date of establishment

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of the facility or forty (40) days counted from the date of reaching the target production rate, whichever comes first.

Table (2) - Cases of Reduction of Stacks that are Tracked Annually

Number of Compliant Stacks	Number of Stacks that are Tracked Annually
Between 1 and 3	1
Between 4 and 8	2
More than 8	3

(4) Upon the request of persons, and after ensuring compliance with the emission levels of one or more specific pollutants (thirty (30%) less than the limits of point sources emission standards listed in Appendices (3) and (4) of this executive regulation for the previous three (3) years prior to the request), the center may reduce the frequency of measuring these pollutants from **non-primary** point sources, according to the following:

a. In case the monitored emissions of one or more pollutants show a range between thirty (30%) and fifty (50%) below the point sources emission standards listed in Appendices (3) and (4) of this executive regulation over the last three years, the center may reduce the frequency of measuring these pollutants to four (4) years.

b. In case the monitored emissions show that one or more specific pollutants do not exceed fifty (50%) of the limits of point sources emission standards listed in Appendices (3) and (4) of this executive regulation over the three (3) years prior to the request, the center may allow a reduction of the measuring frequency of these pollutants to six (6) years, and may also cancel the monitoring requirements after ensuring that percentages are not exceeded for reasons such as the type of technology, fuel, or raw material used, and others.

(5) The facilities or parts thereof shall be classified as primary sources if they are:

a. Without the use of emission control means, it has the capacity to emit more than one hundred (100) tons per year of any of the pollutants listed in the following primary air pollutant standards:

- Carbon Monoxide (CO)
- Nitric Oxide (NO_x)
- Sulphur Dioxide (SO_2)

- Particulate Matter (PM)
- Lead (Pb)

b. Without the use of emission control means, it has the capacity to emit more than ten (10) tons per year of any of the hazardous organic air pollutants listed in Appendix (7) of this executive regulation or more than twenty-five (25) tons annually of a mixture of hazardous organic air pollutants listed in Appendix (7) of this executive regulation.

c. Point sources that burn hazardous material or waste.

Provided that the center decides to divide the facility into several separate point sources based on the facility size and the studies requested from the person, including studies on emission dispersion modelling.

(6) Samples shall be taken, and measurements and analyses shall be conducted in accordance with the latest edition of the USEPA on sampling and analyses of pollutant emissions from point sources and fugitive air emissions, and the center may determine other approaches depending on the case.

(7) Persons must conduct analyses and measurements via a service provider that is licensed by the center.

(8) Persons must notify the center within thirty (30) working days before conducting measurements and analyses on the primary sources that are not subject to the continuous monitoring systems.

(9) The center (or any delegate thereof) may patriciate in supervising the measurement processes and ensuring that quality and efficiency requirements are met when needed.

(10) Persons must submit to the center a report on the results of measurements and analyses of the primary sources that are not subject to the continuous monitoring system within forty (40) working days counted from the date of implementation, whereby the report must include all information and data related to the primary source, measurements, and analyses, including:

a. Analytical data.
b. Physical data.
c. Operational conditions during the analysis.
d. Computation methods.

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e. Analyses results.
f. Calibration data.

Fifth: The Data

(1) Persons operating the point sources mentioned in this article must undertake the following tasks:

a. Maintain all records on operation initialization, shutdown, disruptions, failures, performance tests, evaluation, audit, calibration, configuration, and maintenance of sources and monitoring and tracking systems for a duration no less than five (5) years and submit these to the center whenever requested; the center may increase the duration for some activities to five (5) additional years.
b. Comply with any requirements and controls issued by the center in relation to recording and keeping emissions tracking data.

(2) The following information must be documented for the purposes of inspection by the center and the development of reports:

a. Date, time, address, and coordinates of the location where measurements have been conducted, along with the name of the service provider who handled the measurements.
b. Type of measurement devices used, including the serial numbers of all components of measurement systems and configuration devices used, as well as the measurement procedures and any used calculations.
c. Settings of the sampling device, including measurement range, and the speed of response.
d. Description of the time factor on measurement operations, i.e., the timetables for measurement times, including sampling times.
e. Measurement locations of point sources, including elevation (altitude of the sample source from the earth surface) and the distance between the measurement site and the source of emission.
f. Description of the conditions seen in the measurement processes quantitatively and qualitatively, including wind speed and direction, temperature gradient, relative humidity, and ambient temperatures.

Sixth: Requirements for Air Pollutants Discharge Stacks

(1) All persons must consider the following elements when designing stacks for air pollutants

discharge:

a. Chemical and physical properties of emissions.
b. Elevation.
c. Elevation of facilities in the surrounding areas.
d. External diameter.
e. Internal diameter.
f. Construction material used.
g. Size and speed of emissions.
h. Emission temperature.
i. Direction and speed of prevailing winds.
j. Humidity rate in ambient air.
k. Any other relevant elements.

(2) All persons must design air pollutant emission stacks in accordance with the latest version of the US Environmental Protection Agency (USEPA) design guidelines for stacks to discharge air pollutants.

(3) Persons must conduct periodical maintenance works of the air pollutant emission stacks and take all the necessary precautions to prevent leaks or emissions that exceed source standards.

Seventh: Requirements for Flare Systems for Burning Volatile Organic Emissions

(1) Flare systems for volatile organic emissions are only allowed in the two following cases:

a. If the net heat value of the burning gas exceeds eleven point two (11.2) mega joule per standard cubic meter (MJ/scm) for steam or air assisted flares.
b. If the net heat value of the burning gas exceeds seven point forty-five (7.45) mega joules per standard cubic meter (MJ/scm) for non-assisted flares.

(2) All persons operating flare systems for volatile organic emissions, whether steam-assisted or non-assisted, must design and operate flares at the highest expulsion velocity at the tip, not exceeding eighteen point three (18.3) meters per second (m/s), with the exception of the following cases:

a. If the net heat value of the gas exceeds thirty-seven point three (37.3) mega joule per standard cubic meter (MJ/scm): Design and operate flares at a maximum expulsion velocity at the tip, not exceeding one hundred twenty-two (122) meters per second (m/s).
b. If the net heat value of the burning gas ranges between eleven point two (11.2) and thirty-seven point three (37.3) mega joule per standard cubic meter (MJ/scm): The

design and operation of flares shall be at a maximum expulsion speed calculated in accordance with the following equation:

$$\mathbf{Log_{10}\ (V_{max}) = (H_t + 28.8) / 31.7}$$

Wherein $\mathbf{V_{max}}$ is the maximum velocity and $\mathbf{H_t}$ is net heat value of the flare in mega joules per standard cubic meter (MJ/scm), provided that maximum velocity does not exceed one hundred twenty-two (122) meters per second.

(3) All steam-assisted flare system for organic volatile emission combustion must operate on a Steam-Vent Gas (S/VG) Ratio not exceeding zero point five (0.5) to ensure suitable Destruction and Removal Efficiency (DRE).

(4) All operators of air-assisted high emission combustion flare systems must design the flares and operate them at a maximum expulsion velocity as per the following equation:

$$\mathbf{V_{max} = 8.706 + 0.7084 \times H_t}$$

Wherein $\mathbf{V_{max}}$ is maximum velocity and $\mathbf{H_t}$ is net heat value of the flare in mega joules per standard cubic meter (MJ/scm).

(5) All persons operating volatile organic emission combustion flare systems must comply with the following:

a. Operate all flares with uninterrupted flames and monitor primary flame with a thermocouple or any equivalent device to detect flame. Install digital recording devices showing the times and dates of all flares and operate them without interruption to document the detection of flame.
b. Visible emissions of the flares shall not exceed five minutes for any two consecutive hours.
c. Install devices to monitor flares (e.g., ultrasonic flow meter) on top of the steam pipe next to the liquid suction cylinder in order to measure the total volume of the volatile organic compounds entering the flare.
d. Develop and activate a plan for to maximize the reduction of emissions from the flare.
e. Submit a monthly report to the center clarifying the quantities and estimated composition of burnt gases.

Eighth: Requirements for Hazardous Material Burning

(1) All persons operating boilers, industrial furnaces, and incinerators that burn hazardous materials other than fossil fuel, including hazardous materials as specified in the laws of the Kingdom of Saudi Arabia, for example but not limited to, waste and by-products of industries or used oil, must comply with the following:

a. Only hazardous material specified in environmental permits for operating facilities are allowed to be burnt, and only in case these hazardous materials are generated in the facility itself where it is being burnt.
b. An incineration unit shall be equipped to automatically suspend the intake of hazardous material when operational conditions deviate from those specified in the environmental permit to operate the specified unit.

(2) Operators of boilers and industrial furnaces may be exempt from the requirements to identify the Destruction of Removal Efficiency (DRE) and particle emissions during the preliminary performance test, provided all of the following exemption provisions are applicable to the low-risk wastes:

a. More than 50% of the heat inputs to boilers and industrial furnaces shall be from primary fossil fuels.
b. Heat inputs of fossil fuels and incineration material combined shall exceed 18,608 kilo joules per kilogram (8,000 thermal units per pound).
c. Hazardous material shall be directly inserted into the primary fuel flame area of the incinerator rooms.
d. The Carbon Dioxide (CO) emissions standard listed in Appendix (4) shall be complied with, by providing a continuous emission monitoring system (CEMS) as specified in Appendix (5).
e. Boiler load shall not be less than forty (40) percent. (Boiler load is the overall rate of the boiler at any time for all the heat input to the maximum capacity of inputs as per the design)

(3) All persons operating boilers, industrial furnaces, and incinerators burning hazardous materials other than fossil fuels containing heavy metals or chlorine, must assume that heavy metals or chlorine that feed the unit are emitted from the unit.

(4) All persons operating boilers, industrial furnaces, and incinerators burning hazardous materials other than fossil fuels must keep record of the compositions and quantities of all hazardous materials burnt in their facilities, and must provide if possible any information on the released gases during operations in their facilities.

Article (6) - Emissions of Fugitive Organic Matter

First: Tracking Fugitive Emissions

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(1) Persons must set up and implement systems and programs for the detection of emission of fugitive organic matter and suspend the release of these emissions, which shall be pre-approved by the center for the following activities:

a. Oil refinement.
b. Manufacturing organic chemical material listed in Appendix (6).
c. Operations related to natural gas, such as separation, processing, or treatment of more than seven hundred thousand (700,000) cubic meters of natural gas per day.
d. Manufacturing organic chemicals that produce or use any of the hazardous organic air pollutants listed in Appendix (7) of this executive regulation, unless it meets any of the following requirements:
    - Having a production capacity less than one thousand (1,000) tons per year of any of the hazardous organic air pollutants listed in Appendix (7) of this executive regulation.
    - Producing only heavy liquid chemical material.
    - Lacking volatile organic compounds handling equipment.

(2) Persons responsible for the above-mentioned activities must obtain the approval of the center before changing the approved programs and systems for detecting and stopping the leakage of fugitive organic matter emissions.

(3) Persons must set up a plan for fugitive emissions and must have it approved by the center, provided that it includes, as a minimum, the following:

a. Method for identifying the sources of the fugitive emissions through inspection, monitoring, and computation.
b. Inventory of the material containing volatile organic matter, including all storage areas, pipelines, handover points, and emission points.
c. Responsibilities and targets regarding the management of fugitive emissions, their tracking and reduction.
d. Operational controls for the realization of the targets specified in the plan in accordance with all the requirements of this article.
e. Periodic maintenance works.

(4) All persons must keep data, records, and annual reports on the progress made and the status of fugitive emissions management for a period of no less than five (5) years, and must submit them to the center upon request, and the center may increase the period for some activities for another five (5) years.

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Second: Monitoring Fugitive Volatile Organic Compounds

Persons operating the activities stated in clause (1) of section (first) of this article must comply with the following:

(1) Any of the following methods shall be adopted for the detection and repair of leaks, and the center may identify any other method deemed suitable:
   a. The USEPA method no. twenty-one (21) for the determination of volatile organic compound leaks
   b. Infrared Optical Gas Imaging (OGI) cameras

(2) Notify the center of the method adopted in accordance with clause (1) of section (second) of this article, provided it is only substituted after the center's approval.

(3) Perform a routine visual examination of the stoppage system to detect any leaks.

(4) Document the results of all visual examination operations of the stoppage systems and keep records at the facility to be provided to the center upon request.

(5) Keep the following records:
   a. The number of components that were tracked along with their results.
   b. Detailed schemes, specifications of equipment design, pipeline plans, and devices.
   c. Device configuration and performance testing results.
   d. Copy of the leak survey videos of all OGI cameras.
   e. The dates and durations of suspension of the use of any of the required tracking devices due to malfunctions, periodic maintenance, or other reasons.
   f. The center may specify any additional records or information - relevant - that are required, according to the circumstances.

(6) The operator must track all units and conveyance network components where the concentration of volatile organic compounds or methane exceeds ten (10) percent, and must monitor all compounds whose diameters exceed six (6) mm.

(7) If the operator chooses to use the USEPA Method (21) to determine volatile organic compound leaks, then exceeding the following limits for any of the hazardous organic air pollutants listed in Appendix (7) of the executive regulation and non-hazardous organic air pollutants, as well as greenhouse gases (such as methane), shall be considered a leak:
   a. Pumps – one thousand (1,000) parts per million (ppm)
   b. Blenders – two thousand (2,000) parts per million (ppm)
   c. Other Components – five hundred (500) parts per million (ppm)

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(8) In the event of exceeding the ozone standards, based on the eight (8)-hour ambient air standard, the limits shall be reduced upon the directives of the center, to:

a. Pumps – five hundred (500) parts per million (ppm)
b. Motor – one thousand (1,000) parts per million (ppm)
c. Other Components – two hundred fifty (250) parts per million (ppm)

(9) If the operator chooses to use OGI camera, then any leak detected by the camera shall be considered a leak and is immediately subject to treatment.

(10) When using OGI technology to detect leaks, the operator must not interrupt the skip period, or must implement plans to improve quality or any other activities that reduce the frequency of the leak tracking process.

Third: Volatile Organic Compound (VOC) Storage Systems

Persons whose activities include VOCs storing facilities must comply with the following:

(1) The use of aluminium and magnesium alloys for solvent storage is prohibited, while carbon steel, stainless steel and zinc galvanized steel are acceptable materials for solvent storage.

(2) Plastic containers may be used for storage when they are resistant to the materials inside.

(3) Tanks with a capacity greater than five (5) cubic meters shall have protection valves and installed vapor recovery systems. These shall be ventilated during delivery in the delivery tank to prevent leakage of fumes.

(4) The quality of tanks, gaskets and seals must be resistant to the materials inside and capable of withstanding the pressure difference that may occur.

(5) Tanks shall be constructed in shaded areas - where possible - and should be painted in light colors to reduce the effect of the sun's heat.

(6) Tanks and piping systems shall have a scheduled preventive maintenance that is implemented and documented on site.

(7) The following records must be kept:

a. Chemical name for stored volatile organic compounds.
b. Tank capacity.
c. Record of the dates and periods of the use interruption of any of the required control devices due to malfunction, periodic maintenance, or other reasons.
d. True vapor pressure of stored material.

e. The center may specify any additional records or information - relevant - that are required, according to the circumstances.

(8) The provisions of clauses (9), (10) and (11) of this section shall apply to all persons whose activities or projects include the use of tanks with a capacity exceeding seventy-five (75) cubic meters and a pressure not exceeding two hundred four point nine (204.9) kPa for storing VOCs, except for:

a. Tanks at gas stations.
b. Portable tanks.

(9) It is prohibited to place or store any VOC in fixed tanks unless they are equipped with a control device as specified in Appendix (8) of this executive regulation.

(10) All persons whose activities and projects include the use of high-capacity fixed VOC storage tanks with internal floating roof and storage tanks with external floating roofs must adhere to the following:

a. Prepare the floating roof of the tanks with two layers of insulation (primary and secondary seals, double seals).
b. Perform routine visual inspection for the valves and seals as well as for the two layers of insulation (primary and secondary seals, double seals).
c. Regular self-inspection of tanks.
d. Routine maintenance.

(11) The center may conduct an inspection and examination of tank systems of the types specified in clause (10) of this section during the operation and maintenance work. Persons must repair any defect detected by the center within thirty (30) working days counted from the date of inspection, and this does not exempt them from applying any penalties resulting from failure to carry out maintenance that causes gas emissions (exceeding the design requirements).

Fourth: Loading and Unloading of Organic Compounds and Hazardous Organic Air Pollutants

(1) The provisions of this section shall apply to all operations of loading or unloading VOCs and hazardous organic air pollutants mentioned in Appendix (7) of the executive regulation, whether these operations are undertaken on land or at sea.

(2) For any operator of a facility in which VOCs or hazardous organic air pollutants are loaded or unloaded with a true vapor pressure equal to or greater than ten point thirty four (10.34) kilopascals (one point five (1.5) pounds per square inches (psia)), in quantities

greater than seventy-five (75) cubic meters per day on average over the course of any thirty (30) consecutive days, loading or unloading of any of these materials shall be prohibited unless the fumes emitted from the related processes are controlled by a vapor control system, and the following shall be adhered to:

a. Equipping fluid and steam conveyance networks, including pipes, connectors, and valves, in a way that prevents any steam leakage and is automatically separated after the completion or termination of operations.
b. Equipping fluid and steam conveyance networks in a way that discharges VOCs or hazardous organic air pollutants left inside the loading line in the control system after the completion or termination of operations.
c. For loading operations from or onto transport vessels: Providing hydraulic or other mechanical means necessary to ensure a vapor-tight seal between the loading tube and the loading hatch in the vessel.
d. Suspending transport operations if vapor leakage of more than 20% of the transported LEL (Lower Explosive Limit) is detected.
e. If a leak of more than ten thousand (10,000) parts per million (ppm) is detected during the transports of VOCs or hazardous organic air pollutants, the conveyance network shall be repaired before any further loading is carried out.

(3) Any system operator that controls the loading or unloading of VOCs must adhere to the following:

a. Maintaining the VOC suppression efficiency during the loading of at least ninety-five (95) percent when using a vapor recovery device.
b. Maintaining a suppression efficiency of not less than ninety-eight (98) percent during loading when using a device to burn hazardous air pollutants listed in Appendix (7) of the executive regulation. The suppression efficiency must also be raised if the pollutants are of the carcinogenic or acutely dangerous category.

(4) Any operator of a facility where VOCs or hazardous organic air pollutants are loaded or unloaded must develop an inspection plan and implement it during every transportation operation, provided that the inspection shall include visible liquid leaks, visible vapors, steam leaks or strong odours resulting from the transportation operations.

(5) Any facility operator must stop transportation operations in case of detecting a liquid leakage that cannot be immediately repaired.

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(6) Any operator of a facility in which VOCs or hazardous organic air pollutants are loaded or unloaded must report the emissions to the center and keep records in accordance with the provisions of the executive regulation.

(7) Any operator of a facility where ships are loaded with crude oil with a productivity no less than two hundred (200) million barrels on average on an annual basis over a period of twenty-four (24) months, or for gasoline with a productivity of no less than ten (10) million barrels on average on an annual basis over a period of twenty-four (24) months, must adhere to the following:

a. Each loading station shall be equipped with a Vapor Collection System (VCS) designed to collect VOC vapor from offshore tanker vessels during loading operations as well as to prevent VOC vapor from passing through another loading station or into the atmosphere.
b. Limiting the operations of loading tanker vessels to the vessels equipped with Vapor Collection Equipment (VCE) compatible with the Vapor Collection System (VCS) used at the loading station.
c. Limiting the operations of loading tanker vessels to the vessels where conveyance networks are sealed in a way that prevents any steam leakage, which shall be connected to the Vapor Collection System (VCS).
d. Reducing VOC emissions captured from tanker ship loading operations by ninety-eight (98) percent weight when using the combustion device or by ninety-five (95) percent of weight when using a recovery device. This can be achieved by limiting gasoline loading emissions to one thousand (1,000) parts per million (ppmv) for VOC.

Note: This point does not apply to the loading operations of tanker vessel that reduce emissions using the Vapor Balancing System.

(8) Gasoline distribution stations with a productivity greater than seventy-five (75) cubic meters per day that carry liquid products in petrol tanker trucks shall comply with the following standards:

a. Equipping the facility with a Vapor Collection System (VCS) to collect the entire vapor of organic compounds emitted from tanker trucks during loading.
b. The organic compounds emitted to the atmosphere from the vapor collection system shall not exceed thirty-five (35) milligrams per liter of gasoline loaded to the tanker trucks, except for the facilities equipped with the steam treatment system prior to

the issuance of the executive regulation, as the permissible limits for the organic compounds emitted to the atmosphere from the vapor collection system shall be eighty (80) milligrams per liter of gasoline loaded to tanker trucks.

Article (7) - Controls for Reducing Emissions of Volatile Substances (Dust and Aerosols)

Persons when carrying out exploration, excavation, construction, demolition, transportation of resulting waste, transportation, loading or unloading of any materials or soil must take the necessary precautions during these activities=, in addition to the necessary precautions for safe storage or transportation to prevent its volatilization, including following:

(1) Covering volatile materials in the work site or fixing them by other means such as spraying with water or placing them in closed areas so as not to pollute the ambient air.

(2) Using special transportation modes that are equipped with means specific to the prevention of volatile substances (dust and plankton) emissions when transporting, loading, or unloading waste and dust.

(3) The persons referred to in this article must install the routes and methods of transporting materials by any appropriate means to limit the emission of volatile materials therefrom at the activity execution sites.

Article (8) – Violations Apprehension and Penalties Imposition

(1) Violations of the provisions of the executive regulation shall be apprehended, and the penalties set out in Table (3) shall be imposed in accordance with the Executive Regulation for Apprehension of Violations and Imposition of Penalties related to the Environmental Law, taking into account the following:

(2) Serious violations shall be prescribed a penalty proportional to the degree of damage, the size and inherent importance of the damaged site, and the economic and social implications arising therefrom.

(3) The estimation of the penalty for significant violations referred to in clause (1) of this article shall be made by a committee formed of experts and qualified persons, established through a decision of the center's CEO.

(4) Violations related to air quality deemed serious if they involve any of the following acts:

a. Acts that lead to environmental degradation.
b. Acts that harm sensitive receptors or environmentally sensitive areas.

Table (3) – Violations and Penalties

Number	Violation	Penalty (Saudi Riyals)	Comments
1.	Installation and operation of networks to monitor and track ambient air quality without a license	50,000 (For each network or station)	Rectifying the situation
2.	Sourcing an unlicensed service provider	50,000	Rectifying the situation
3.	Failure to comply with the license requirements of ambient air quality monitoring and tracking networks	10,000 (For each requirement)	Rectifying the situation
4.	Failure to provide the center with records and data on ambient air quality monitoring and tracking networks upon request or in the manner specified by the center	From 20,000 to 100,000 (For each notification received from the center)	Rectifying the situation
5.	The licensee's failure to report air quality violations that are tracked by ambient air quality monitoring and tracking networks	From 1,000 to 20,000 (For each violation to the standards)	
6.	Publishing air quality data or indicators without the approval of the center	From 50,000 to 1,000,000	Based on the importance and amount of data
7.	Exceeding emission standards from point sources	From 5,000 to 5,000,000	Based on the duration, quantity and severity of emissions and their impact on ambient air quality, in addition to to obligating the violator to treat the damages, and pay compensation
8.	Failure to comply with the plans, procedures and measures issued by the center regarding the	From 5,000 to 5,000,000	Based on the duration, quantity and severity of emissions and their impact

Number	Violation	Penalty (Saudi Riyals)	Comments
	implementation of plans to reduce emissions		on ambient air quality, in addition to to obligating the violator to treat the damages, and pay compensation
9.	Failure to comply with regular maintenance of machinery, equipment and emission control systems	From 20,000 to 200,000	Based on the severity and quantity of emissions and their impact on air quality
10.	Failure to submit periodic reports based on the period specified in the temporary exemption permit	From 20,000 to 100,000 (For each report)	Based on the importance of information and data and the severity of emissions
11.	Failure to design stacks in accordance with the controls and requirements specified in article (6) of the executive regulation	50,000	Rectifying the situation is required
12.	Failure to comply with the periodic maintenance work of the emissions discharge stacks	From 10,000 to 100,000	Based on the severity and quantity of emissions and their impact on air quality
13.	Failure to comply with the installation of continuous monitoring systems for the activities listed in Appendix (7) of the executive regulations, or upon the request of the center	From 50,000 to 5,000,000	Based on the severity and quantity of emissions and their impact on air quality
14.	Failure to comply with the center's controls and requirements when installing continuous monitoring systems	From 50,000 to 500,000	Based on the severity and quantity of emissions and their impact on air quality
15.	Failure to obtain the center’s approval for the installation of the predictive emission monitoring system (PEMS) or predictive emission monitoring system (PEMS) despite the center's refusal to do so.	50,000	

Number	Violation	Penalty (Saudi Riyals)	Comments
16.	Failure to comply with the installation or audit of continuous monitoring systems by a licensed service provider	From 50,000 to 200,000	Based on the severity and quantity of emissions and their impact on air quality
17.	Failure to provide the center with the operational procedures of the continuous monitoring systems on time	10,000	
18.	Failure to provide the center with data and reports related to continuous monitoring upon request or in the manner specified by the center	From 20,000 to 100,000 (For each notice received from the center)	Based on the importance and quantity of data
19.	Failure to comply with the controls and procedures placed by the center in regards to linking continuous monitoring systems with the center's monitoring systems.	10,000 (For each procedure)	
20.	Failure to comply with conducting continuous monitoring system audits in accordance with the provisions of this executive regulation	From 10,000 to 200,000 (For each year)	Based on the severity and quantity of emissions and their impact on air quality
21.	Failure to comply with the center's controls and requirements regarding continuous monitoring systems audits	From 10,000 to 200,000 (For each requirement)	Based on the severity and quantity of emissions and their impact on air quality
22.	Failure to conduct annual tests and analyses of point sources that are not subject to continuous monitoring according to article (5) hereof.	From 10,000 to 100,000 (For each year)	Based on the duration, quantity and severity of emissions and their impact on ambient air
23.	Failure to comply with the controls and requirements regarding the annual tests and analyses of point sources that are not subject to continuous monitoring according to article (5)	From 5,000 to 50,000 (For each requirement)	Based on the importance of the requirement and the potential impact on the environment

Number	Violation	Penalty (Saudi Riyals)	Comments
	hereof.		
24.	Failure to keep records and data according to the duration, controls and requirements specified in article (5) hereof	From 10,000 to 100,000	Based on the importance of data and the potential impact on the environment
25.	Failure to inform the center immediately of emergency situations or temporary closures that resulted in exceeding the standards for emissions from point sources.	From 50,000 to 500,000	Based on the amount and duration of emissions, in addition to obligating the violator to pay a penalty for exceeding the standards of emissions from point sources
26.	Failure to comply with the requirements of the design, installation and operation of flares systems for emissions combustion	From 50,000 to 500,000	Based on the amount and duration of emissions
27.	Failure to comply with the requirements of burning hazardous materials	From 50,000 to 500,000	Based on the amount and duration of emissions
28.	Failure to develop and implement programs and systems to detect and stop leaked organic materials	From 50,000 to 500,000	Based on the amount of hazardous materials and their impact on the environment
29.	Failure to obtain the center's prior to changing the programs and systems for detecting and stopping fugitive emissions	From 50,000 to 500,000	Based on the amount of hazardous materials and their impact on the environment
30.	Failure to develop a plan to manage fugitive emissions	20,000	
31.	Failure to keep annual reports on the progress and status of fugitive emissions management for the period specified in article (8)	From 10,000 to 50,000 (For each year)	Based on the amount of hazardous materials and their impact on the environment

Number	Violation	Penalty (Saudi Riyals)	Comments
32.	Failure to comply with the requirements and controls for storing VOCs	From 5,000 to 50,000 (For each requirement)	Based on the storage amount and its impact on the environment
33.	Failure to comply with the requirements set for tracking and treating fugitive emissions	50,000 Saudi Riyals	
34.	Failure to comply with the monitoring requirements of VOC emissions	50,000 Saudi Riyals	
35.	Failure to comply with the requirements for loading and unloading of organic compounds and hazardous organic air pollutants	50,000 Saudi Riyals	
36.	Failure to comply with controls to limit volatile substances (dust and air obstructions)	50,000 Saudi Riyals	
37.	Failure to comply with the requirements of permits and licenses or any other requirements related to air quality issued by the center	50,000 Saudi Riyals (For each requirement)	

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Appendix 1 – Ambient Air Quality Standards for Primary Pollutants

#	Pollutant	Averaging Period	Proposed Standards (µg.m-3)*	Allowed Exceedances
1	Carbon monoxide (CO)	1-hour	40,000	1X per year
2		8- hour	10,000	2X per month
3	Nitrogen dioxide (NO2)	1- hour	200	24X per year
4		1-year	100	-
5	Sulphur dioxide (SO2)	1- hour	441	24X per year
6		24-hour	217	3X per year
7		1-year	65	
8	Ozone (O3)**	8- hour	157	25 days per year averaged over 3 years
9	Particle Matters (less than 10 µm) (PM10)	24-hour	340	12X per year***
10		1-year	50	-
11	Particle Matters (less than 2.5 µm) (PM2.5)	24-hour	35	12X per year***
12		1-year	15	-
13	Lead in Particle Matters Pb (in TSP)	3 months	0.15	3-month rolling average with no exceedances allowed

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Notes:

*These values are based on a standard temperature of 25°C and a pressure of 1 atm.

**To calculate ozone 8-hr value and to assign it to the appropriate day, the following rule is applied: The maximum daily eight-hour mean concentration shall be selected by examining eight-hour running averages, calculated from hourly data and updated each hour. Each eight - hour average so calculated shall be assigned to the day on which it ends. i.e. the first calculation period for any one day will be the period from 17:00 on the previous day to 01:00 on that day; the last calculation period for any one day will be the period from 16:00 to 24:00 on the day.

***Contributions from natural sources can be assessed but cannot be controlled. Therefore, where natural contributions to pollutants in ambient air can be determined with sufficient certainty, and where exceedances are due in whole or in part to these natural contributions, these may be subtracted when assessing compliance with air quality limit values. Demonstration is conducted through measurements, modeling of air masses back trajectories, remote sensing, and modeling.

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Appendix 2 – Ambient Air Quality Standards for Hazardous Pollutants

#	Pollutant		($\mu g.m^{-3}$)/ hour	($\mu g.m^{-3}$)/ 24 hours	($\mu g.m^{-3}$)/ year
1	Acetaldehyde (C_2H_4O)	الاسيتالديهيد	90	-	-
2	Acetic Acid (CH_3COOH)	حمض الخليك	250	-	-
3	Acetone (C_3H_6O)	الاسيتون	5,900	-	-
4	Acrylic Acid ($C_3H_4O_2$)	حمض الأكريليك	60	-	6
5	Acrylonitrile (C_3H_3N)	الاكريلونيتريل	43	-	2
6	Ammonia (NH_3)	الأمونيا	180	-	92
7	Arsenic (As)	الزرنيخ	0.1	-	0.01
8	Benzene (C_6H_6)	البنزين	30	-	3
9	Benzo[a] Pyrene ($C_{20}H_{12}$)	بينزو(أ) بيرين	-	-	0.001
10	Bromine (Br)	البروم	7	-	0.7
11	Bromoform ($CHBr_3$)	بروموفورم	50	-	5
12	Butadiene 1,3 (C_4H_6)	البوتادين 1 ، 3	10	-	2
13	Cadmium (Cd)	الكاديميوم	5.4	0.025	0.0033
14	Carbon Disulfide (CS_2)	ثاني كبريتيد الكربون	30	-	-
15	Carbon Tetrachloride (CCl_4)	رابع كلوريد الكربون	-	2.4	-
16	Chlorine (Cl)	الكلور	43	-	2.6
17	Chloroform ($CHCl_3$)	كلوروفورم	100	-	10
18	Cumene (C_9H_{12})	الكومين	500	-	-
19	Ethylbenzene (C_8H_{10})	أثيل بنزين	26,000	1,000	-
20	Ethylene (C_2H_4)	الإيثيلين	-	40	-
21	Ethylene Dibromide ($C_2H_4Br_2$)	ثاني بروميد الاثيلين	150	3	0.22
22	Ethylene Dichloride ($C_2H_4Cl_2$)	ثاني كلوريد الاثيلين	150	3	0.4

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#	Pollutant		($\mu g.m^{-3}$)/ hour	($\mu g.m^{-3}$)/ 24 hours	($\mu g.m^{-3}$)/ year
23	Ethylene Oxide (C_2H_4O)	أكسيد الاثيلين	20	-	2.0
24	Formaldehyde (CH_2O)	الفورمالديهايد	65	-	3.3
25	Fluorides (F^-)	الفلوريدات	1µg.m-3 for 30 days		
26	Hydrogen Chloride (HCl)	كلوريد الهيدروجين	75	-	-
27	Hydrogen Cyanide (HCN)	سيانيد الهيدروجين	-	8	-
28	Hydrogen Fluoride (HF)	فلوريد الهيدروجين	-	-	14
29	Hydrogen Iodide (HI)	يوديد الهيدروجين	10	-	1
30	Hydrogen Sulfide (H_2S)	كبريتيد الهيدروجين	14	4	-
31	Manganese (Mn)	المنغنيز	2	-	0.2
32	Methanol (CH_3OH)	الميثانول	2,600	-	-
33	Methylene Diphenyl Di-isocyanate (MDI) ($C_{15}H_{10}N_2O_2$)	ميثيلين ثنائي الفينيل دي-إيزوسيانات	0.7	-	-
34	Naphthalene ($C_{10}H_8$)	النفثالين	-	22.5	-
35	Nickel (Ni)	النيكل	0.1	-	0.02
36	Phenol (C_6H_6O)	الفينول	100	30	-
37	Phosgene ($COCl_2$)	الفوسجين	4	-	0.4
38	Polymeric Methylene Diphenyl di-Isocyanate (PMDI) ($C_{15}H_{10}N_2O_2$)	البوليمرية الميثيلين ثنائي الفينيل دي إيزوسيانات	-	0.7	-
39	Propylene (C_3H_6)	البروبيلين	-	4,000	-
40	Propylene Oxide (C_3H_6O)	أكسيد البروبيلين	480	1.5	0.3
41	Pyridine (C_5H_5N)	بيريدين	30	-	3
42	Sulfate (SO_4^{2-})	كبريتات	-	25	-
43	Styrene (C_8H_8)	الستايرين	215	-	-

#	Pollutant		(µg.m^{-3})/ hour	(µg.m^{-3})/ 24 hours	(µg.m^{-3})/ year
44	Tetrachloroethylene (C_2Cl_4)	رابع كلور الإيثيلين	-	250	-
45	Toluene (C_7H_8)	التولوين	1,800	400	-
46	Toluene Di-isocyanate (TDI) ($C_9H_6N_2O_2$)	تولوين دي إيزوسيانات	-	0.2	-
47	Vanadium (V)	الفاناديوم	-	2	-
48	Vinyl Chloride (C_2H_3Cl)	كلوريد الفينيل	130	1	0.2
49	Xylene (C_8H_{10})	الزيلين	2,300	700	-

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Appendix 3 – General Standards for All Point Source Emission

List of Units Abbreviation Used in Appendix (3) :

- **Ht**: Net heating value of a gas combusted in a flare **(صافي القيمة الحرارية للغاز المحترق باستخدام شعلة)**
- **MJ**: Mega Joule **(ميجا جول)**
- **Ppmv**: Parts Per Million Volume **(جزء لكل مليون بحسب الحجم)**
- **Scm**: standard cubic meter **(متر مكعب قياسي)**
- **Vmax:** maximum permitted velocity **(السرعة القصوى المسموح بها)**

#	Source	Pollutant	Emissions Maximum Limit
1	جميع مصادر الانبعاثات All sources	Particle Matter	The opacity level should not exceed 20% of the normal level
2		Asbestos	No emission allowed
3	مخزونات المنتجات Stockpiles	Particle Matter	The opacity level should not exceed 10% of the normal level
4	أبراج التبريد Cooling Towers	Particle Matter	Less than 0.0005% of the total volume of water distributed for cooling
5	جرام/ساعة من ملوثات 100مصادر ينبعث منها أكثر من الهواء العضوية الخطرة المدرجة في الملحق (7) من اللائحة Sources emitting > 100 g/hr organic Hazardous Air Pollutants (Appendix 7)	Volatile Organic Compounds (Total)	The equivalent of 20 mg/m^3 of Toluene
6	مصادر ينبعث منها أكثر من 2 كيلوجرام/الساعة أو 5 طن /السنة (أيهما أصغر) من ملوثات الهواء العضوية الغير خطرة Sources emitting > 5t/y non- Hazardous Air	Volatile Organic Compounds (Total)	The equivalent of 80 mg/m^3 of Toluene

#	Source	Pollutant	Emissions Maximum Limit
	Pollutants VOC		
7	(المركبات العضوية مرافق خدمة المواد العضوية المتطايرة المتطايرة الهاربة) For components in VOC service (Fugitive VOC)	Volatile Organic Compounds (Total)	10,000 part per million by volume (ppmv)
8	الصمامات والوصلات والموصلات في مرافق خدمة ملوثات الهواء العضوية الخطرة المدرجة في الملحق (7) من اللائحة (المركبات العضوية المتطايرة الهاربة) For valves, connectors, and flanges in organic Hazardous Air Pollutants Service (Fugitive VOC) (Appendix 7)	Organic Hazardous Air Pollutants	500 part per million by volume (ppmv)
9	مشاعل الغازات الحمضية Acid gas flares	Visible Emissions	The opacity level should not exceed 20% of the normal level for a duration of 6 minutes during any single hour

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Appendix 4 – Standards for Pollutant Emissions Point Sources by Industrial Activity

Table (1) Content Guide by Industry

#	Source	Source in Arabic
1	Abrasive Blasting	الكشط بالمواد الكاشطة
2	Aluminium Reduction Plant	مصانع اختزال الألومنيوم
3	Ammonia Fertilizers (including urea)	الأسمدة التي تحتوي على الأمونيا (بما في ذلك اليوريا)
4	Ammonium Sulfate Manufacturing	تصنيع كبريتات الأمونيوم
5	Asphalt / Concrete Plants	مصانع الاسفلت/الخرسانة
6	Beverage Can Surface Coating Industry	صناعة طلاء سطح عبوات المشروبات
7	Boilers and Industrial Furnaces (BIF) Burning Hazardous Materials	المراجل والأفران الصناعية التي تحرق المواد الخطرة
8	Brick and Clay Products	منتجات القرميد والطين
9	Chlorine Manufacturing	تصنيع الكلور
10	Coal cleaning plants (with thermal dryer)	مصانع تنظيف الفحم (مع مجفف حراري)
11	Coke Oven Batteries	بطاريات أفران الكوك
12	Combustion Facilities (constructed before September 1, 2005)	منشآت الاحتراق (التي تم بناؤها قبل 1 سبتمبر 2005)
13	Combustion Facilities (constructed or modified after September 1, 2005)	منشآت الاحتراق (التي تم بناؤها أو تعديلها بعد 1 سبتمبر 2005)

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#	Source	Source in Arabic
14	Ferroalloy Production Facilities (Electric Arc Furnaces)	منشآت إنتاج السبائك الحديدية أفران القوس الكهربائي
15	Formaldehyde	فورمالدهيد
16	Glass Fiber Manufacturing Plants	مصانع إنتاج الألياف الزجاجية
17	Glass Manufacturing Plants	مصانع إنتاج الزجاج
18	Grain Elevators	رافعات الحبوب
19	Graphic Arts - Industry - Publication Rotogravure Printing and Flexographic Printing	الفنون التخطيطية - الصناعة - الطباعة الروتوغرافية والطباعة الفلكسوغرافية
20	Hazardous and Medical Waste Incineration (constructed before September 1, 2005)	حرق النفايات الخطرة والطبية (المنشآت التي تم بناؤها قبل 1 سبتمبر، 2005)
21	Hazardous and Medical Waste Incineration (constructed or modified after September 1, 2005)	حرق النفايات الخطرة والطبية (المنشآت التي تم بناؤها أو تعديلها بعد 1 سبتمبر، 2005)
22	Hydrochloric Acid Plant	مصانع حمض الهيدروكلوريك
23	Industrial Surface Coating - Large Metal Appliances & Furniture	عملية طلاء الاسطح الصناعية - المعدّات المعدنية الكبيرة والأثاث
24	Iron and Steel Mills	مصانع الحديد والفولاذ
25	Kraft Pulp Mills	مصانع لب ورق الكرافت
26	Lead Acid Battery Manufacturing Plants	مصانع إنتاج بطاريات الرصاص الحمضية
27	Lime Manufacturing Plants	مصانع إنتاج الكلس
28	Medical Waste Autoclave (For regulated medical wastes)	معقم للنفايات الطبية (للنفايات الطبية الخاضعة للنظام)
29	Metal Coil Surface Coating Paints	دهانات لطلاء أسطح اللفائف المعدنية
30	Mineral Processing Plants (Metallic)	مصانع معالجة المعادن (فلزي)
31	Mineral Processing Plants (Non-Metallic)	مصانع معالجة المعادن (غير فلزي)
32	Nitric Acid Plants	مصانع حمض النيتريك
33	Petroleum Refineries	مصافي النفط

#	Source	Source in Arabic
34	Pharmaceutical Plants	المصانع الصيدلانية
35	Phosphate Fertilizer	الأسمدة الفوسفاتية
36	Phosphate Rock Plants	مصانع الصخر الفوسفاتي
37	Polymeric Coating (supporting Substrate Facilities)	الطلاء البوليميري (منشآت الدعم الاساسية)
38	Polymer Manufacturing (Polypropylene; Polyethylene; Polystyrene)	تصنيع البوليمر (البوليبروبيلين؛ البولي إثيلين؛ البوليستايرين)
39	Portland Cement Plants	مصانع الإسمنت البورتلاندي
40	Primary Copper Smelters	مصاهر النحاس الأساسية
41	Primary Lead Smelter	مصاهر الرصاص الأساسية
42	Primary Zinc Smelters	مصاهر الزنك الأساسية
43	Secondary Aluminium smelting plants	مصانع صهر الألومنيوم الثانوي
44	Secondary Brass and Bronze Production	إنتاج النحاس الأصفر والبرونز الثانوي
45	Secondary Lead Smelting Plants	مصانع صهر الرصاص الثانوي
46	Sintering Plants	مصانع التلبيد
47	Steel Plants – Basic Oxygen Furnaces for making Molten Steel from Scrap	مصانع الفولاذ - أفران معالجة الأكسيجين الاساسية لتصنيع الفولاذ المنصهر من
48	Steel Plants – Electric Arc Furnace (EAF)	مصانع الفولاذ - فرن قوس كهربائي
49	Sulfur Recovery Plants	مصانع استرداد الكبريت
50	Sulfuric Acid Plants	مصانع حمض الكبريتيك
51	Synthetic Fiber Production Facilities	منشآت إنتاج الألياف الاصطناعية
52	Synthetic Organic Chemical Manufacturing Industry (SOCMI Processes)	التصنيع التركيبي للمواد الكيميائية العضوية (العمليات)

#	Source	Source in Arabic
53	Titanium Dioxide Plant	مصانع ثاني أكسيد التيتانيوم
54	Vinyl Chloride	كلوريد الفينيل
55	Polyvinylchloride & Ethylene Dichloride Manufacturing (constructed or modified after September 1, 2005)	تصنيع الكلوريد المتعدد الفينيل ثاني كلوريد الإيثيلين (المنشآت التي تم بناؤها أو تعديلها بعد 1 سبتمبر 2005)

List of Units Abbreviation Used in Table (1) :

- **DRE**: Destruction and Removal Efficiency **(كفاءة التدمير والإزالة)**
- **dscm**: Dry Standard Cubic Meter **(متر مكعب قياسي جاف)**
- **Nm^3**: Normal Cubic Meter **(متر مكعب عادي)**
- **POM**: Polycyclic Organic Matter **(مادة عضوية متعددة الحلقات)**
- **ppm:** Parts Per Million **(جزء لكل مليون)**
- **ppmv**: Parts Per Million Volume **(جزء لكل مليون بحسب الحجم)**
- **TOC**: Total Organic Carbon **(الكربون العضوي الكلي)**
- **TEQ**: TEQ – Toxic Equivalent **(مكافئ سمّي)**
- **TRS:** Total Reduced Sulfur **(الكبريت المختزل الكلي)**
- **VOC:** Volatile Organic Compounds **(المركبات العضوية المتطايرة)**

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Table 1 – Standards for Pollutants Emissions by Industrial Activities

	#	Source	Pollutant	Emission Standard [6]
1	Abrasive Blasting			
	1.1	Sandblasting	Silica	< 5% silica in abrasives used in outdoor blasting
2	Aluminum Reduction Plants			
	2.1	Potlines	Total Fluorides	0.6 kg/t of aluminum produced
	2.2		Opacity	10%
	2.3		Particulates	2.45 kg/Mg (4.9 lb/ton) of aluminum produced
	2.4	Potlines at soderberg plants	POM [18]	0.32 Kg/t of aluminum produced
	2.5		Nickel	0.035 kg/Mg of aluminum produced
	2.6		Arsenic	0.003 kg/Mg of aluminum produced
	2.7		Poly Chlorinated Biphenyls	2.0 µg TEQ/ton of aluminum produced
	2.8	Paste production plants (continuous)	POM [18]	0.175 kg/t of paste produced
	2.9	Paste production plants (batch)	POM [18]	0.38 kg/t of paste produced
	2.10	Anode bake plants	Total Fluorides	0.01 kg/t of green anode produced

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	#	Source	Pollutant	Emission Standard [6]
	2.11		POM [18]	0.025 kg/t of green anode produced
	2.12		Particulates	0.035 kg/Mg of green anode
	2.13	Bauxite grinding	Particulates	0.06 kg/t
	2.14	Calcining of Aluminum Hydroxide	Particulates	2.00 kg/t
	2.15		Opacity	20%
	2.16	Pitch Storage Tanks	POM [18]	Reduce inlet emissions by 95% or more
3	Ammonia Fertilizers (including urea)			
	3.1	Granulators and other	Particulates [7]	0.25 Kg/t
	3.2			0.35 Kg/t *(constructed before September 1, 2005)*
	3.3		Ammonia	50 mg/Nm^3 [7]
	3.4			150 mg/Nm^3 [7] *(constructed before September 1, 2005)*
	3.5	Prilling towers	Particulates [7]	0.5 Kg/t
	3.6			1.25 Kg/t *(constructed before September 1, 2005)*
	3.7		Ammonia	50 mg/Nm^3 [7]

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	#	Source	Pollutant	Emission Standard [6]
	3.8			85 mg/Nm^3 [7] *(constructed before September 1, 2005)*
	3.9	Primary Ammonia Reformer	NO_x (as NO_2 at 3% O_2)	For new facilities *(constructed after September 2005):* 150 mg/Nm^3 (75 ppmv), 0.45 Kg/t of product [26]
	3.10			For existing facilities *(constructed before September 2005):* 300 mg/Nm3 (150 ppmv), 0.9 Kg/t of product [26]
4	Ammonium Sulfate manufacturing			
	4.1	Ammonium Sulfate dryer	Particulates [7]	0.15 kg/t of ammonium sulfate produced
	4.2		Opacity	15%
	4.3		Ammonia	50 mg/Nm^3
5	Asphalt / Concrete Plants			
	5.1	All emissions points	Particulates	90 mg/dscm
	5.2	Fuel gas combustion	Opacity	20%
6	Beverage Can Surface Coating Industry			
	6.1	Coating operations	VOC	0.29 kg/l of coating solids from each two-piece can exterior base coating
	6.2			0.46 kg/l of coating solids from each two-piece can clear base coating operation AND

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	#	Source	Pollutant	Emission Standard [6]
				from each over-varnish coating operation
	6.3			0.89 kg/l of coating solids from each two-piece can inside spray coating operation
7	Boilers and Industrial Furnaces (BIF) Burning Hazardous Materials			
	7.1	Stack gases	Organic Emissions	99.99% Destruction and removal efficiency
	7.2		CO	Not to exceed 100 ppmv on an hourly rolling average basis, corrected to 7% oxygen, dry gas basis
	7.3		NO_x	As Combustion Device standards (modified facilities constructed after September 1,2005 - Facilities not combusting chlorinated organics)
	7.4		SO_2	As Combustion Device standards (modified facilities constructed after September 1,2005)
	7.5		Particulate	180 mg/dscm after correction to 7% oxygen stack gas concentration
	7.6		Chlorinated Organics	99.9999% Destruction and removal efficiency
	7.7		Metals	Sb: 1500 g/h – Pb: 430 g/h – Ag: 1.5 x 10^4 g/h – Ba: 2.5 x 10^5 g/h Hg: 1500 g/h – Tl: 1500 g/h – As: 11 g/h – Cd: 28 g/h – Cr: 4.2 g/h – Be:21 g/h
8	Brick and Clay Products			
	8.1	Raw material handling - grinders	Particulates	4.25 Kg/t of product [17]
	8.2	Raw material handling - dryers	Particulates	0.039 Kg/t of product [17]

	#	Source	Pollutant	Emission Standard [6]
9	Chlorine Manufacturing			
	9.1	Exit gases	Chlorine gas [8]	30 mg/m^3
10	Coal cleaning plants (with thermal dryer)			
	10.1	Thermal dryer	Particulates	0.07 g/dscm
	10.2		Opacity	20%
	10.3		NOx + CO	a combined concentration of 280 ng/J heat input
	10.4		SO_2	85 ng/J heat input
	10.5	Pneumatic coal-cleaning equipment	Particulates	0.023 g/dscm
	10.6		Opacity	5%
	10.7	Coal processing and conveying equipment, coal storage system, or coal transfer and loading system	Particulates	0.023 g/dscm
	10.8		Opacity	10%
11	Coke Oven Batteries			
	11.1	Nonrecovery coke oven battery	Particulates	4.1 g/Mg of dry coal
	11.2		Opacity	20 %
12	Combustion Facilities (constructed before September 1, 2005)			
	12.1	Fossil-fuel fired steam generating unit or furnaces with a heat input capacity more than 250 MBTU/h (73 MW)	Particulates	43 ng/J (0.1 lb/MBTU)
	12.2		SO_2	340 ng/J (0.8 lb/MBTU)
	12.3		NO_x	86 ng/J (0.2 lb/MBTU) gas fired

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	#	Source	Pollutant	Emission Standard [6]
				130 ng/J (0.3 lb/MBTU) oil fired
	12.4	Electric utility steam generating units operated on fossil fuel with more than 250 MBTU/h (73 MW) electrical output	Particulates	13 ng/J (0.03 lb/MBTU)
	12.5		SO_2	340 ng/J (0.8 lb/MBTU)
	12.6		NO_x	86 ng/J (0.2 lb/MBTU gas fired 130 ng/J (0.3 lb/MBTU) oil fired
	12.7	Industrial/commercial/institutional steam generating units or furnaces with a heat capacity more than 100 MBTU/h (29 MW)	Particulates	43 ng/J (0.1 lb/MBTU)
	12.8		SO_2	215 ng/J (0.5 lb/MBTU) when <30% heat input derived from oil 340 ng/J (0.8 lb/MBTU) when >30% heat input derived from oil
	12.9		NO_x	86 ng/J (0.2 lb/MBTU gas fired 130 ng/J (0.3 lb/MBTU) oil fired
	12.10		Particulates	43 ng/J
	12.11	Small industrial / commercial / institutional steam generating units /furnaces with a heat capacity 100 MBTU/h (29MW) or less but greater than or equal to 10 MBTU/h (2.9MW)	SO_2	215 ng/J (0.5 lb/MBTU)
	12.12	Stationery gas turbines with heat input > 3 MW	NO_x	NOx = 0.0150 (14.4)/Y + F; Percent by Volume calculated at 15% O_2 dry basis [9]

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	#	Source	Pollutant	Emission Standard [6]
	12.13		SO_2	0.015% by vol. at 15% O_2 dry basis
	12.14		Turbine Fuel	< 0.8% Sulphur by weight
	12.15	Stationery gas turbines with heat input > 29 MW	NO_x	NOx = 0.0075 d(14.4)/Y + F; Percent by Volume calculated at 15% O_2 dry basis [9]
	12.16		SO_2	0.015% by vol. at 15% O_2 dry basis
	12.17		Turbine Fuel	< 0.8% Sulphur by weight
13	Combustion Facilities (constructed or modified after September 1, 2005)			
	13.1	Fossil-fuel fired steam generating unit or furnaces with a heat input capacity more than 250 MBTU/h (73MW) (Note: HF, HCl and Heavy metals are not applicable for facilities using gaseous fuel.)	Particulates	43 ng/J (0.1 lb/MBTU)
	13.2		SO_2	340 ng/J (0.8 lb/MBTU)
	13.3		NO_x	43 ng/J (0.1 lb/MBTU) gas fired 69 ng/J (0.16 lb/MBTU) oil fired
	13.4		Hydrogen Chloride	0.00005 ng/J [23]
	13.5		Hydrogen Fluoride	0.00005 ng/J [23]
	13.6		Heavy Metals	Heavy Oil Combustion Source [23] Antimony: 0.001512 ng/J - Arsenic: 0.000378

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	#	Source	Pollutant	Emission Standard [6]
				ng/J Beryllium: 0.000063 ng/J – Cadmium: 0.000025 ng/J Chromium: 0.002520 ng/J - Cobalt: 0.003780 ng/J Lead: 0.001008 ng/J - Manganese: 0.002520 ng/J Nickel: 0.011340 ng/J - Selenium: 0.002520 ng/J Mercury: 0.000013 ng/J
	13.7	Electric utility steam generating units operated on fossil fuel with more than 250 MBTU/h (73 MW) electrical output	Particulates	13 ng/J (0.03 lb/MBTU)
	13.8		SO2	340 ng/J (0.8 lb/MBTU)
	13.9		NOx [11]	43 ng/J (0.1 lb/MBTU gas fired 69 ng/J (0.16 lb/MBTU) oil fired
	13.10	Industrial/commercial/institutional steam generating units or furnaces with a heat capacity more than 100 MBTU/h (29 MW)	Particulates	43 ng/J (0.1 lb/MBTU)
	13.11		SO_2	215 ng/J (0.5 lb/MBTU) when <30% heat input derived from oil 340 ng/J (0.8 lb/MBTU) when >30% heat input derived from oil
	13.12		NO_x [10,11]	43 ng/J (0.1 lb/MBTU) gas fired 69 ng/J (0.16 lb/MBTU) oil fired

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	#	Source	Pollutant	Emission Standard [6]
	13.13	Small industrial/ commercial/ institutional steam generating units /furnaces with a heat capacity 100 MBTU/h (29MW) or less but greater than or equal to 10 MBTU/h (2.9MW)	SO_2	215 ng/J (0.5 lb/MBTU)
	13.14	Stationery gas turbines with heat input > 100 MW	NO_x [10]	9 ppmv at 15% O_2 dry basis
	13.15		SO_2	0.015% by vol. at 15% O_2 dry basis
	13.16		Sulfur contents of Turbine fuel	< 0.8% Sulphur by weight
	13.17	Stationery gas turbines with heat input > 10 MW and <100MW	NO_x [10]	25 ppmv at 15% O_2 dry basis
	13.18		SO_2	0.015% by vol. at 15% O_2 dry basis
	13.19		Sulfur contents of Turbine fuel	< 0.8% Sulphur by weight
	13.20	Stationery gas turbines with heat input < 10 MW	NO_x [10]	42 ppmv at 15% O_2
	13.21		SO_2	0.015% by vol. at 15% O_2 dry basis
	13.22		Sulfur contents of Turbine fuel	< 0.8% Sulphur by weight
	13.23	Duct burner	NO_x	86 ng/J (0.2 lb/MBTU gas fired 130 ng/J (0.3 lb/MBTU) oil fired
14	Ferroalloy Production Facilities (Electric Arc Furnaces)			

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	#	Source	Pollutant	Emission Standard [6]
	14.1	Silicon metal, Ferrosilicon, Calcium, Silicone or Silico-manganese, Zirconium	Particulates	0.45 kg/MW-hr
	14.2	High carbon ferrochrome, charge chrome, standard Ferro-manganese, silicomanganese, calcium carbide or silvery iron	Particulates	0.23 kg/MW-hr
	14.3	Ferro-chrome, silicon, or ferromanganese silicon	Opacity	15%
	14.4		CO	20% by Volume
	14.5		Sulfur contents of Turbine fuel	< 0.8% Sulphur by weight
	14.6	Ferromanganese (after June 30, 2015)	Mercury	13 µg/dscm
	14.7		Polycyclic Aromatic Hydrocarbons	12000 µg/dscm
	14.8	Ferromanganese (before June 30, 2015)	Mercury	130 µg/dscm
	14.9		Polycyclic Aromatic Hydrocarbons	12000 µg/dscm
	14.10	Silicomanganese (after June 30, 2015)	Mercury	4 µg/dscm
	14.11		Polycyclic Aromatic Hydrocarbons	72 µg/dscm
	14.12	Silicomanganese (before June 30, 2015)	Mercury	12 µg/dscm
	14.13		Polycyclic Aromatic Hydrocarbons	130 µg/dscm
	14.14	Any electric arc furnace	Formaldehyde	201 µg/dscm
	14.15	Any electric arc furnace (after June 30, 2015)	HCl	180 µg/dscm
	14.16	Any electric arc furnace (constructed before June 30, 2015)	HCl	1100 µg/dscm
15	Formaldehyde			

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	#	Source	Pollutant	Emission Standard [6]
	15.1	Storage of formaldehyde solutions with vapor pressure<= 570 mmHg	Formaldehyde	A floating roof is allowable if it can be shown that the emissions from all vents of the storage tank do not exceed 0.1 kg/hour of gas/vapor Or if the emissions through the tank vents exceed 0.1 kg/hour, a floating roof may be permitted if the concentration of formaldehyde in the vent gas does not exceed 20 mg/m3 (STP), OR a sealed storage tank with vapor recovery is required
	15.2	Storage of formaldehyde solutions with vapor pressure => 570 mmHg	Formaldehyde	A sealed storage tank with a vapor recovery system
	15.3	Waste Gases [24]	Formaldehyde	60 mg/m^3
16	Glass Fiber Manufacturing Plants			
	16.1	Exit gases	Particulates	5.5 kg/t of glass fiber produced
17	Glass Manufacturing Plants			
	17.1	Glass melting furnace	Particulates	0.5 g/kg of glass produced
	17.2	Pressed and blown glass with borosilicate recipe melting furnace	Particulates	1.0 g/kg of glass produced
	17.3	Float Glass	NOx [20]	2.5 kg/ton (5.5 lb/ton) -24 hour (daily) average stack emission of 1000 mg/Nm^3 1.8 kg/ton (4.1 lb/ton) -30 day rolling average stack emission of 750 mg/Nm^3

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	#	Source	Pollutant	Emission Standard [6]
	17.4		Ammonia	≤ 5.0 ppm from any source using SCR Technology
	17.5	Textile/wool fiber glass melting furnace	Particulates	0.5 g/kg of glass produced
18	Grain Elevators			
	18.1	All sources except grain dryer	Particulates	0.023 g/dscm
	18.2		Opacity	Zero Percent
19	Graphic Arts - Industry - Publication Rotogravure Printing and Flexographic Printing			
	19.1	Fugitive emissions	VOC	16 percent of total mass of VOC solvent and water contained in water borne inks, used at a facility during one calendar month
20	Hazardous and Medical Waste Incineration (constructed before September 1, 2005)			
	20.1	Incinerator	Particulates	34 mg/dscm corrected to 7% oxygen
	20.2		Visible emissions	10% opacity except for no more than 6 minutes in any hour
	20.3		Sulphur dioxide	500 mg/dscm
	20.4		CO	100 mg/dscm
	20.5		Organics	>99.99% destruction and removal efficiency (DRE) for POHC[18]
	20.6		Total Dioxins & Furans	30 ng TEQ/dscm at 7% oxygen
	20.7		PCB	1 mg/kg PCB feed for a maximum one-hour average concentration or >99.9999% destruction and removal efficiency (DRE)
	20.8		Hydrogen Chloride	100 mg/dscm OR at least 99% removal efficiency if emission is 1.8 kg/h

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	#	Source	Pollutant	Emission Standard [6]
	20.9		Hydrogen Fluoride	5 mg/dscm
	20.10		Metals	Sb: 300g/h – Pb: 90g/h – Ag: 3,000g/h – Ba: 50,000 g/h – Hg: 300 g/h – Tl: 300g/h – As: 2.3 g/h – Cd: 5.4 g/h – Cr: 0.82 g/h – Cr: 0.82 g/h- Be: 4.0 g/h
			Minimum Temperature and minimum Residence Time where incineration of > 1% halogenated organic substances expressed as Chlorine) takes place is: 850 °C for 1 second OR 1100 °C for 2 seconds	
21	Hazardous and Medical Waste Incineration (constructed or modified after September 1, 2005)			
	21.1	Incinerator	Particulates	34 mg/dscm corrected to 7% oxygen
	21.2		Visible emissions	10% opacity except for no more than 6 minutes in any hour
	21.3		NOx	400 mg/m3 capacity < 6 tph 200 mg/m3 capacity ≥ 6 tph
	21.4		Sulphur dioxide	50 mg/dscm
	21.5		CO	50 mg/dscm
	21.6		Chlorinated organics	>99.9999% destruction and removal efficiency (DRE) for POHC [17]
	21.7		Organics	>99.99% destruction and removal efficiency (DRE) for POHC [17]
	21.8		Total Dioxins & Furans	0.1 ng TEQ/dscm
	21.9		PCB	1 mg/kg PCB feed for a maximum one-hour average concentration or >99.9999% destruction and removal efficiency (DRE)

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	#	Source	Pollutant	Emission Standard [6]
	21.10		Hydrogen Chloride	10 mg/dscm
	21.11		Hydrogen Fluoride	1 mg/dscm
	21.12		Tl + Cd	0.05 mg/dscm
	21.13		Sb + Pb + Co + As + Cr +Cu + Mn + Ni + V	0.5 mg/dscm
	21.14		Hg	0.05 mg/dscm
	21.15		*Minimum Temperature and minimum Residence Time where incineration of > 1% halogenated organic substances expressed as Chlorine) takes place is: 850 °C for 1 second OR 1100 °C for 2 seconds*	
22	Hydrochloric Acid Plants			
	22.1	Hydrochloric acid plants	HCl	0.25 kg/t of acid produced
	22.2	Hydrochloric acid regenerating plants	HCl	25 ppmv
	22.3		Cl_2	6 ppmv
23	Industrial Surface Coating - Large Metal Appliances & Furniture			
	23.1	Coating	VOC	0.9 kg of VOC per litre of applied coating solids
24	Iron and steel mills			
	24.1	electric arc metal melting furnace, electric induction metal melting furnace, or scrap preheater	Particulate	11.4 mg/dscm
	24.2	Cupola metal melting furnace	Particulate	13.7 mg/dscm
25	Kraft pulp mills			

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	#	Source	Pollutant	Emission Standard [6]
	25.1	Recovery furnace	Particulate	0.1 g/dscm at 8% oxygen
	25.2		Opacity	20 % with ESP and wet scrubber installed
	25.3	Digester system, brown stock washer system, multiple-effect evaporator system, or condensate stripper system	Total reduced sulphur	5 ppm by volume on a dry basis (10% oxygen)
26	Lead Acid Battery Manufacturing Plants			
	26.1	Lead reclamation facility	Lead	4.5 mg/dscm
	26.2		Opacity	5%
	26.3	Grid casting facility[SEP]	Lead	0.4 mg/dscm
	26.4	Paste mixing facility[SEP]	Lead	1 mg/dscm
	26.5	Other general operations	Lead	1 mg/dscm
	26.6	Lead Oxide Manufacturing	Lead	5 mg/kg of Lead feed
	26.7	Any facility except lead reclamation	Opacity	0%
27	Lime Manufacturing Plants			
	27.1	Rotary lime-kiln emissions	Particulates	0.3 kg/t of stone feed
	27.2		Opacity	15 %
28	Medical Waste Autoclave [12] (For regulated medical wastes)			

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	#	Source	Pollutant	Emission Standard [6]
	28.1	Gravity Flow Autoclave		Temp.≥121 °C, Pres.=15 psig, R. T=>60mins Or Temp. ≥135 °C, Pres.=31 psig, R.T =>45 mins Or Temp. ≥149 °C, Pres.=52 psig, R.T =>30 mins
	28.2	Vacuum Autoclave *(subjected to a minimum of one pre- vacuum pulse to purge the autoclave of all air)*		Temp.≥149 C, Pres.=15 psig, R. T=>45mins Or Temp. ≥135 C, Pres.=31 psig, R.T =>30 mins
	28.3	Steam Sterilizer *(subjected at 100% steam conditions and all air evacuated)*		Temp. ≥121 C, Pres.=15 psig, R. T ≥ 90mins Or Temp. ≥133 C, Pres.=27 psig, R.T ≥ 45 mins Or Temp. ≥160 C, Pres.=80 psig, R.T ≥ 16 mins
29	Metal Coil Surface Coating Paints			
	29.1	Fugitive emissions	VOC	0.28 kg/l of coating solids with no control 0.14 kg/l of coating solids with control
30	Mineral Processing Plants (Metallic)			
	30.1	Exit gases	Particulates	0.05 g/dscm
	30.2	Emissions from any source except wet scrubbing control device	Opacity	7%
31	Mineral Processing Plants (Non-Metallic)			

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	#	Source	Pollutant	Emission Standard [6]
	31.1	Belt conveyors or other affected facility	Particulates	0.05 g/dscm
	31.2		Opacity	10%
32	Nitric Acid Plants			
	32.1	Exit gases	NOx	1.5 kg/t of acid produced (expressed as 100 percent nitric acid)
	32.2		Opacity	10%
33	Petroleum Refineries			
	33.1	Fluid catalytic cracking unit catalyst Regenerator	Particulates	1.0 kg/t of coke burn-off
	33.2		Opacity	30%
	33.3		CO	500 ppm
	33.4		SO_2 [14]	50 ppm with an add-on control device OR 9.8 kg/t of coke burn-off without an add-on control device
	33.5	Fuel gas combustion	H_2S contents of fuel gas	<230 mg/dscm
	33.6	Claus sulfur recovery plants	SO2	250 ppm at zero percent oxygen on dry basis if emissions are controlled by an oxidation/reduction control system followed by incineration
	33.7		Reduced Sulfur andH2S	300 ppm of reduced sulfur compounds and 10 ppm H_2S calculated as SO_2 at 0% oxygen on a dry basis if emissions are controlled by reduction control system not followed by incineration

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	#	Source	Pollutant	Emission Standard [6]
	33.8	Process Vent	Organic HAP [18]	Reduce emissions of TOC by 98% by wt. OR to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust the emissions in a flare
34	Pharmaceutical Plants			
	34.1	Process vents	Organic HAP [18]	Reduce emissions of TOC by 98% by wt. OR to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust the emissions in a flare
	34.2		Hydrogen halides and halogens	20 ppm
35	Phosphate Fertilizer			
	35.1	Exit gases from any source	Total fluorides	10 g/t of equivalent P_2O_5 feed
	35.2	Exit gases - super phosphoric acid plant	Total fluorides	5 g/t of equivalent P_2O_5 feed
	35.3	Exit gases – di-ammonium phosphate plants	Total fluorides	30 g/t of equivalent P_2O_5 feed
	35.4	Exit gases- triple super phosphate plants constructed after 1979	Total fluorides	100 g/t of equivalent P_2O_5 feed
	35.5	Exit gases - granular superphosphate storage facilities	Total fluorides	0.25 g/hr/t of equivalent P_2O_5 stored
36	Phosphate Rock Plants			

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	#	Source	Pollutant	Emission Standard [6]
	36.1	Phosphorous plant	Polonium [24]	4.5 curies per year (Total emissions from plant)
	36.2	Phosphate rock dryer	Particulates	0.03 kg/t of rock feed
	36.3		Opacity	10 %
	36.4	Phosphate rock calciner	Particulates	0.12 kg/t of rock feed
	36.5		Opacity	10%
	36.6		Polonium [24]	2 curies per year (same with nodulizing kiln)
	36.7	Phosphate rock grinder	Particulates	0.006 kg/t of rock feed
	36.8		Opacity	0%
37	Polymeric Coating (supporting Substrate Facilities)			
	37.1	Coating operation and coating mix operation	VOC	Install, operate and maintain a total enclosure around the coating operation and vent the captured VOC emissions from the total enclosure to a control device that is at least 95% efficient.
	Polymer Manufacturing (Polypropylene; Polyethylene; Polystyrene)			
	38.1	All facilities with process vents	TOC [14]	Reduce emissions of TOC by 98% by wt. OR concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust emissions in a flare.
39	Portland Cement Plants			
	39.1	Kiln gases	Particulates	150 g/t of feed to the kiln
	39.2		Opacity	20%

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	#	Source	Pollutant	Emission Standard [6]
	39.3		NOx	0.76 kg/ Mg of clinker
	39.4		SO_2	0.2 kg/ Mg of clinker
	39.5		Dioxins and Furans	0.2 ng/dscm (TEQ) at 7% oxygen
	39.6		Mercury	27.5 kg/MM Tons of clinker
	39.7		Total Hydrocarbons	24 ppmv at 7% oxygen
	39.8		HCl	3 ppmv at 7% oxygen
	39.9	Clinker cooler	Particulates	50 g/t of feed to the kiln
	39.10		Opacity	10 %
	39.11	All other sources	Opacity	10%
40	Primary copper Smelters			
	40.1	Dryer gases	Particulates	50 mg/dscm
	40.2	Roaster, smelting furnace or copper converter	SO_2	650 ppm
	40.3		Opacity	20%
41	Primary lead smelters			
	41.1	Blast furnace, dross reverberatory furnace, or sintering machine discharge end	Particulate	50 g/dscm
	41.2		SO_2	650 ppm
	41.3		Opacity	20 %
42	Primary Zinc Smelters			

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	#	Source	Pollutant	Emission Standard [6]
	42.1	Sintering machine gases	Particulates	50 mg/dscm
	42.2	Roaster gases	SO_2	650 ppm
	42.3	All units	Opacity	20%
	Secondary Aluminum smelting plants			
	43.1	Aluminum scrap shredder	Particulate	23 mg/dscm
	43.2		Opacity	10 %
	43.3	Scrap dryer/delacquering kiln/decoating kiln	Particulate	0.04 kg/ Mg of feed/charge
	43.4		Total Hydrocarbon	0.03 kg THC as propane /Mg of feed/charge
	43.5		Dioxins and Furans	0.25 µg TEQ/Mg of feed/charge
	43.6		HCl	0.40 kg/ Mg of feed/charge
	43.7	Rotary dross cooler	Particulate	0.09 g/dscm
	43.8		Opacity	10 %
	43.9	Furnace that is not a melting/holding furnace processing only clean charge	Particulate	0.2 kg/Mg of feed/charge
	43.10		Dioxins and Furans	15 µg TEQ/Mg of feed/charge
	43.11	Melting/holding furnace processing only clean charge	Particulate	0.4 kg/Mg of feed/charge
	43.12		Dioxins and Furans	15 µg TEQ/Mg of feed/charge
	43.13	In-line fluxer	Particulate	0.005 kg/Mg of feed/charge
	43.14		HCl	0.02 kg/Mg of feed/charge
	43.15	Thermal chip dryer	Total Hydrocarbon	0.4 kg THC as propane /Mg of feed/charge

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	#	Source	Pollutant	Emission Standard [6]
	43.16		Dioxins and Furans	2.50 µg TEQ/Mg of feed/charge
44	Secondary Brass and Bronze Production			
	44.1	Exit gases from reverberatory furnace	Particulates	50 mg/dscm
	44.2		Opacity	20%
45	Secondary lead smelting plants			
	45.1	Process vents	Lead	1 mg/dscm
	45.2	Vent gases	Lead	0.2 mg/dscm
	45.3	Collocated blast and reverberatory furnaces	Total hydrocarbons	20 ppmv (4 % oxygen)
	45.4		Dioxins and Furans	0.5 ng TEQ /dscm (7% oxygen)
	45.5	Reverberatory and electric furnaces	Total hydrocarbons	12 ppmv (4 % oxygen)
	45.6		Dioxins and Furans	170 ng TEQ/dscm (7% oxygen)
46	Sintering plants			
	46.1	Windbox exhaust stream	Particulate	0.2 kg/Mg of product sinter
	46.2	Discharge end	Particulate	45.7 mg/m^3
	46.3		Opacity	20%
	46.4	Sinter cooler	Particulate	22.8 mg/m^3
	46.5		Opacity	10%
	46.6	Casthouse	Particulate	22.8 mg/m^3
	46.7		Opacity	20%

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	#	Source	Pollutant	Emission Standard [6]
	46.8	Basic oxygen process furnace (BOPF)	Particulate	22.8 mg/m^3
	46.9	Hot metal transfer, skimming, and desulfurization operation at BOPF	Particulate	22.8 mg/m^3
	46.10	Roof monitoring at BOPF	Opacity	20%
47	Steel Plants – Basic Oxygen Furnaces for making Molten Steel from Scrap			
	47.1	Furnace with a control device	Particulates	23 mg/dscm
	47.2		Opacity	10%
	47.3	Steel Pickling Plants – Pickling Lines	HCl	18 ppmv or 97% control
48	Steel Plants – Electric Arc Furnace (EAF)			
	48.1	Electric arc furnace	Particulates	12 mg/dscm
	48.2	Exit gases from control device	Opacity	3 %
	48.3	Exit gases from shop due to EAF	Opacity	6% during melting 20% during charging 40% during tapping
	48.4	Exit gases from dust handling system	Opacity	10%
49	Sulfur recovery plants			
	49.1	Claus sulfur recovery unit part of a sulfur recovery plant with design capacity greater than 20 long tons per day (LTD)	SO_2	250 ppmv on dry basis at 0% excess air
	49.2		Total reduced sulfur	300 ppmv of TRS calculated as ppmv SO_2 on dry basis
	49.3	Sulfur recovery unit (Claus or	SO_2	250 ppmv on dry basis at 0% excess air

	#	Source	Pollutant	Emission Standard [6]
	49.4	other type, regardless of size)	Total reduced sulfur	300 ppmv of TRS calculated as ppmv SO_2 on dry basis
50	Sulfuric acid Plants			
	50.1	Exit gases	Acid mist including SO_3 and H_2SO_4 Vapors	75 g/t of acid produced (expressed as 100 percent sulfuric acid)
	50.2		Opacity	10%
	50.3		SO_2	2 kg/t of acid produced (expressed as 100 percent sulfuric acid)
51	Synthetic Fiber Production Facilities			
	51.1	All facilities that produce acrylic and non-acrylic fibers	VOC	10 kg VOC/t of solvent (6 month rolling average)
	51.2	Facilities that produce only non-acrylic fibers	VOC	17 kg VOC/t of solvent
52	Synthetic Organic Chemical Manufacturing Industry (SOCMI Processes)			
	52.1	Any air oxidation unit producing any of the chemicals listed in Table 1 of Appendix 5 as a product or by -product	TOC [14]	Reduce emissions of TOC by 98% by wt. OR to a concentration of 20 ppmv on a dry basis corrected to 3% oxygen OR combust the emissions in a flare
	52.2	Any distillation operation producing any of the chemicals listed in Table 2 of Appendix 5 as a product or by-product		

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	#	Source	Pollutant	Emission Standard [6]
	52.3	Any reactor process [16] producing any of the chemicals listed in Table 3 of Appendix 5 as a product or by-product		
55	Titanium Dioxide Plant			
	53.1	Chlorinator, chlorine storage, chlorine	Chlorine [16]	30 mg/m^3
	53.2	Steel Pickling Plants – Pickling Lines	Particulates	0.05 g/dscm
	53.3		Opacity	7% except for wet scrubbing system
54	Vinyl Chloride			
	54.1	Vents from equipment used in VCM formation; purification; and loading / unloading	Vinyl Chloride	10 ppm (3 hourly average)
	54.2	Oxychlorination reactor	Vinyl Chloride	0.2 g/kg of the 100% ethylene dichloride product from the oxychlorination process
55	Polyvinylchloride & Ethylene Dichloride Manufacturing (constructed or modified after September 1, 2005)			
	55.1	Polyvinyl chloride reactor; stripper; mixing, weighing and holding containers; and monomer recovery system	Vinyl Chloride	10 ppm (3 hourly average)
	55.2	Ethylene dichloride unit	Vinyl Chloride	10 ppm (3 hourly average)
	55.3	Oxychlorination reactor	Vinyl Chloride	0.2 g/kg of the 100% ethylene dichloride product from the oxychlorination process

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Notes:

(1) Compliance with the standards will be determined by comparison with hourly average data, unless otherwise specified, that are corrected to standard temperature and pressure, moisture and oxygen content as specified by USEPA Methods.

(2) General standards apply to all emissions sources unless individual facility standards are specified.

(3) Applies to facilities exempted by the National Center for Environmental Compliance from conducting fugitive emission monitoring.

(4) The maximum exit velocity of a flare (Vmax) is calculated by dividing the maximum volumetric flow rate at STP by the cross-sectional area of the flare tip. Ht is the Net Heating Value of the gas being combusted.

(5) The value of F for Stationary Gas Turbines NOx estimation shall be obtained using the following:

Y = manufacturer rated heat rate at manufacturer's rated peak load (kJ/Wh) OR actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kJ/Wh

F = NOx emission allowance for fuel bound nitrogen, defined below

N = fuel bound nitrogen

Fuel Bound Nitrogen (Percent by weight)	F (NOx by weight)
0	$N \leq 0.015$
0.04(N)	$0.015 \leq N < 0.1$
0.004 + 0.0067(N-0.1)	$0.1 < N \leq 0.25$
0.005	$N > 0.25$

(6) For mixed fuel the standard is prorated according to the % heat input from derived from each fuel:

NOx standard (ng/J) = [(% heat input gas x NOx standard gas) + (% heat input oil x NOx standard oil)] / (% heat input gas + % heat input oil)

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(7) The SO2 limit shall be considered a seven-day rolling average.

(8) TOC = total organic compounds, less methane and ethane.

(9) Exemptions from the source standards for SOCMI reactor processes are as follows:

a. Any reactor process that is designed and operated as a batch operation
b. A process unit with a total design capacity for all chemicals produced within that unit of less than 1,000 tons per year
c. If the vent stream from an affected facility is routed to a distillation unit subject to the SOCMI standards and has no other releases to the atmosphere except for a PRV the facility is exempt.

(10) POM = Polycyclic organic matter, POHC=Principal Organic Hazardous Constituent

(11) Measured as individual organic Hazardous Air Pollutant (HAP) or as TOC (15)

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Appendix 5 – Emission Point Sources Subject to Continuous Monitoring

#	Source (Design Basis)	Parameters [1]
1	Coal cleaning plants (with thermal dryer)	Opacity
2	Aluminum reduction plants	PM
3	Ferroalloy production facilities (Electric Arc Furnaces)	PM
4	Hazardous and Medical Waste Incineration	PM, NOx, SO_2
5	Lead smelting	Lead
6	Portland Cement	NOx, SO_2, PM
7	Metal coil surface coating paints	Total Hydrocarbons
8	Gas Turbines > 50 MW heat input capacity	NOx
9	Combustion Devices >73 MW heat input capacity	Opacity [2], PM, SO2[2] and NOx [3]
10	BIFs operating > 1000 hours per year	CO or Hydrocarbons
11	Hazardous waste incinerators	CO downstream of combustion zone Combustion temperature[1] Waste feed rate, SO_2, HCl, PM and Oxygen
12	Nitric Acid Plants	NOx
13	Petroleum Refineries a) Fluid Catalytic Cracking Unit Catalyst Regenerators (with incinerator or waste heat boiler)	Opacity CO
14	Petroleum Refineries b) Fuel Gas Combustion Devices [4]	SO_2 [5] O_2
15	Petroleum Refineries c) Claus Sulfur plants > 20 t/d with oxidation or reduction control system followed by Incinerator	SO_2 O_2
16	Petroleum Refineries d) Claus Sulfur plants > 20 t/d with reduction control system not followed by incinerator	Reduced Sulphur Compounds O_2

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#	Source (Design Basis)	Parameters [1]
17	Steel Plants (electric arc furnaces) - Emission from the control device	Opacity
18	Sulfuric Acid Plants	SO_2

Notes:

(1) Pertains to exhaust gases except where noted

(2) Combustion sources that burn natural gas or hydrogen ONLY shall be exempt from the continuous emission monitoring requirements for opacity and SO2.

(3) If the operator of the facility demonstrates during a performance test and subsequent point source monitoring tests that the emissions of NOx are consistently less than 70% of the applicable standard for facilities constructed after 1st September 2005, then the source is exempt from the requirement for continuous emission monitoring of NOx. Demonstration of consistent compliance will require one of the following number consecutive spot sampling tests:

- 2 results < 50% standard
- 3 results < 60% standard
- 4 results < 70% standard
- 30 days < 70% standard using portable continuous emission monitor All spot sampling tests shall be separated by at least 3 months and completed within 2 years.

(4) Fuel gas combustion devices having a common source of fuel gas may be monitored at only one representative location.

(5) In lieu of monitoring SO2 in combustion gases, H2S in fuel gas may be monitored

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Appendix 6 - Synthetic Organic Chemical Manufacturing Industry (SOCMI) Facilities that are Subject to the Provisions of this Executive Regulation

Table 1 – Synthetic Organic Chemical Manufacturing Industry (SOCMI) Facilities – Oxidation Processes

Chemical Product/Byproduct	
Dimethyl Terephthalate	Acetaldehyde
Ethylene dichloride	Acetic Acid
Ethylene Oxide	Acetone
Formaldehyde	Acetonitrile
Formic Acid	Acetophenone
Glycoxal	Acrolein
Hydrogen Cyanide	Acrylic Acid
Isobutyric Acid	Acrylonitrile
Isophthalic Acid	Anthraquinone
Maleic anhydride	Benzaldehyde
Methyl Ethyl Ketone	Benzoic Acid; Tech.
a-Methyl Styrene	1,3-Butadiene
Phenol	1-Butyl Benzoic Acid
Phthalic Anhydride	N-Butyric Acid
Propionic Acid	Crotonic Acid
Propylene Oxide	Cumene Hydro-peroxide
Styrene	Cyclohexanol
Terephthalic Acid	Cyclohexanone

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Table 2 - Synthetic Organic Chemical Manufacturing Industries (SOCMI) Facilities - Distillation Processes

Chemical Product/Byproduct			
Acetaldehyde	tert-Butyl hydro-peroxide	Benzene	Cumene hydro-peroxide
Acetaldol	2-Butene-1,4-diol	Benzenesulphonic Acid	Cyanuric chloride
Acetic Acid	Butyl-aldehyde	Benzenesulphonic Acid Alkyl de rivatives	Cyclohexane
Acetic Anhydride	Butyric anhydride	Benzoic Acid, tech.	Cyclohexane, oxidized
Acetone	Caprolactam	Benzyl Chloride	Cyclohexanol
Acetone Cyanohydrin	Carbon disulphide	Biphenyl	Cyclohexanone
Acetylene	Carbon tetra-bromide	Bisphenol A	Cyclohexanone oxime
Acrylic Acid	Carbon tetrachloride	Brometone	Cyclohexene
Acrylonitrile	Chlorobenzene	1,3-Butadiene	1,3-Cyclopentadiene
Adipic Acid	2-Chloro-4-(ethyl amino)-6-(isopropyl amino)-s-triazine	Butadiene and Butene fractions	Cyclopropane
Adiponitrile	Chloroform	n-Butane	Diacetone alcohol
Alcohols, C-11 or lower, mixtures	p-Chloronitrobenzene	1,4-Butanediol	Dibutanized aromatic co ncentrate
Alcohols, C-12 or higher, mixtures	Chloroprene	Butanes, mixed	1,4-Dichlorobutene
Allyl chloride	Citric acid	1-Butene	3,4-Dichloro-1-butene
Amylene	Croton-aldehyde	2-Butene	Dichlorodifluoromethan e

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Chemical Product/Byproduct			
Amylenes, mixed	Crotonic acid	Butenes, mixed	Dichlorodimethylsilane
Aniline	Cumene	n-Butyl Acetate	di-Chlorohydrin
tert-Butyl alcohol	Di-n-heptyl-n-nonyl undecyl phthalate	Butyl Acrylate	di-Ethanolamine
Butyl-benzyl phthalate	Di-Isodecyl Phthalate	n-Butyl alcohol	Diethyl-Benzene
Butylene glycol	Di-Isononyl Phthalate	sec-Butyl alcohol	Diethylene glycol
Dimethylamine	Hexa-methylene tetra-mine	Ethyl Cyanide	Linear alcohols, ethoxylated, mixed
Dimethyl Terephthalate	Hexane	Ethylene	Linear alcohols, ethoxylated, sulfated, sodium salt, mixed
2,4 di-Nitro-toluene	2-Hexenedinitrile	Ethylene dibromide	Linear alkyl-benzene
2,6 di-Nitro-toluene	3-Hexenedinitrile	Ethylene dichloride	Magnesium acetate
Dioctyl phthalate	Hydrogen cyanide	Ethylene Glycol	Maleic anhydride
Dodecene	Iso-butane	Ethylene glycol mono-butyl	Melamine
Dodecyl-benzene, non-linear	Iso-butanol	Ethylene glycol mono-ethyl ether	Mesityl oxide
Dodecyl-benzene-sulphonic Acid	Isobutylene	Ethylene glycol mono-ethyl ether acetate	Meth-acrylonitrile
Dodecyl-benzene-sulphonic Acid, sodium salt	Iso-butyraldehyde	Ethylene glycol monomethyl ether	Methanol
Epichlorohydrin	Isodecyl alcohol	Ethylene oxide	Methylamine
Ethanol	Isooctyl alcohol	2-Ethylhexanol	Methylbenzene diamine

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Chemical Product/Byproduct			
Ethanolamine	Isopentane	2-Ethylhexyl alcohol	Methyl Chloride
Ethyl Acetate	Isophthalic acid	Ethyl Benzene	Isopropanol
Ethyl Acrylate	Isoprene	Ethyl Chloride	Ketene
2-Ethylhexyl amine	Methylene Chloride	3-Pentene nitrile	Vinylidene chloride
Ethyl methyl benzene	Methyl ethyl ketone	Pentenes mixed	m-Xylene
6-ethyl-1,2,3,4-tetrahydro-9,10-anthracene-drone	Methyl Iodide	Perchloroethylene	o-Xylene
Formaldehyde	Methyl isobutyl ketone	Phenol	p-Xylene
Glycerol	Methyl methacrylate	1-Phenylethyl hydro-peroxide	Xylenes, mixed
n-Heptane	2-Methylpentane	Phenyl propane	m-Xylenol
Heptenes (mixed)	1-Methyl-1-2-pyrrolidone	Phosgene	Tetra-methyl lead
Hexadecyl-chloride	Methyl tert-butyl ether	Phthalic anhydride	Tetra (methyl-ethyl) lead
Hexa-methylene diamine	Naphthalene	Propane	Tetrahydrofuran
Hexa-methylene diamine adipate	Nitrobenzene	Propionaldehyde	Toluene
1-Nonene	1,1,1-Trichloroethane	Prionic acid	Toluene 2,4-diamine
Nonyl alcohol	1,1,2-Trichloroethane	Propyl alcohol	Toluene 2,4-(and 2,6)-di-isocyanate (80/20 mixture)
Nonyl phenol	Trichloroethylene	Propylene	Tri-bromo-methane

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Chemical Product/Byproduct			
Nonphenol, ethoxylated	Tri-choro-fluoro-methane	Propylene chlorohydrin	Terephthalic acid
Octene	1,1,2-Trichloro-1,2,2-trifluoroethane	Propylene glycol	1,1,2,2-Tetrachloroethane
Oil soluble petroleum sulfonate, calcium salt	Tri-ethanolamine	Propylene oxide	Tetraethyl lead
Oil soluble petroleum sulfonate, sodium salt	Tri-ethylene glycol	Sodium cyanide	Styrene
Pentaerythritol	Vinyl acetate	Sorbitol	Vinyl chloride
n-Pentane			

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Table 3 - Synthetic Organic Chemical Manufacturing Industries (SOCMI) Facilities - Reactor Processes

Chemical Product/Byproduct			
Acetaldehyde	Butyric anhydride	Benzenesulphonic Acid Alkyl de rivatives	Diacetone alcohol
Acetic Acid	Caprolactam	Benzyl Chloride	1,4-Dichlorobutene
Acetic Anhydride	Carbon disulphide	Bisphenol A	3,4-Dichloro-1-butene
Acetone	Carbon tetrachloride	Brometone	Dichlorodifluoromethane
Acetone Cyanohydrin	Chlorobenzene	1,3-Butadiene	Dichlorodimethylsilane
Acetylene	Chloroform	Butadiene and Butene fractions	di-Ethanolamine
Acrylic Acid	p-Chloronitrobenzene	n-Butane	Diethyl-Benzene
Acrylonitrile	Citric acid	1,4-Butanediol	Diethylene glycol
Adipic Acid	Cumene	Butanes, mixed	Di-Isodecyl Phthalate
Adiponitrile	Cumene hydro-peroxide	1-Butene	Dimethyl Terephthalate
Alcohols, C- 11 or lower, mixtures	Cyanuric chloride	2-Butene	2,4 di-Nitro-toluene
Alcohols, C- 12 or higher, mixtures	Cyclohexane	Butenes, mixed	2,6 di-Nitro-toluene
Allyl chloride	Cyclohexane, oxidized	n-Butyl Acetate	Dioctyl phthalate
Amylene	Cyclohexanol	Butyl Acrylate	Dodecene

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Chemical Product/Byproduct			
Amylenes, mixed	Cyclohexanone	n-Butyl alcohol	Dodecyl-benzene, non-linear
Aniline	Cyclohexanone oxime	sec-Butyl alcohol	Dodecyl-benzene-sulphonic Acid
Benzene	Cyclohexene	tert-Butyl alcohol	Dodecyl-benzene-sulphonic Acid, sodium salt
Benzenesulphonic Acid	Cyclopropane	Butyl-benzyl phthalate	Epichlorohydrin
Butylene glycol	Ethanol	6-ethyl-1,2,3,4-tetrahydro-9,10-anthracene-drone	Nitrobenzene
tert-Butyl hydro-peroxide	Ethanolamine	Formaldehyde	1-Nonene
2-Butene-1,4-diol	Ethyl Acetate	Glycerol	Nonyl alcohol
Butyl-aldehyde	Ethyl Acrylate	n-Heptane	Nonyl phenol
Ethyl Benzene	Maleic anhydride	Heptenes (mixed)	Nonphenol, ethoxylated
Ethyl Chloride	Mesityl oxide	Hexa-methylene diamine	Oil soluble petroleum sulfonate, calcium salt
Ethylene	Methanol	Hexadecyl-chloride	Octene
Ethylene dibromide	Methylamine	Hexa-methylene diamine adipate	Pentaerythritol
Ethylene dichloride	Methylbenzene diamine	Hexa-methylene tetra-mine	3-Pentene nitrile
Ethylene Glycol	Methyl Chloride	Hexane	Pentenes mixed
Ethylene glycol mono-butyl	Methylene Chloride	2-Hexenedinitrile	Perchloroethylene
Ethylene glycol mono-ethyl ether	Methyl ethyl ketone	3-Hexenedinitrile	Phenol
Ethylene glycol mono-	Methyl isobutyl ketone	Hydrogen cyanide	1-Phenylethyl hydro-peroxide

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Chemical Product/Byproduct			
ethyl ether acetate			
Ethylene glycol monomethyl ether	Methyl methacrylate	Iso-butane	Phenyl propane
Ethylene oxide	1-Methyl-1-2-pyrrolidone	Iso-butanol	Phosgene
2-Ethylhexanol	Methyl tert-butyl ether	Isobutylene	Phthalic anhydride
2-Ethylhexyl amine	Naphthalene	Iso-butyraldehyde	Propane
Isopentane	Propionaldehyde	Magnesium acetate	Terephthalic acid
Isoprene	Propyl alcohol	Tetraethyl lead	1,1,1-Trichloroethane
Isopropanol	Propylene	Tetra-methyl lead	1,1,2-Trichloroethane
Ketene	Propylene glycol	Tetra (methyl-ethyl) lead	Trichloroethylene
Linear alcohols, ethoxylated, mixed	Propylene oxide	Tetrahydrofuran	Tri-choro-fluoro-methane
Linear alcohols, ethoxylated, sulfated, sodium salt, mixed	Sorbitol	Toluene	1,1,2-Trichloro-1,2,2-trifluoroethane
Linear alkyl-benzene	Styrene	Toluene 2,4-diamine	Tri-ethanolamine
Vinylidene chloride	Vinyl chloride	Toluene 2,4-(and 2,6)-di-isocyanate (80/20 mixture)	Tri-ethylene glycol
m-Xylene	o-Xylene	Tri-bromo-methane	Vinyl acetate
m-Xylenol	p-Xylene		

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Appendix 7 - Hazardous Air Pollutants (HAP)

Organic HAPs	
Acetaldehyde	o-Cresol
Acetamide	Cumene
Acetonitrile	2,4-D (salts & eslayoutters)
Acetophenone	DDE
2-Acetylaminofluorene	Diazomethane
Acrolein	Dibenzofurans
Acrylamide	1,2-Dibromo 3-chloropropane
Acrylic Acid	Di-butylphthalate
Acrylonitrile	1,4-Dichlorobenzene
Allyl chloride	3,3-Dichlorobenzidine
4-Aminodiphenyl	Dichloroethyl ether
Aniline	1,3-Dichloropropane
o-Anisidine	Dichlorvos
Benzene	Diethanoloamine
Benzidine	N,N-Diethylaniline
Benzotrichloride	N,N-Dimethylaniline
Benzyl chloride	Diethyl sulphate
Biphenyl	3,3-Dimethoxybenzidine
Bis (2-ethylhexyl) phthalate (DEHP)	Dimethyl amino-azobenzene
Bis-(chloro-methyl) ether	3,3-Dimethyl benzidine

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Organic HAPs	
Bromoform	Dimethyl carbomyl chloride
1,3-Butadiene	Dimethyl formamide
Calcium cyanamide	1,1-Dimethyl hydrazine
Captan	Dimethyl phthalate
Caprolactam	Dimethyl sulphate
Carbaryl	4,6-Dinitro-o-cresol; and salts
Carbon di-sulphide	2,4-Dinitrophenol
Carbon tetrachloride	2,4-Dinitrotoluene
Carbonyl sulphide	1,4-Dioxane (1,4-Diethylene oxide)
Catechol	1,2-Diphenyl hydrazine
Chloramben	Epichlorohydrin
Chlordane	1,2-Epoxybutane
Chloro-acetic acid	Ethyl acrylate
2-Chloroacetophenone	Ethyl benzene
Chlorobenzene	Ethyl carbomate (urethane)
Chloro-benzylate	Ethyl chloride
Chloroform	Ethylene dibromide
Chloromethyl methyl ether	Ethylene dichloride
Chloroprene	Ethylene glycol
Cresols/Cresylic Acid	Ethyleneimine (Aziridine)
m-Cresol	Ethylene oxide
p-Cresol	Ethylene thio-urea

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Organic HAPs	
Ethylene chloride	Phenol
Formaldehyde	p-Phenylenediamine
Glycol ethers[1]	Phosgene
Heptachlor	Phosphorus
Hexachlorobenzene	Phthalic anhydride
Hexachlorobutadiene	Polychlorinated biphenyls
Hexachlorocyclopentadiene	Polycyclic Organic Matter[2]
Hexachloroethane	1,3-Propane sulphone
Hexamethylene 1,6-diisocyanate	Beta-propiolactone
Hexamethylphosphoramide	Propionaldehyde
Hexane	Propoxur
Hydrazine	Propylene dichloride
Hydroquinone	Propylene oxide
Isophorone	1,2-Propyleneimine
Lindane (all isomers)	Quinoline
Maleic anhydride	Quinone
Methanol	Styrene
Methoxychlor	Styrene oxide
Methyl bromide (bromomethane)	2,3,7,8-tetrachlorodibenzo-p-dioxin
Methyl chloride (chloromethane)	1,1,2,2-Tetrachloroethane
Methyl chloroform	Tetrachloroethylene

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Organic HAPs	
Methyl ethyl ketone (2-Butanone)	Titanium tetrachloride
Methyl hydrazine	Toluene
Methyl iodide	2,4-Toluene diamine
Methyl isobutyl ketone	2,4-Toluene di-isocyanate
Methyl isocyanate	o-Toluidine
Methyl methacrylate	Toxaphene (chlorinated camphene)
Methyl-tert-butyl ether	1,2,4-Trichlorobenzene
4,4-Methylene bis (2-chloroaniline)	1,1,2-Trichloroethane
Methylene chloride (dichloromethane)	Trichloroethylene
Methylene diphenyl di-isocyanate	2,4,5-Trichlorophenol
4,4-Methylenedianiline	2,4,6-Trichlorophenol
Napthalene	Triethylamine
Nitrobenzene	Trifluraline
4-Nitrobiphenyl	2,2,4-Trimethyl pentane
4-Nitrophenol	Vinyl acetate
2-Nitropropane	Vinyl bromide
N-Nitrosodimethylamine	Vinyl chloride
N-Nitrosomorpholine	Vinylidene chloride
N-Nitroso N-methyl urea	Xylenes (isomers and mixtures)
Parathion	o-Xylenes
Pentachloronitrobenzene	m-Xylenes
Pentachlorophenol	p-Xylenes

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Organic HAPs	
Antimony Compounds	Cyanide Compounds[3]
Arsenic Compounds	Fine Mineral Fibres[4]
Asbestos	Hydrogen chloride (Hydrochloric acid)
Beryllium Compounds	Hydrogen fluoride (Hydrofluoric acid)
Cadmium Compounds	Lead Compounds
Chlorine	Manganese Compounds
Chromium Compounds	Mercury Compounds
Cobalt Compounds	Nickel Compounds
Coke oven emissions	Selenium Compounds
Phosphine	Radionuclides (including radon)

Notes:

1. Includes mono- and di-ethers of ethylene, diethylene and tri-ethylene glycol.
2. Includes organic compounds with more than one benzene ring and which have a boiling point greater than 100°C.
3. Any cyanide (CN) compound where formal dissociation may occur.
4. Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, dross or other mineral derived fibers of average diameter of one (1) micron or less.

Appendix 8 - Required Control Devices for Storage Tanks for VOCs

Tank Capacity "C" (m^3)	True Vapor Pressure (kPa)	Control Device Necessary for Storage [(1)]

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C < 75	Any	None
C ≥ 75	5.2 ≤ Tvp < 76.6	Fixed roof with internal floating roof OR external floating roof with double seals OR closed vent system with control device.
	Tvp ≥ 76.6	Closed vent system with control device.

Notes:

Internal floating roofs shall be designed and installed in accordance with U.S EPA 40 CFR Part 60 subpart Kb.

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