Requirements of the EU-legislation in the field of Air Quality

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EU legislation on Air Quality Monitoring

- Directive 96/62/EC on ambient air quality assessment and management *(Framework Directive)*
- Directive 99/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air *(1st Daughter Directive)*
- Directive 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air *(2nd Daughter Directive)*
- Directive 2002/3/EC relating to ozone in ambient air *(3rd Daughter Directive)*
- Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air *(4th Daughter Directive)*

Directive 96/62/EC on ambient air quality assessment and management

- Framework Directive specifies in article 1: Objectives
  The general aim of this Directive is to define the basic principles of a common strategy to - inter alia
  - assess the ambient air quality in Member States on the basis of common methods and criteria,
  - obtain adequate information on ambient air quality and ensure that it is made available to the public, ...

- Framework Directive specifies in Annex I:
  List of atmospheric pollutants to be taken into consideration in the assessement and management of ambient air quality
  - at intial stage: sulphur dioxide, nitrogen dioxide, fine particulate matter, suspended particulate matter, lead, ozone
  - Other air pollutants: benzene, carbon monoxide, poly-aromatic hydrocarbons, cadmium, arsenic, nickel, mercury

1st to 4th Daughter Directive

Each Daughter Directive

- defines the pollutants (if necessary)
  eg. fine particulate matter – PM_{10}, $PM_{2,5}$
- sets limit values, target values or information and alert tresholds for specific pollutants
- sets criteria for classifing and locating sampling points (macroscale and microscale)
- sets critieria for the minumum number of sampling points
- sets Data Quality Objectives (DQO) on
  - measurement uncertainty
  - data capture
  - time coverage
- specifies reference methods for measurement (by refering to ENs)
- or allows member states to use any other method which it can demonstrate gives results equivalent to the above method.
- may ask for additional measurements
  eg. ozone precusors, background sampling of total gaseous mercury,...

Reference methods for measurement of pollutants - European standards

- Prepared by CEN working groups, with the explicite goal to describe standard measurement methods, which are suited for fullfilling the Daughter Directive‘s Data Quality Objectives (WG has a mandate from the European Commission).
  - Not necessarily absolute methods, but usually instrumental methods for field operation.

- Published and in force:
  - EN14211 NO/NO_2, EN14212 SO_2, EN14625 O_3, EN14626 CO
  - EN14662 parts 1-3 benzene
  - EN14902 Pb, Cd, As, Ni in PM_{10}
  - EN12341 PM_{10}, EN14907 $PM_{2,5}$ (manual gravimetric methods!)

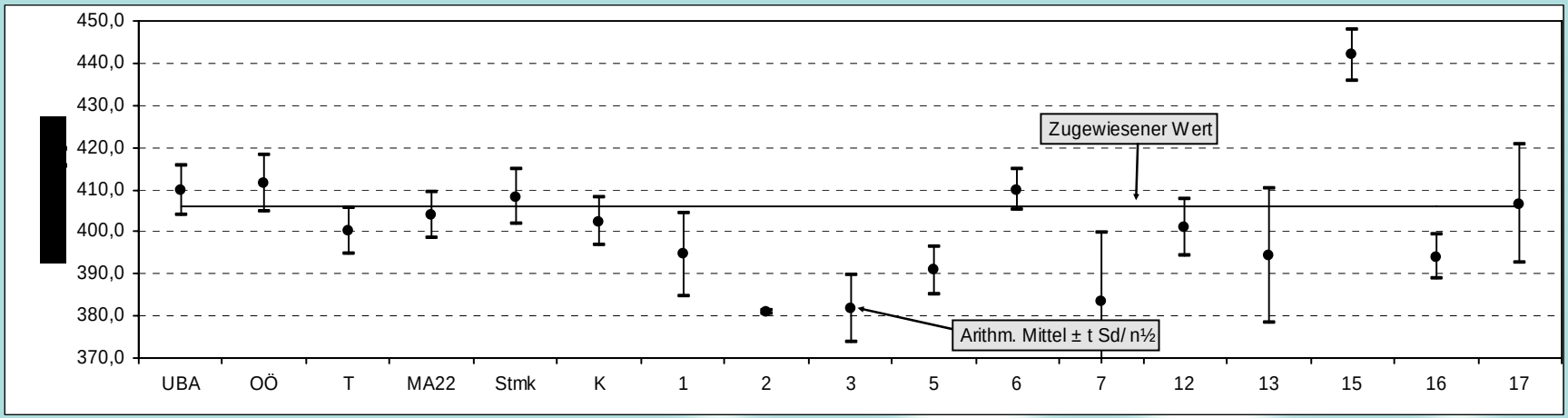
- Under way:
  - prEN15549 Benzo[a]pyren, deposition of BaP
  - Deposition of Pb, Cd, As, Ni
  - Total gaseous mercury and deposition

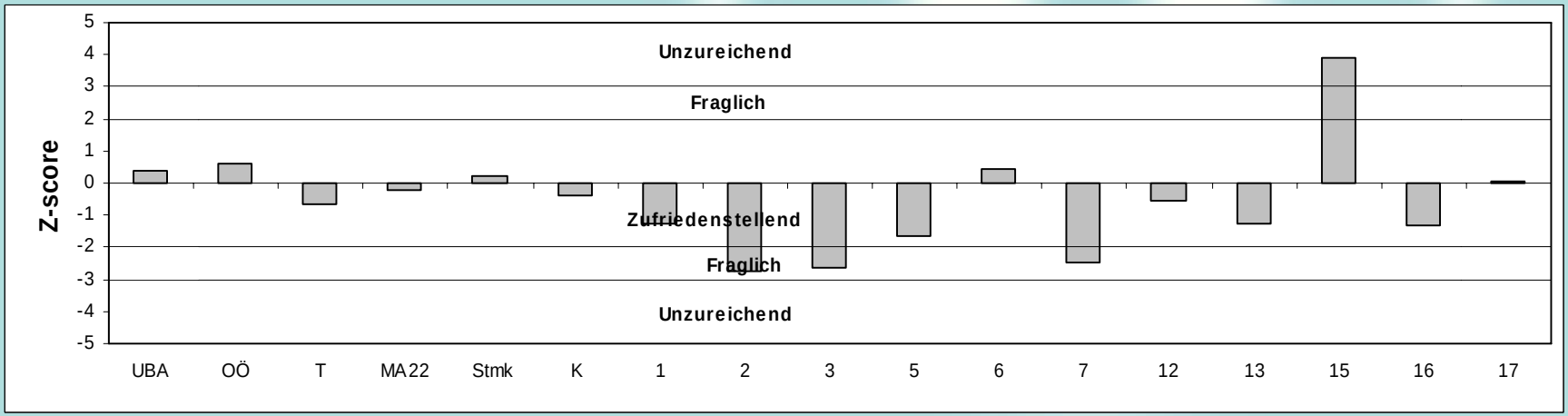
Background monitoring network

Tasks of the Calibration Laboratory (National Reference Laboratory for Air Quality)

- Provide traceability for the Austrian networks – minimum once a year certification of network standards (Kalibrierworkshop)
- Assure the comparability of air quality measurements in Austria
- Organise quality assurance actions – intercomparisons, round robin tests on national level
- Participate in European and international intercomparisons

ERLAP 2006: Results NO_2 , highest concentration, all participants





Instrumentation and Preparation of Calibration Gases in the Reference Laboratory

For CO, NO and NO_2, SO_2 and O_3:

2 reference monitors

Preparation of primary gas mixtures for CO, NO and NO_2, SO_2:

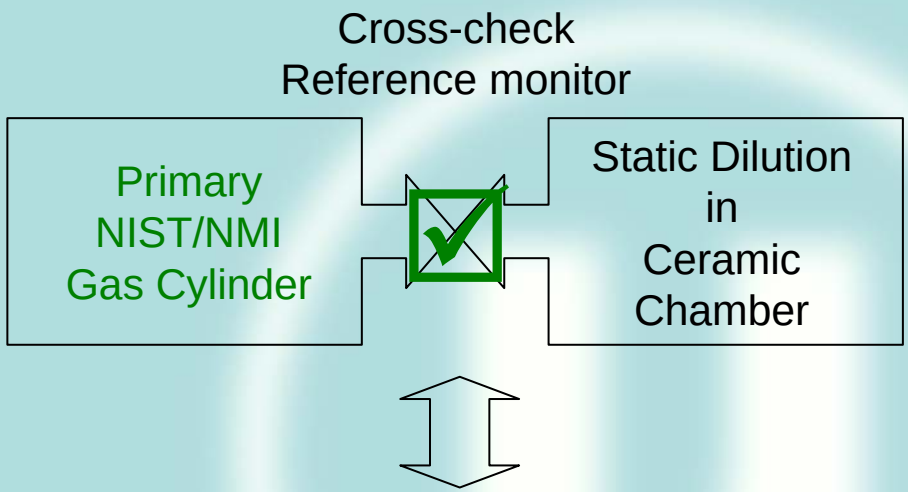
Basic Method: dynamic dilution

regularely cross-checked with
Static Dilution or
Permeation

For O_3:

Primary UV-Photometer and 2 ozone calibrators

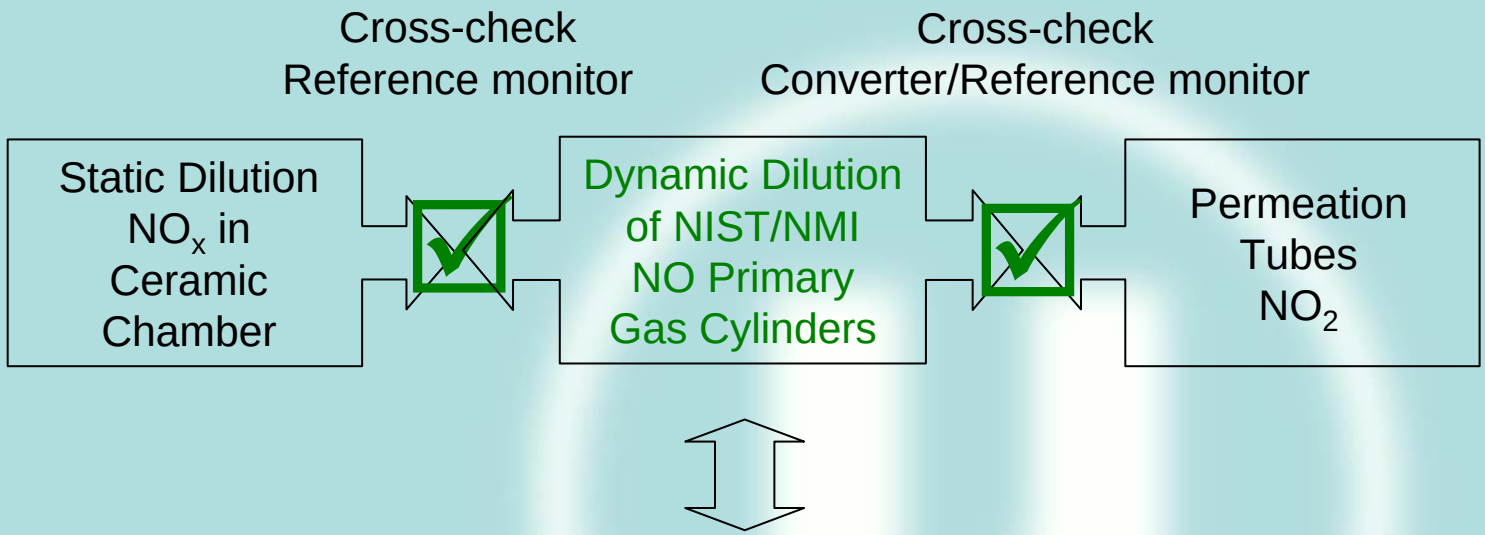
Traceability of Carbon Monoxide



International bilateral intercomparison
minimum once a year (EMPA, ERLAP)

Participation in European Intercomparisons of
National Reference Laboratories,
at ERLAP - April 1999 and April 2003

Traceability of Nitrogen Oxides



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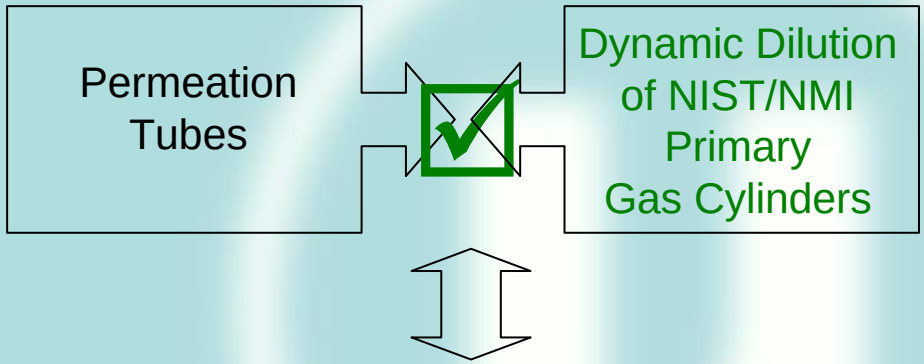
Traceability of Sulphur Dioxide

Cross-check
Reference monitors



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Participation in European Intercomparisons of
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Traceability of Ozon

Primary Method: NIST Standard Reference Photometer #26

since December 2001

Reference Instrumentation
2 TEI 49 CPS Ozone Calibrators
2 TEI 49 Ozone Monitors

Intercalibration to other SRPs via Reference Calibrator: minimum once a year
usually #15 at EMPA, (GAW World Calibration Centre for Ozone)

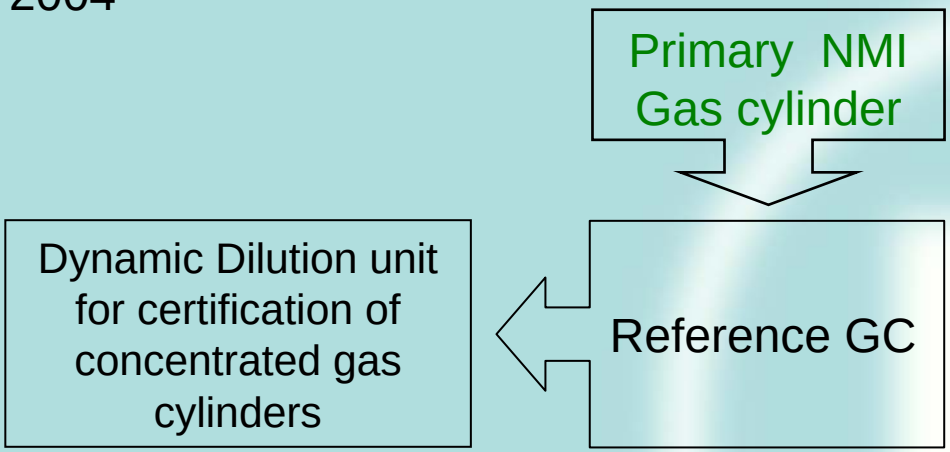
Participation in 1st European Intercomparison of National Reference Laboratories, at ERLAP - April 1999

EUROMET 414 Ozone Comparison

CCQM-P28 at BIPM (Bureau International de Poids et Mesures) in Paris, 2004

Traceability of Benzene and VOCs

Benzene monitoring with automatic GC/FID started in 2000, VOCs in 2004



Monitoring of Ozone VOC precursors:

At the moment a complex concept is finalized, applying different monitoring techniqes for the different tasks (trends, fingerprints,..). Central point will be mobile, automatic GC combination, covering the whole spectrum of VOCs of Directive 2002/3/EC.

Traceabilty of Flow

Crucial influence quantity for

permeation and dilution systems

sampling of particulate matter

Certified flow meters (Brooks, DryCal)

Compressor with controllable MFC as flow generator

Weighing room (PM_{10} and $PM_{2,5}$)