

Article 76 – Ambient Air Quality

Section 1 – Purpose. Ambient air quality must be managed to protect the public health and welfare from the effects of air pollution. This article applies to all air outside of a facility's boundary.

Section 2 – Kuwait Ambient Air Quality Standards (KAAQS). Ambient air quality within Kuwait should not exceed the limits shown in Appendix 17-1. These limits will be reviewed every two years to ensure they meet international standards and conform to conditions that satisfy the public health and welfare in Kuwait.

Section 3 - Kuwait Implementation Plan. The KEPA Director will create the Kuwait Implementation Plan to ensure compliance with KAAQS. The KIP will establish Air Quality Control Zones, timelines of execution, and roles and responsibilities of stakeholders within the zones. The KIP will be submitted within six months of adoption and reviewed every two years for relevancy and updates.

Section 4 – Air Quality Control Zones (AQCZ). As part of the KIP, the State of Kuwait will be divided into Air Quality Control Zones (AQCZ) based on local air quality referenced to KAAQS listed in Appendix 17-1.

Section 5 - Designation of AQCZs. AQCZs will be designated in the KIP based on historical monitoring and weather data. AQCZs will be categorized as:

- a. Attainment – zone does not exceed KAAQS more than three times in 12 consecutive months. For PM-10 and PM-2.5, exceedances measured during dust storms will not counted.
- b. Non-Attainment – Zone exceeds KAAQS standards more than three times within 12 consecutive months.
- c. Unclassifiable – Zone does not have sufficient data to establish a category rating. Unclassifiable zones must be determined within six months of being categorized as Unclassified.

Section 6 - Classifications of Non-Attainment Zone. Severity of non-attainment zones will be described based on ratings assigned in Appendix 17-2.

Section 7 - Primary and Secondary Air Quality Standards. Primary Air Quality Standard are standards that are set to protect human health. Secondary Air Quality Standards are standards that are set to protect the public welfare. The KAAQS established in Appendix 17-1 will apply as both primary and secondary standards.

Appendix 17-1

Kuwait Ambient Air Quality Standards

Pollutant	Guideline Value	Averaging Time	Source Modeled
Carbon Monoxide CO	30 mg/m ³ (26 ppm) ^a 10 mg/m ³ (9 ppm)	1 hour 8 hours	WHO Air Quality Guidelines for Europe (Second Edition)- 2000
Nitrogen Dioxide NO₂	200 µg/m ³ (106 ppb) 40 µg/m ³ (21 ppb)	1 hour Annual	WHO Air Quality Guidelines - Global Update 2005
Sulfur Dioxide SO₂	20 µg/m ³ (8 ppb) 75 µg/m ³ (29 ppb)	24 hours 1 hour	WHO Air Quality Guidelines - Global Update 2005 / US Clean Air Act (40 CFR Part 50)
Ozone O₃	100 µg/m ³ (51 ppb)	8 hours	WHO Air Quality Guidelines - Global Update 2005
Lead Pb	0.5 µg/m ³	Annual	WHO Air Quality Guidelines for Europe (Second Edition)- 2000
(PM₁₀)	90 µg/m ³ 150 µg/m ³	Annual 24 hours	US Clean Air Act (40 CFR Part 50)
(PM_{2.5})	15 µg/m ³ 35 µg/m ³	Annual 24 hours	WHO Air Quality Guidelines - Global Update 2005

a) Exposure at these concentrations should be for no longer than the indicated times and should not be repeated within 8 hours.

Notes:

All the standards mentioned above are mean values.

All standards are referenced to Standard Pressure and Temperature (STP) of 1 Atm and 25° Celsius.

PM10/2.5 standards do not apply for sandstorms longer than 3 hours.

mg/m³= Milligram per cubic meter of air.

ppm= parts per million.

ppb = parts per billion

PM₁₀= Particulate Matters equal or less than 10 micrometer in diameter.

PM_{2.5}= Particulate Matters equal or less than 2.5 micrometer in diameter.

µg/m³= Micro gram per cubic meter of air.

WHO= World Health Organization.

Appendix 17-2 Classification of Non-Attainment Zone Pollutants

Classifications are based on how much an individual pollutant exceeds KAAQS standards.

	Ozone		NO ₂		PM-10	
	ppb (8 Hr Average)		ppb (1 Hr Average)		ug/m ³ (24 Hr Average)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
Extreme	136	> 136	216	>216	351	>351
Severe	110	135	171	215	301	350
Serious	91	110	151	170	251	300
Moderate	71	90	131	150	201	250
Marginal	51	70	106	130	150	200

Article 79 – Stationary Emission Sources

Section 1 – Purpose. Stationary emission sources greatly impact air quality. Proper management and control technologies are required to ensure that emissions do not significantly degrade ambient air conditions within the designated air quality control zones.

Section 2. Major Sources. A major source is an individual source of air emissions that generates annual emissions in excess to the pollutant thresholds in Appendix 20-1.

Section 3 – Permitting and Registration of Stationary Emission Sources. New sources will be issued a Permit to Construct (PTC) during planning, design, construction, and commissioning phases. Once installed, the source will require a Permit to Operate (PTO). Existing sources will require a PTO. Industries and emission sources subject to PTI and PTO permits are listed in Appendix 20-2.

Section 4. New Source Review. New emission sources will be subject to a New Source Review (NSR) based on air dispersion modeling and prevention of significant deterioration (PSD) to local air quality conditions. In KAAQS air quality attainment zones, emission sources should not cause air quality to exceed KAAQS limits. In non-attainment zones, emission sources should not cause further deterioration of ambient air quality or prevent air quality from improving. The NSR will use internationally accepted air dispersion models suitable for the location and pollutant modeled.

Section 5. Area Operating Permits. Small emission sources that are not classified as major sources and industries with multiple small emission sources in non-attainment zones will be permitted under an area operating permit (AOP). The physical boundary of the area will be clearly defined by the KEPA director. Businesses and industries covered within an area permit will be required to register their emission sources and utilize Reasonably Achievable Control Technology (RACT) based on emission type and economic analysis.

Section 6. Kuwait Emissions Inventory. A Kuwait Emissions Inventory will be conducted annually of all permitted and registered emission sources. The inventory will include all air pollutants listed in Appendix 20-3.

Section 7. New Source Performance Standards in Non-Attainment Zones. New or modified stationary emission sources will be required to utilize Lowest Achievable Emission Rate Technology (LAER) if sited in a Non-Attainment Air Quality Control Zone. Technology considered meeting the LAER standard for a specific process and industry will be based on the following procedures:

- a. the average emission limitation achieved by the best performing twelve percent (12%) of similar existing international sources in the category or subcategory for categories and subcategories with 30 or more sources, or
- b. the average emission limitation achieved by the best performing 5 international sources in the category or subcategory for categories or subcategories with fewer than 30 sources.

Section 8. Existing Source Performance Standards in Non-Attainment Zones. Existing stationary emission sources will be required to utilize Reasonably Achievable Control Technology (RACT) if sited in a Non-Attainment Air Quality Control Zone. Technology considered meeting the RACT standard for a specific process and industry will be based on economic and technical feasibility studies with a final determination made by KEPA. International accepted methods of analysis will be considered.

Section 9. New Source Performance Standards in Attainment Zones. New or modified stationary emission sources will be required to utilize Best Achievable Control Technology (BACT) if sited in Air Quality Attainment Control Zone. Technology considered meeting the BACT standard for a specific process and industry will be based on economical and environment analysis that shows that contributory emissions from the source and control technology will not deteriorate air quality in the Zone and move it into a non-attainment category.

Section 10. Leak Detection and Repair Programs. All major sources will have a Leak Detection and Repair (LDAR) program that detects fugitive emissions using internationally accepted detection quantification methods. A leak detection survey will take place annually and be reported with the annual emissions inventory.

Section 11. Recordkeeping and Reporting. Major sources, permit holders, and emission sources in non-attainment areas must submit an annual emission report to KEPA containing the following information:

- Inventory of the emissions of all regulated pollutants and all pollutants for which the facility is classified as a major source.
- Description of all emissions points.
- Annual Emissions of all pollutants in Appendix 20-4 with methodology of determination.
- Description of input materials
- Description of pollution control equipment including down-time for maintenance
- Description of any operating limitations or restrictions on work practices that affect the emissions of regulated pollutants.
- Description of any test methods that will be used to determine compliance with each pollution control requirement.
- Monitoring and reporting specified in the permit.

Appendix 20-1A Major Source Thresholds

	Metric tonnes/year							
	VOC	NO ₂	SO ₂	PM10	CO	Pb	1 HAP	2+ HAP
Non-Attainment Zone	25	25	100	100	100	100	10	25
Attainment or Unclassified Zone	50	50	100	100	100	100	10	25

A source becomes a major source if any one emission threshold is exceeded.

For annual emissions calculated using emission factors or other methods, the lower limit is 5% below the threshold.

For sources with direct or continuous emission monitoring systems, the printed threshold is the lower limit for the pollutant or pollutants being monitored.

HAPs are Hazardous Air Pollutants described in Appendix 20-1B.

Appendix 20-1B Hazardous Air Pollutants

Chemical Abstract Service (CAS) Number	Chemical Name
75-07-0	Acetaldehyde
60-35-5	Acetamide
75-05-8	Acetonitrile
98-86-2	Acetophenone
53-96-3	2-Acetylaminofluorene
107-02-8	Acrolein
79-06-1	Acrylamide
79-10-7	Acrylic acid
107-13-1	Acrylonitrile
107-05-1	Allyl chloride
92-67-1	4-Aminobiphenyl
62-53-3	Aniline
90-04-0	o-Anisidine
1332-21-4	Asbestos
71-43-2	Benzene (including benzene from gasoline)
92-87-5	Benzidine
98-07-7	Benzotrichloride
100-44-7	Benzyl chloride
92-52-4	Biphenyl
117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)
542-88-1	Bis(chloromethyl)ether
75-25-2	Bromoform
106-99-0	1,3-Butadiene
156-62-7	Calcium cyanamide
105-60-2	Caprolactam
133-06-2	Captan
63-25-2	Carbaryl
75-15-0	Carbon disulfide
56-23-5	Carbon tetrachloride
463-58-1	Carbonyl sulfide
120-80-9	Catechol
133-90-4	Chloramben
57-74-9	Chlordane
7782-50-5	Chlorine
79-11-8	Chloroacetic acid
532-27-4	2-Chloroacetophenone
108-90-7	Chlorobenzene
510-15-6	Chlorobenzilate

67-66-3	Chloroform
107-30-2	Chloromethyl methyl ether
126-99-8	Chloroprene
1319-77-3	Cresols/Cresylic acid (isomers and mixture)
95-48-7	o-Cresol
108-39-4	m-Cresol
106-44-5	p-Cresol
98-82-8	Cumene
94-75-7	2,4-D, salts and esters
3547-04-4	DDE
334-88-3	Diazomethane
132-64-9	Dibenzofurans
96-12-8	1,2-Dibromo-3-chloropropane
84-74-2	Dibutylphthalate
106-46-7	1,4-Dichlorobenzene(p)
91-94-1	3,3-Dichlorobenzidene
111-44-4	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542-75-6	1,3-Dichloropropene
62-73-7	Dichlorvos
111-42-2	Diethanolamine
121-69-7	N,N-Diethyl aniline (N,N-Dimethylaniline)
64-67-5	Diethyl sulfat
119-90-4	3,3-Dimethoxybenzidine
60-11-7	Dimethyl aminoazobenzene
119-93-7	3,3'-Dimethyl benzidine
79-44-7	Dimethyl carbamoyl chloride
68-12-2	Dimethyl formamide
57-14-7	1,1-Dimethyl hydrazine
131-11-3	Dimethyl phthalate
77-78-1	Dimethyl sulfat
534-52-1	4,6-Dinitro-o-cresol, and salts
51-28-5	2,4-Dinitrophenol
121-14-2	2,4-Dinitrotoluene
123-91-1	1,4-Dioxane (1,4-Diethyleneoxide)
122-66-7	1,2-Diphenylhydrazine
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)
106-88-7	1,2-Epoxybutane
140-88-5	Ethyl acrylate
100-41-4	Ethyl benzene
51-79-6	Ethyl carbamate (Urethane)
75-00-3	Ethyl chloride (Chloroethane)
106-93-4	Ethylene dibromide (Dibromoethane)

107-06-2	Ethylene dichloride (1,2-Dichloroethane)
107-21-1	Ethylene glycol
151-56-4	Ethylene imine (Aziridine)
75-21-8	Ethylene oxide
96-45-7	Ethylene thiourea
75-34-3	Ethylidene dichloride (1,1-Dichloroethane)
50-00-0	Formaldehyde
76-44-8	Heptachlor
118-74-1	Hexachlorobenzene
87-68-3	Hexachlorobutadiene
77-47-4	Hexachlorocyclopentadiene
67-72-1	Hexachloroethane
822-06-0	Hexamethylene-1,6-diisocyanate
680-31-9	Hexamethylphosphoramide
110-54-3	Hexane
302-01-2	Hydrazine
7647-01-0	Hydrochloric acid
7664-39-3	Hydrogen fluoride (Hydrofluoric acid)
7783-06-4	Hydrogen sulfide
123-31-9	Hydroquinone
78-59-1	Isophorone
58-89-9	Lindane (all isomers)
108-31-6	Maleic anhydride
67-56-1	Methanol
72-43-5	Methoxychlor
74-83-9	Methyl bromide (Bromomethane)
74-87-3	Methyl chloride (Chloromethane)
71-55-6	Methyl chloroform (1,1,1-Trichloroethane)
78-93-3	Methyl ethyl ketone (2-Butanone)
60-34-4	Methyl hydrazine
74-88-4	Methyl iodide (Iodomethane)
108-10-1	Methyl isobutyl ketone (Hexone)
624-83-9	Methyl isocyanate
80-62-6	Methyl methacrylate
1634-04-4	Methyl tert butyl ether
101-14-4	4,4-Methylene bis(2-chloroaniline)
75-09-2	Methylene chloride (Dichloromethane)
101-68-8	Methylene diphenyl diisocyanate (MDI)
101-77-9	4,4'-Methylenedianiline
91-20-3	Naphthalene
98-95-3	Nitrobenzene
92-93-3	4-Nitrobiphenyl

100-02-7	4-Nitrophenol
79-46-9	2-Nitropropane
684-93-5	N-Nitroso-N-methylurea
62-75-9	N-Nitrosodimethylamine
59-89-2	N-Nitrosomorpholine
56-38-2	Parathion
82-68-8	Pentachloronitrobenzene (Quintobenzene)
87-86-5	Pentachlorophenol
108-95-2	Phenol
106-50-3	p-Phenylenediamine
75-44-5	Phosgene
7803-51-2	Phosphine
7723-14-0	Phosphorus
85-44-9	Phthalic anhydride
1336-36-3	Polychlorinated biphenyls (Aroclors)
1120-71-4	1,3-Propane sultone
57-57-8	beta-Propiolactone
123-38-6	Propionaldehyde
114-26-1	Propoxur (Baygon)
78-87-5	Propylene dichloride (1,2-Dichloropropane)
75-56-9	Propylene oxide
75-55-8	1,2-Propylenimine (2-Methyl aziridine)
91-22-5	Quinoline
106-51-4	Quinone
100-42-5	Styrene
96-09-3	Styrene oxide
1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin
79-34-5	1,1,2,2-Tetrachloroethane
127-18-4	Tetrachloroethylene (Perchloroethylene)
7550-45-0	Titanium tetrachloride
108-88-3	Toluene
95-80-7	2,4-Toluene diamine
584-84-9	2,4-Toluene diisocyanate
95-53-4	o-Toluidine
8001-35-2	Toxaphene (chlorinated camphene)
120-82-1	1,2,4-Trichlorobenzene
79-00-5	1,1,2-Trichloroethane
79-01-6	Trichloroethylene
95-95-4	2,4,5-Trichlorophenol
88-06-2	2,4,6-Trichlorophenol
121-44-8	Triethylamine
1582-09-8	Trifluralin

540-84-1	2,2,4-Trimethylpentane
108-05-4	Vinyl acetate
593-60-2	Vinyl bromide
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride (1,1-Dichloroethylene)
1330-20-7	Xylenes (isomers and mixture)
95-47-6	o-Xylenes
108-38-3	m-Xylenes
106-42-3	p-Xylenes
	Antimony Compounds
	Arsenic Compounds (inorganic including arsine)
	Beryllium Compounds
	Cadmium Compounds
	Chromium Compounds
	Cobalt Compounds
	Coke Oven Emissions
	Cyanide Compounds ¹
	Glycol ethers ²
	Lead Compounds
	Manganese Compounds
	Mercury Compounds
	Fine mineral fibers ³
	Nickel Compounds
	Polycyclic Organic Matter ⁴
	Radionuclides (including radon) ⁵
	Selenium Compounds

NOTE: For all listings above which contain the word "compounds" and for glycol ethers, the following applies: Unless otherwise specified, these listings are defined as including any unique chemical substance that contains the named chemical (i.e., antimony, arsenic, etc.) as part of that chemical's infrastructure.

1. X'CN where X = H' or any other group where a formal dissociation may occur. For example KCN or Ca(CN)₂

2. Includes mono- and di- ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH₂CH₂)_n-OR' where n = 1, 2, or 3

R = alkyl or aryl groups

R' = R, H, or groups which, when removed, yield glycol ethers with the structure: R-(OCH₂CH₂)_n-OH. Polymers are excluded from the glycol category.

3. Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

4. Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 °C.

5. A type of atom which spontaneously undergoes radioactive decay.

Appendix 20-2 Categories that Require Permitting or Registration

The following industrial processes require registration if located in an attainment zone and a permit to operate (PTO) if located in a non-attainment zone. Processes that can show through emission modeling or monitoring that they produce less than the threshold limits of Appendix 20-1 do not need PTOs but must still be registered. Non-inclusion in this Appendix does not prevent the source from meeting all requirements of Article 76.

- Automobile Painting
- Brick and Structural Clay Manufacturing
- Chlorine Production
- Combustion Turbines
- Polyurethane Foam Fabrication
- Industrial/Commercial Boilers totaling more than 10 MBTU/hr
- Process Heaters
- Iron and Steel Manufacturing
- Metal Surface Coating
- Organic Chemical Production
- Paper Surface Coating
- Plastic Surface Coating
- Printing, Coating and Dying Fabrics
- Cement Manufacturing
- Waste Incinerators
- Petroleum Refineries
- Chemical Process Plants
- Petroleum/Oil Storage and Transfer Units with total storage of 300,000 barrels
- Electric Plants greater than 250 MBTU/hr
- Municipal Landfills
- Stationary Internal Combustion Engines larger than 50 brake horse-power

Appendix 20-3 Reportable Air Pollutants

Table 20-3-1. Reportable Criteria Air Pollutants

Criteria Air Pollutants		
Compound	Name	CAS
O ₃	Ozone	10028-15-6
CO	Carbon Monoxide	630-08-0
SO ₂	Sulfur Dioxide	7446 09 5
NO ₂	Nitrogen Dioxide	10102-44-0
Pb	Lead	7439-92-1
PM-10	PM less than 10 microns	
PM-2.5	PM less than 2.5 microns	

Report in tonnes per year

Table 20-3-2. Reportable VOCs

Volatile Organic Compounds		
Compound	Name	CAS
C ₆ H ₆	Benzene	71-43-2
CH ₂ O	Formaldehyde	50-00-0
C ₇ H ₈	Toluene	108-88-3
C ₈ H ₁₀	Xylenes (all isomers)	1330-20-7

Report in tonnes per year

Table 20-3-3. Reportable Greenhouse Gases

Greenhouse Gases		
Compound	Name	CAS
CO ₂	Carbon Dioxide	124-38-9
CH ₄	Methane	74-82-8
N ₂ O	Nitrous Oxide	10024-97-2
CFC-11	Freon-11	75-69-4
CFC-12	Freon-12	75-71-8
CFC-113	1,1,1-Trichlorotrifluoromethane	76-13-1
HCFC-22	1-Chloro-1,1-Difluoromethane	75-45-6
HCFC-141b	1,1-Dichloro-1-Fluoroethane	1717-00-6
HCFC-142b	1-Chloro-1,1-Difluoroethane	75-68-3
CH ₃ CCl ₃	1,1,1-Trichloroethane Methyl chloroform	71-55-6
CCl ₄	Carbon Tetrachloride	56-23-5
HFC-32	Difluoromethane	75-10-5
HFC-125	1,1,1,2,2-Pentafluoroethane	354-33-6
HFC-134a	1,1,1,2-Tetrafluoroethane	811-97-2
HFC-143a	1,1,1-Trifluoroethane	420-46-2
HFC-152a	1,1-Difluoroethane	75-37-6
HFC-23	Trifluoromethane	75-46-7
HFC-227ea	Heptafluoropropane	431-89-0
HFC-236fa	1,1,1,3,3,3-hexafluoropropane	690-39-1
HFC-4310mee	1,1,1,2,2,3,4,5,5,5-Decafluoropentane	138495-42-8
SF ₆	Sulfur Hexafluoride	2551-62-4
CF ₄ (PFC-14)	Carbon tetrafluoride	75-73-0
C ₂ F ₆ (PFC-116)	Hexafluoroethane	76-16-4
C ₄ F ₁₀	Perfluorobutane	355-25-9
C ₆ F ₁₄	Perfluorohexane	355-42-0
Halon-1211	Bromochlorodifluoromethane	353-59-3
Halon-1301	Bromotrifluoromethane	75-63-8

Report in tonnes per year