



New Articles 76 & 79

30 April 2012

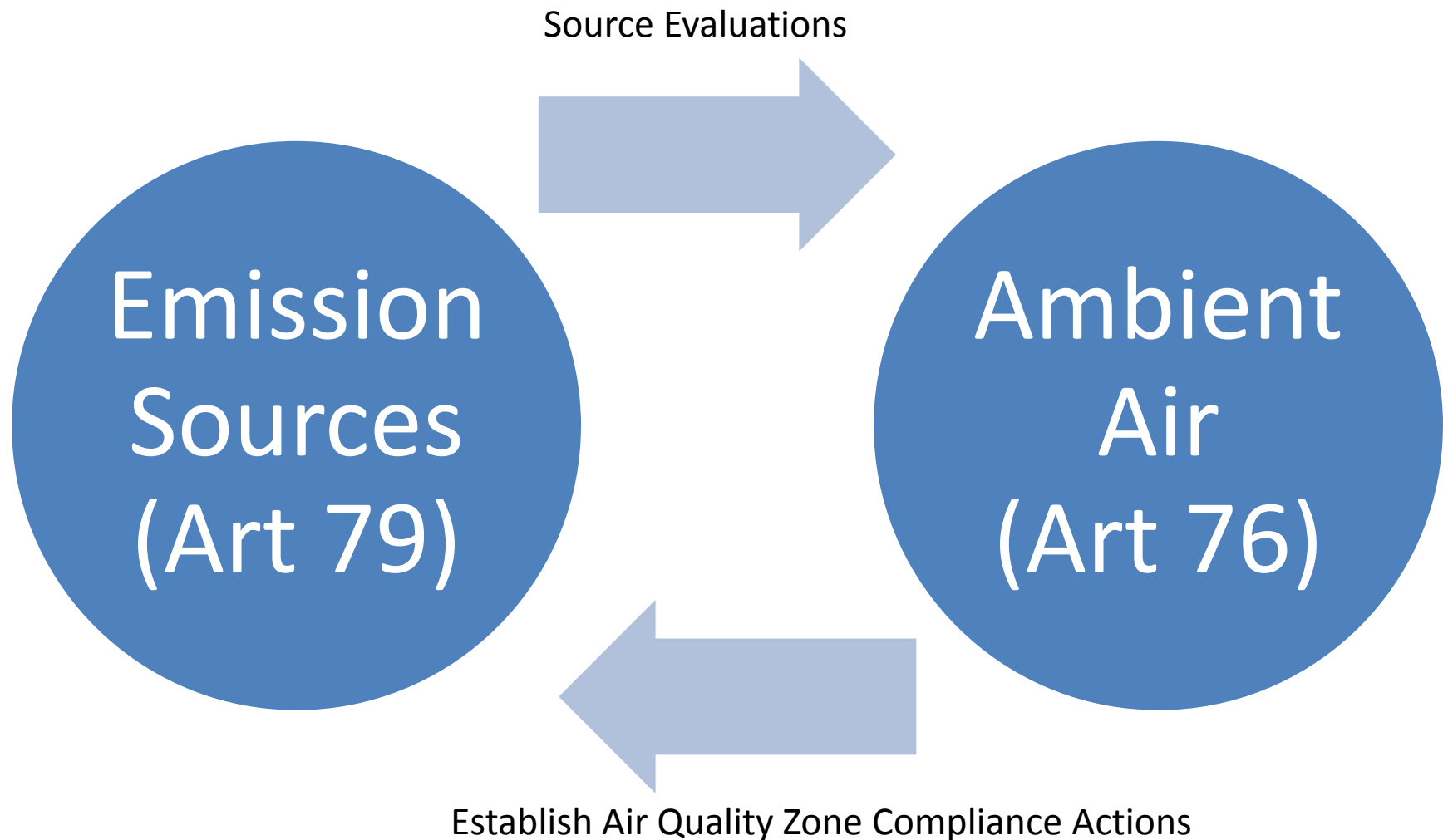
Agenda

- Why Change?
- Article 76 Revised
- Article 79 Revised

Why Change the Previous Articles?

- Updated Articles
- Replaced Appendices
- Modernized
- Requires regular review
- Introduces the Kuwait Implementation Plan
- Integrates Ambient Air Quality with Point Source emissions

Integration



New Article 76 Overview

- **Industrial and Residential standards are combined**
- **Units are rectified from mg/m³ to ug/m³ in line with international standards**
- **WHO guideline are used verbatim except in areas where time weighted averages are less than 1 hour. Time periods less than 1 hour were discarded due to difficulty in measuring using existing air monitoring assets.**
- **WHO values for PM₁₀ were discarded in favor of higher US standards.**
- **H₂S, Cl, and NH₃ were removed from the list of criteria air pollutants**
- **NMHCs was removed as most of the NMHCs of interest are precursors in some way to Ozone or cannot be distinguished from hazardous and non-hazardous chemicals.**

Kuwait Ambient Air Quality Standards

Pollutant	Guideline Value	Averaging Time	Source Modeled
Carbon Monoxide CO	30 mg/m ³ (26 ppm) 10 mg/m ³ (9 ppm)	1 hour 8 hours	WHO Air Quality Guidelines for Europe (Second Edition)- 2000
Nitrogen Dioxide NO ₂	200 µg/m ³ (106 ppb) 40 µg/m ³ (21 ppb)	1 hour Annual	WHO Air Quality Guidelines - Global Update 2005
Sulfur Dioxide SO ₂	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 O ₃	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
(PM ₁₀)	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

Based on 25 deg C at 1 atm

Kuwait Implementation Plan

- Designate Air Quality Control Zones
 - Identify Non-Attainment and Attainment Zones
- Determine actions for Non-Attainment Zone
- Determine actions to Prevent Significant Deterioration in Attainment Zones
- Determine monitoring standards and methodologies

New Article 79 Overview

- Defines Major Sources and Permit Requirements
 - Permits to Construct (PTC) and Permits to Operate (PTO)
 - New Source Reviews
 - Area Operating Permits
- Performance Standard in Attainment and Non-Attainment Areas
- Leak Detection and Repair Program
- Recordkeeping Requirements

Article 76 (Ambient Air)

- **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.

Article 76 (Ambient Air)

- **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.

Article 76 (Ambient Air)

- **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.

Article 76 (Ambient Air)

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

Article 76 (Ambient Air)

- **Section 5 - Designation of AQCZs.** AQCZs will be designated in the KIP based on historical monitoring and weather data. AQCZs will be categorized as:
 - 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.
 - Non-Attainment – Zone exceeds KAAQS standards more than three times within 12 consecutive months.
 - 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.

Article 76 (Ambient Air)

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

Article 76 (Ambient Air)

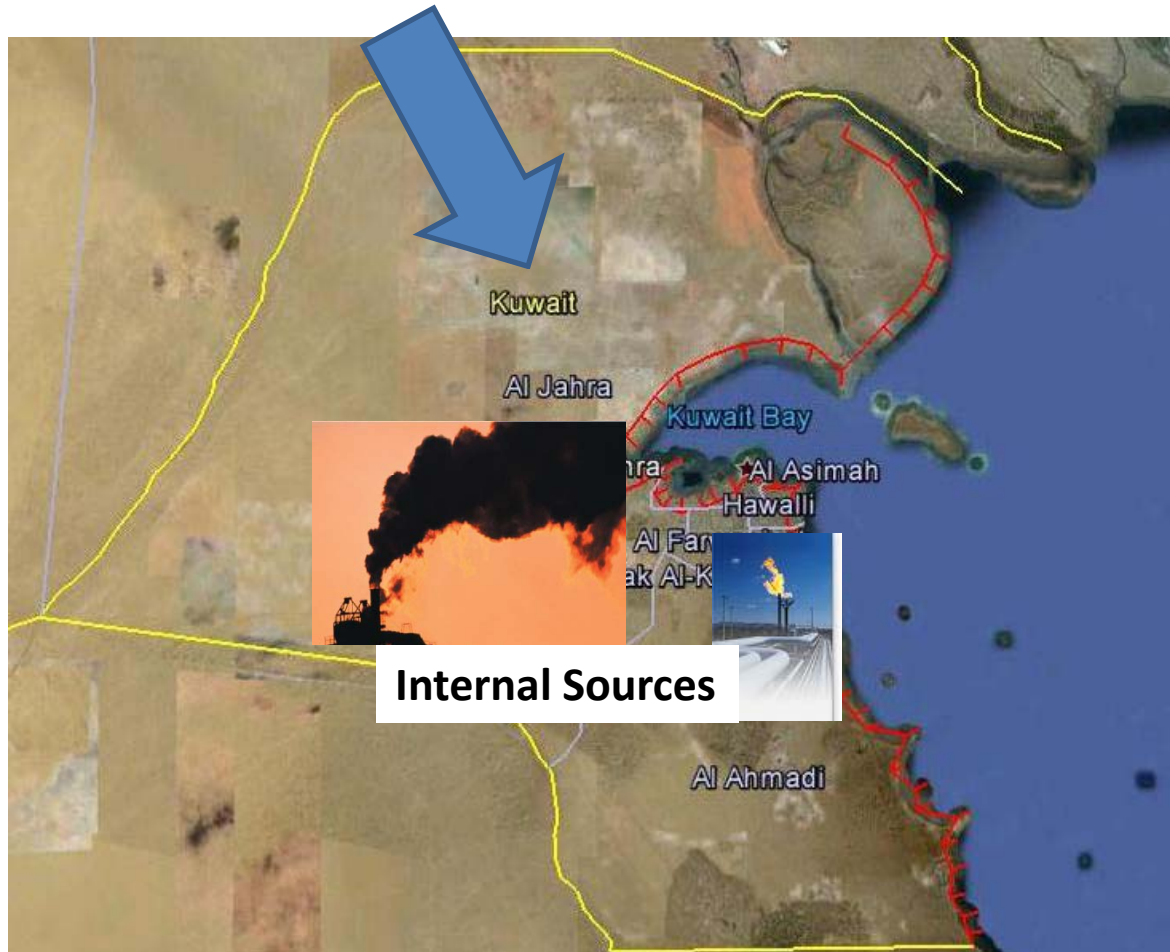
- **Section 7 - Primary and Secondary Air Quality Standards.** Primary Air Quality Standard are standards that are set to protect human health. Secondary Air Quality Standards are standards that are set to protect the public welfare. The KAAQS established in Appendix 17-1 will apply as both primary and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

Air Quality Zones

- Identify air zones of similar meteorological patterns and air quality
- Using CALPUFF to model localized air movements
 - Create a virtual source
 - Use generated weather data
- Major zones
 - Coastal Zone (<12 km from coast)
 - Inland Zone (>12 km from coasts)

Source Evaluation

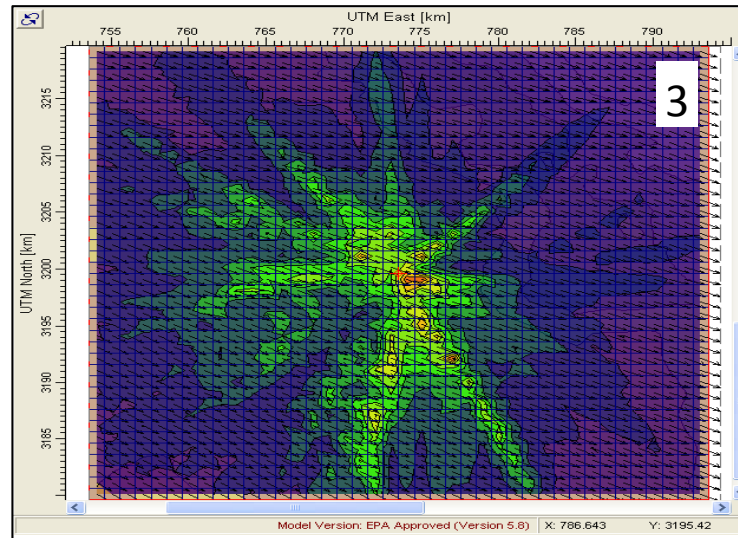
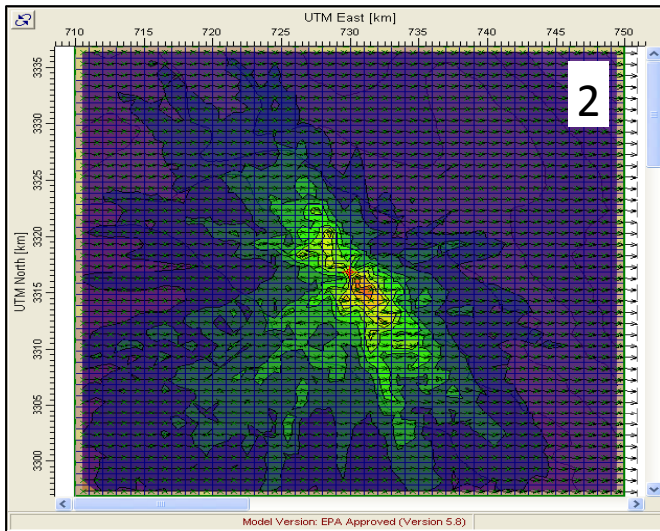
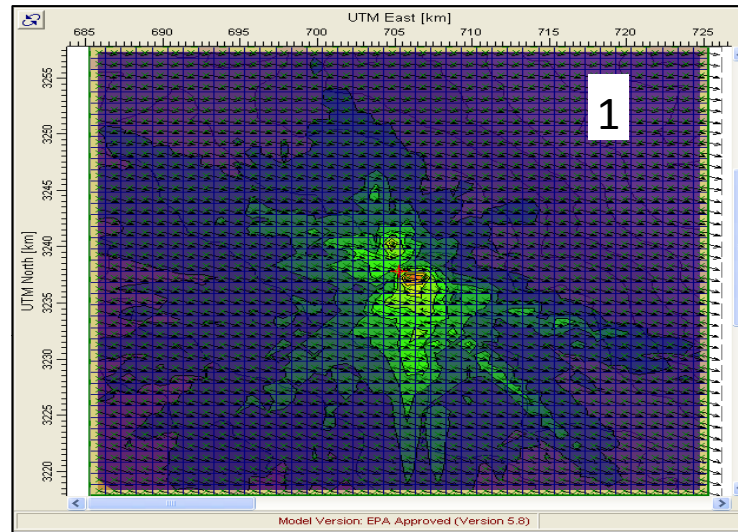
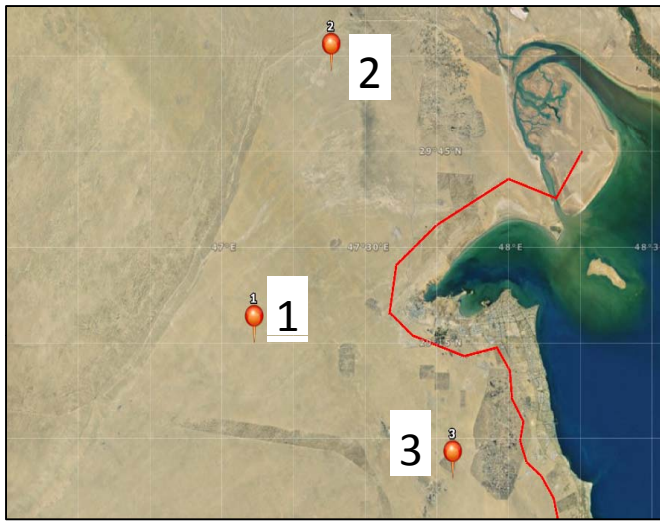
External Sources (Ozone, CO₂)



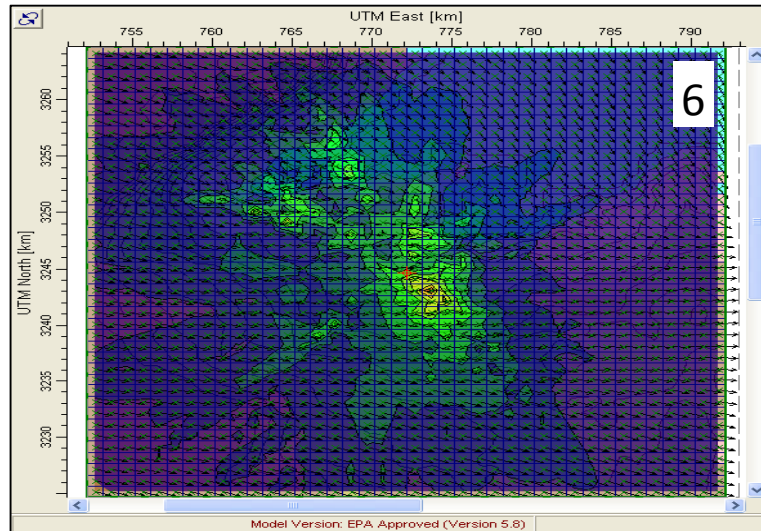
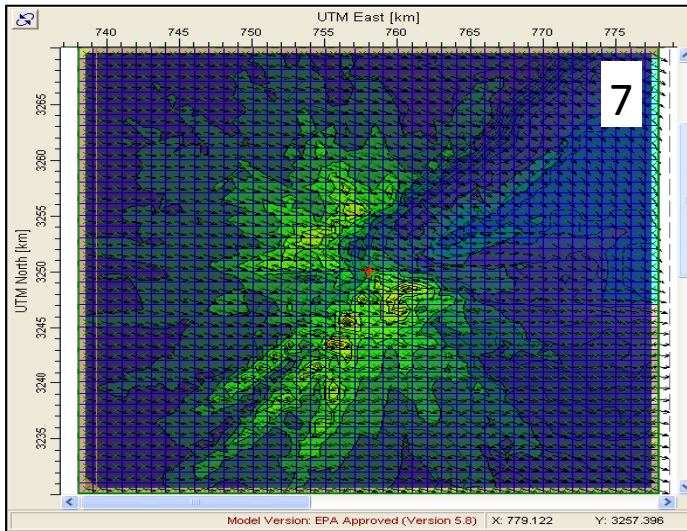
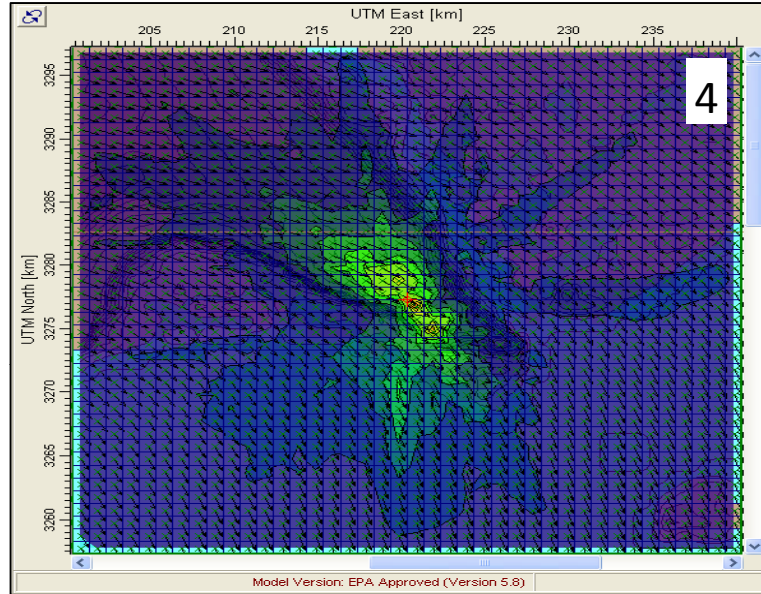
- New monitoring locations
- Long range transport modeling

- Emissions Inventories
- Emission Reporting
- Source Permitting

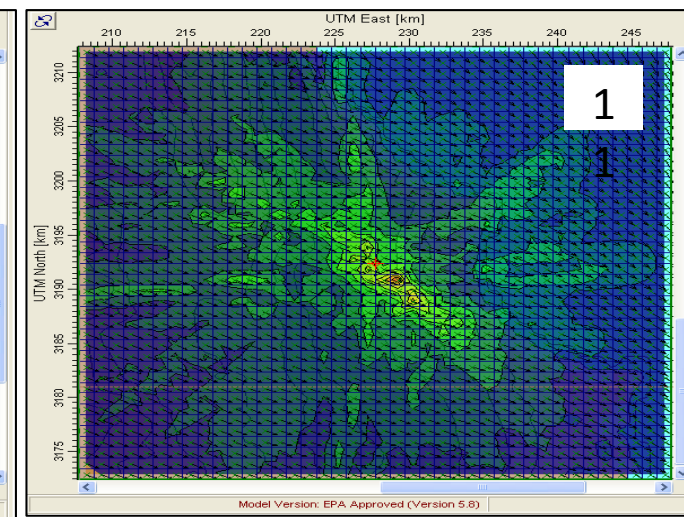
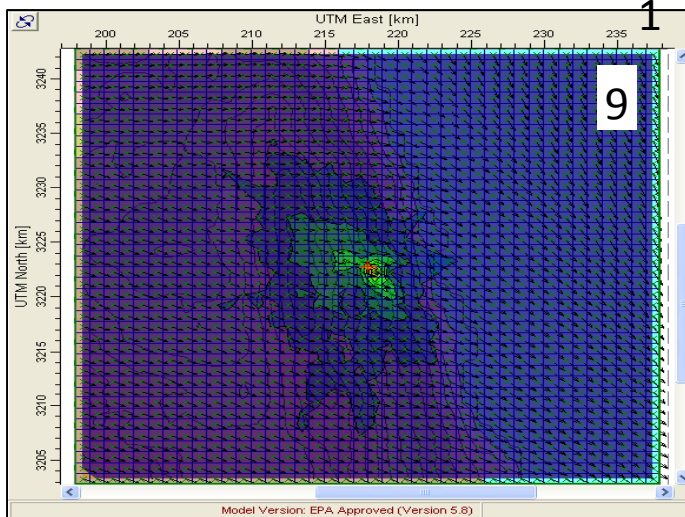
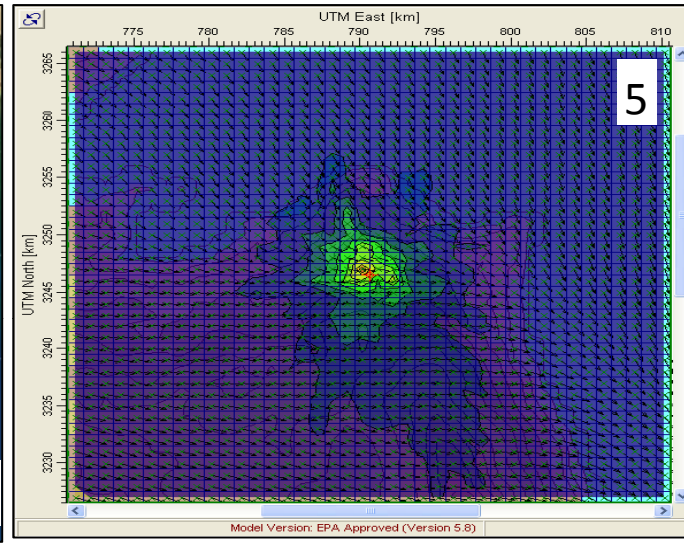
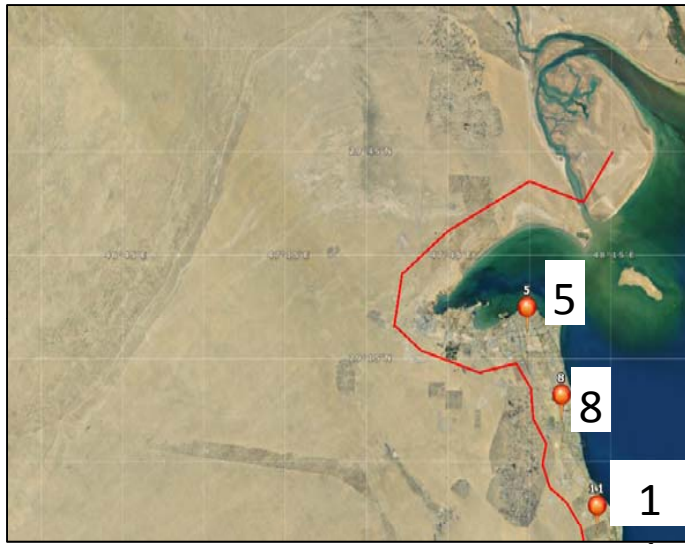
Inland Zones



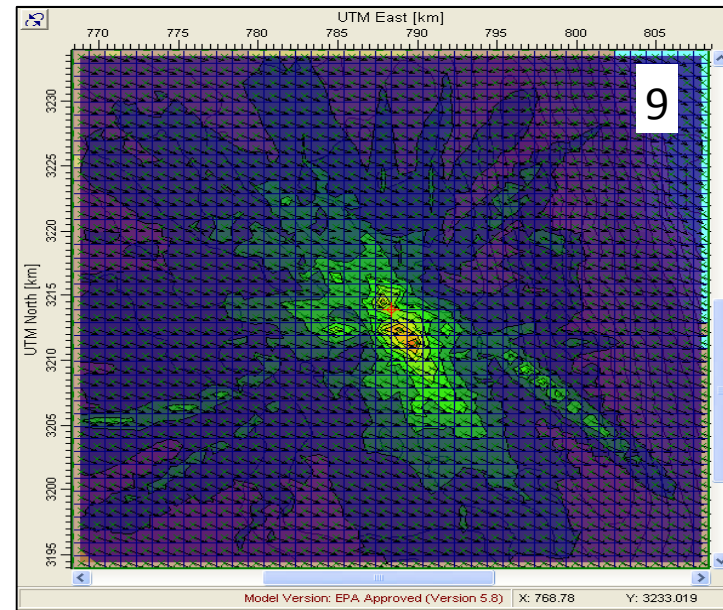
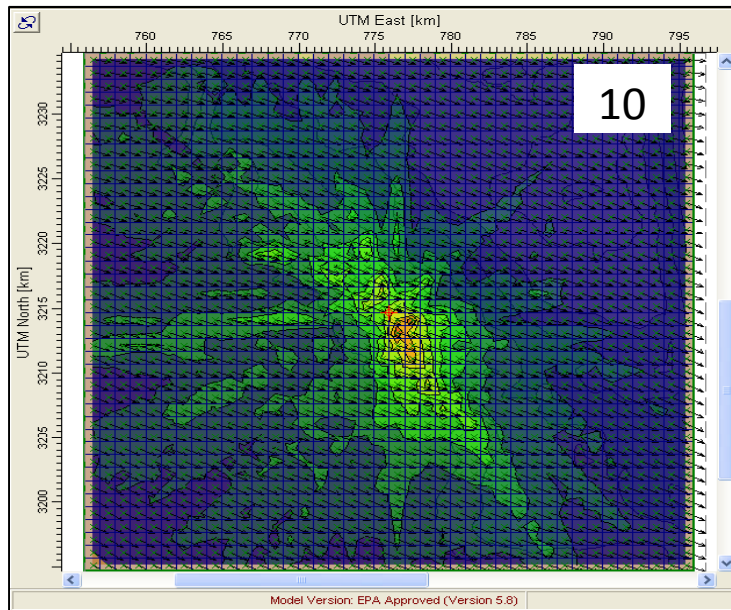
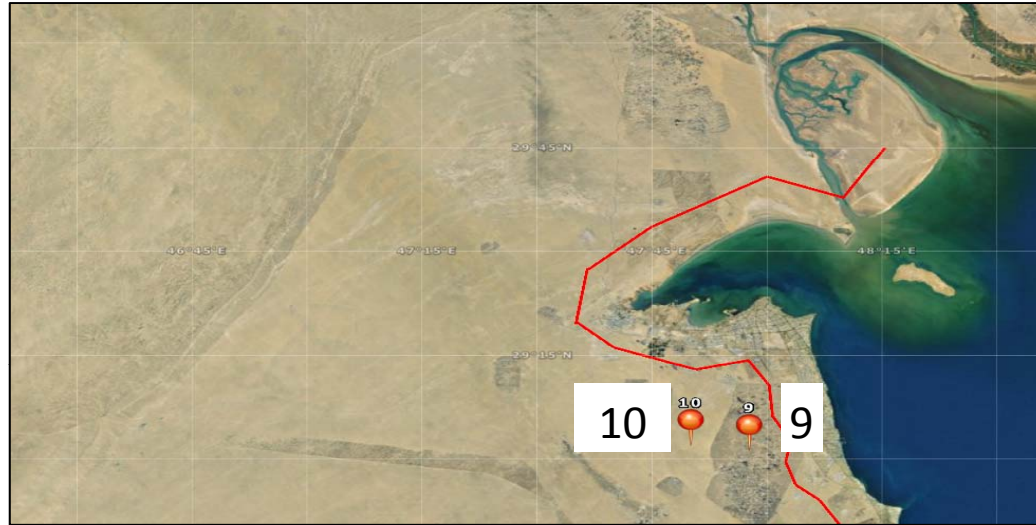
Central Coastal Zones



Southern Coastal Zones



Southern Inland Zones

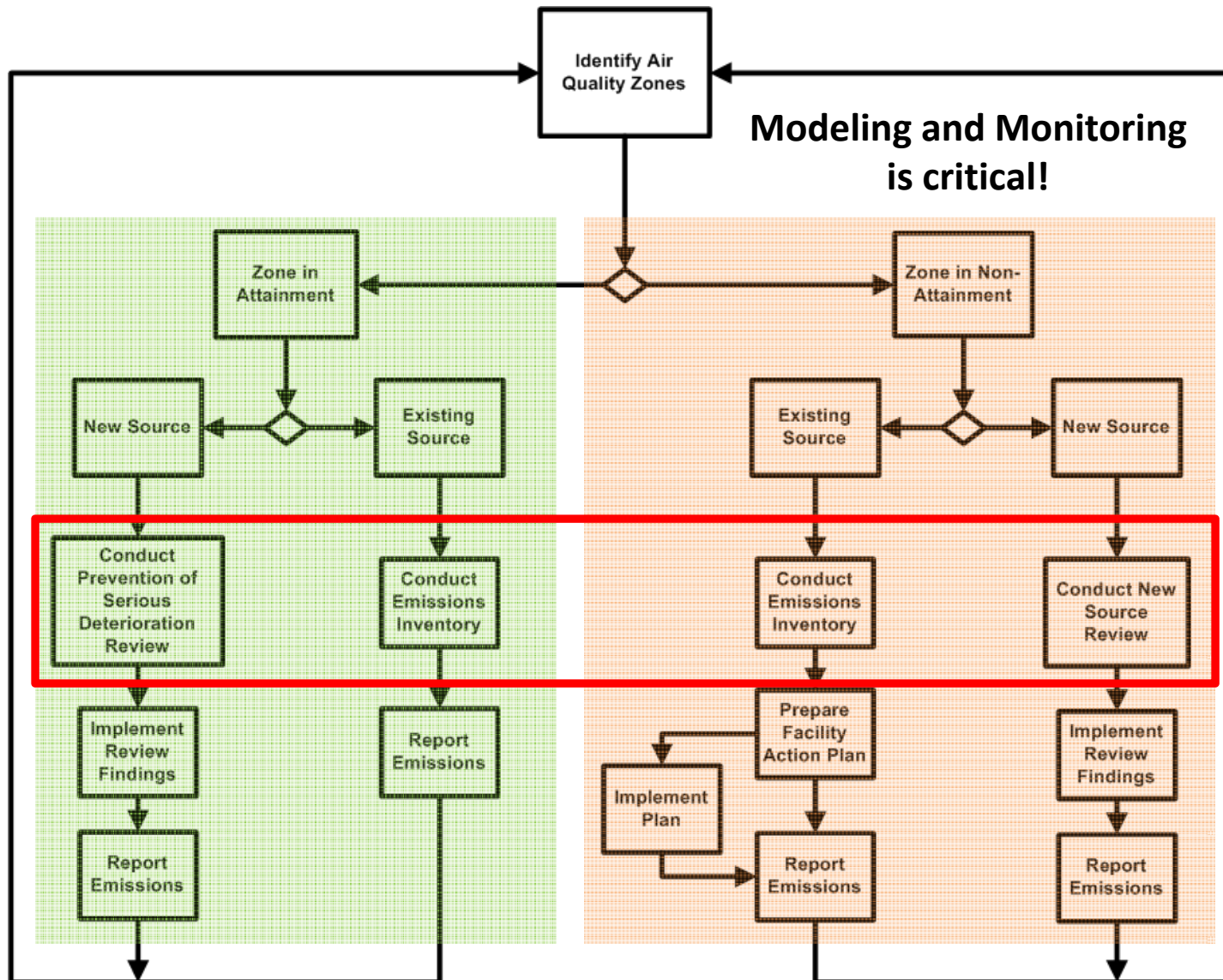


Proposed Zones

- Northern Inland Zone
- Southern Inland Zone
- Burgan Inland Zone
- Northern Coastal Zone
- Central Coastal Zone
- Southern Coastal Zone



Deployment of the KIP



KIP Infrastructure

- Air Monitoring System
 - Existing stations
 - Mobile stations
 - Data Quality Checking
 - Air Modeling tools
- e-Gov Management System
 - Web based
 - Self reporting tools

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.

Article 79 (Stationary Emission Sources)

- **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.

Major Sources (Appendix 20-1)

	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

Article 79 (Stationary Emission Sources)

- **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 PTC and PTO permits are listed in Appendix 20-2.

Appendix 20-2 Categories that Require Permitting or Registration

- 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

Article 79 (Stationary Emission Sources)

- **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.

Article 79 (Stationary Emission Sources)

- **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.

Article 79 (Stationary Emission Sources)

- **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.

Appendix 20-3 Reportable 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	

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

Appendix 20-3 Reportable Air Pollutants

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

Article 79 (Stationary Emission Sources)

- **Section 7. New Source Performance Standards in Non-Attainment Zones.** New or modified stationary emission sources will be required to utilized 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:
 - 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
 - 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.

Article 79 (Stationary Emission 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.

Article 79 (Stationary Emission Sources)

- **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.

Article 79 (Stationary Emission Sources)

- **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.

Article 79 (Stationary Emission Sources)

- **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.

This Year

- KEPA/KIEM
 - KIP
 - PTC and PTO Programs
- Industry
 - Emissions Inventories

THANK YOU

