Station requirements

ACTRIS station requirements NOx and VOC

Instruments, instrument set up, suitable inlet lines, filter systems, material, gases, calibration and quality assurances procedures should be designed as recommended in the ***measurement guidelines*** for NOx (ACTRIS Deliverable 4.10, 2014) and VOCs (ACTRIS Deliverable 4.9, 2014), respectively.

This includes, that each site should

regularly **calibrate** the instrument with a certified calibration gas
regularly perform zero gas measurements
perform monthly measurements of ***target gases*** and submit the target gas results to EBAS
submit data including uncertainty and precision to EBAS following the protocol, deadlines and use the submission templates
participate at the annual ***data quality workshop***
provide feedback to the ***open issues*** in the ACTRIS QC/QA process

Calibration standards VOCs

NPL proposal

30-component ozone precursor standard (EU directive 2002/3/EC) @ **4 nmol/mol**

Ethane	1,3-butadiene	2,2,4-trimethylpentane
Ethene	Pentane	Benzene
Ethyne	2-methylbutane	Toluene
Propane	1-pentene	Ethylbenzene
Propene	*trans*-2-pentene	*m*-xylene
Butane	*2-methyl-1,3-butadiene (isoprene)*	*p*-xylene
2-methylpropane	Hexane	*o*-xylene
1-butene	2-methylpentane	1,2,3-trimethylbenzene
trans-2-butene	Heptane	1,2,4-trimethylbenzene
cis-2-butene	Octane	1,3,5-trimethylbenzene

Calibration standards VOCs

NPL proposal

30-component ozone precursor standard (EU directive 2002/3/EC)

Number of cylinders (10L)	Price (GBP)
< 3	£3,065
3 - 5	£2,700
6 - 10	£2,350
> 10	£2,050

Please answer until December 15th, 2015
Note, that registering interest at this stage does not commit you to any purchase.

Contact: marivon.corbel@npl.co.uk (cc anja.claude@dwd.de)

Calibration standards NOx

Potential CCL for NOx: NPL

no decision yet

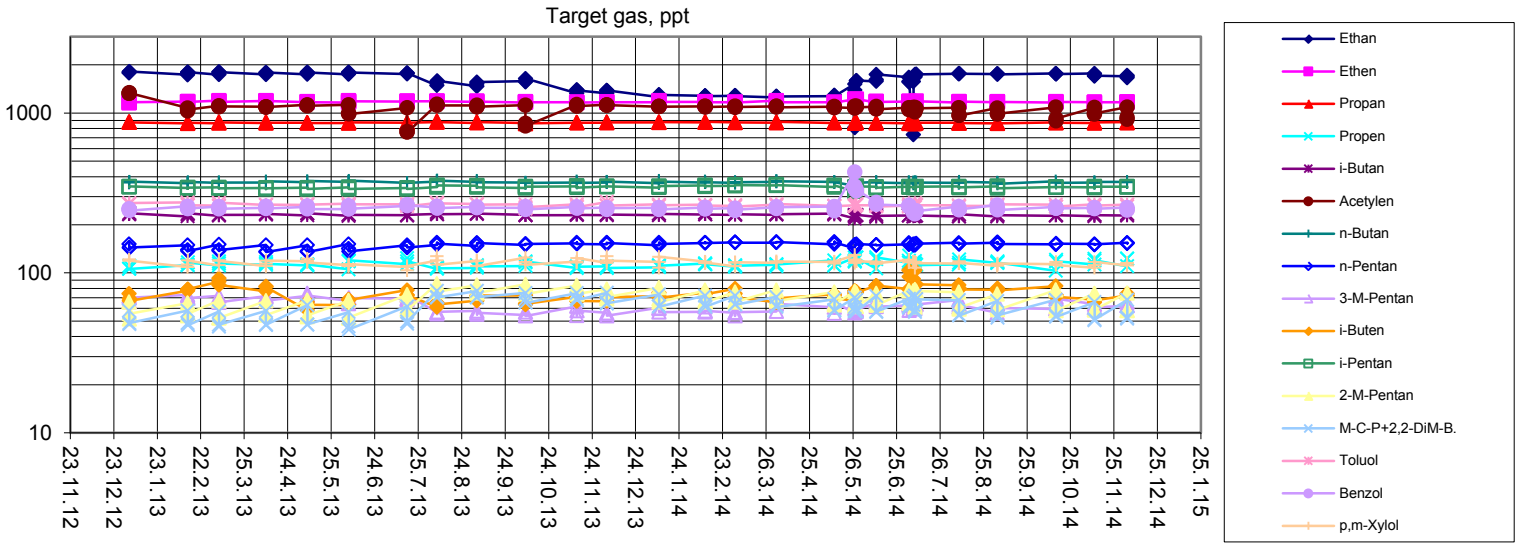
Similar proposal as for VOCs is expected

Target gases

A **target gas** is preferably a whole-air working standard calibrated versus laboratory standard, other standards or by other means, but may also be a synthetic mixture. → **will be MANDATORY for ACTRIS sites!**

Why?

QC of instrument performance and calibration procedure



Measurements of compressed whole air from cylinder 2012-2015; generally 3 replicates are measured once a month.

Target gases NOx

Proposal

Range: ~ 50 nmol/mol

Manufacturing:
Commercially (e.g. Linde, Air Liquide)

Certification:
UBA – German environmental Agency
OR
WCC-NOx
OR
Mines Douai

→ ***to be determined***

Deutscher Akkreditierungs Rat
DAR
DGA-PL-6673.09

Prüfschein

Test Certificate

Umwelt Bundes Amt
Für Mensch und Umwelt

NATIONALES EU-REFERENZLABOR FÜR LUFTQUALITÄT

Prüfschein-Nr.: 006-2011
Certificate No:

Seite 1 von 2
Page:

Auftraggeber *Customer*	UBA-Messnetz Herr Cazzato
Auftragsnummer *Order Number*	467
Gegenstand *Object*	NO in Stickstoff
Typ *Type*	10-L-Prüfgasflasche
Serien-Nr. *Serial-Number*	A3994
Hersteller *Manufacturer*	Air Liquide
Datum der Prüfung *Date of Test*	07.06.2011
Angewandtes Verfahren *Method of execution*	Grundlage DIN EN 14211:2005 Der Analysator APNA-370 (Chemolumineszenz) wurde mit einem primären Standard kalibriert.
Ergebnis *Result*	52,2 nmol/mol (95 % Vertrauensbereich)
Messunsicherheit *Uncertainty of measurement*	± 1,0 nmol/mol
Umgebungsbedingungen *Environmental conditions*	20,9 °C; 991,9 hPa
Rückführung *Traceability*	UBA

Dieser Prüfschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge und Änderungen bedürfen der ausdrücklichen Genehmigung des EU-Referenzlabors.
This test certificate may not be reproduced other than in full except with the permission of the EU-Reference Laboratory.

Target gases VOCs

Proposal

1. NPL prepares spiked mixtures (0.5 nmol/mol spike level) with 30 component ozone precursors in breathing air and assigns certified mole fractions with stability certificate

2. Same but without stability certificate

3. NPL just certifies whole air mixtures provided by *third parties*

Possibilities 1 and 2 are preferred!

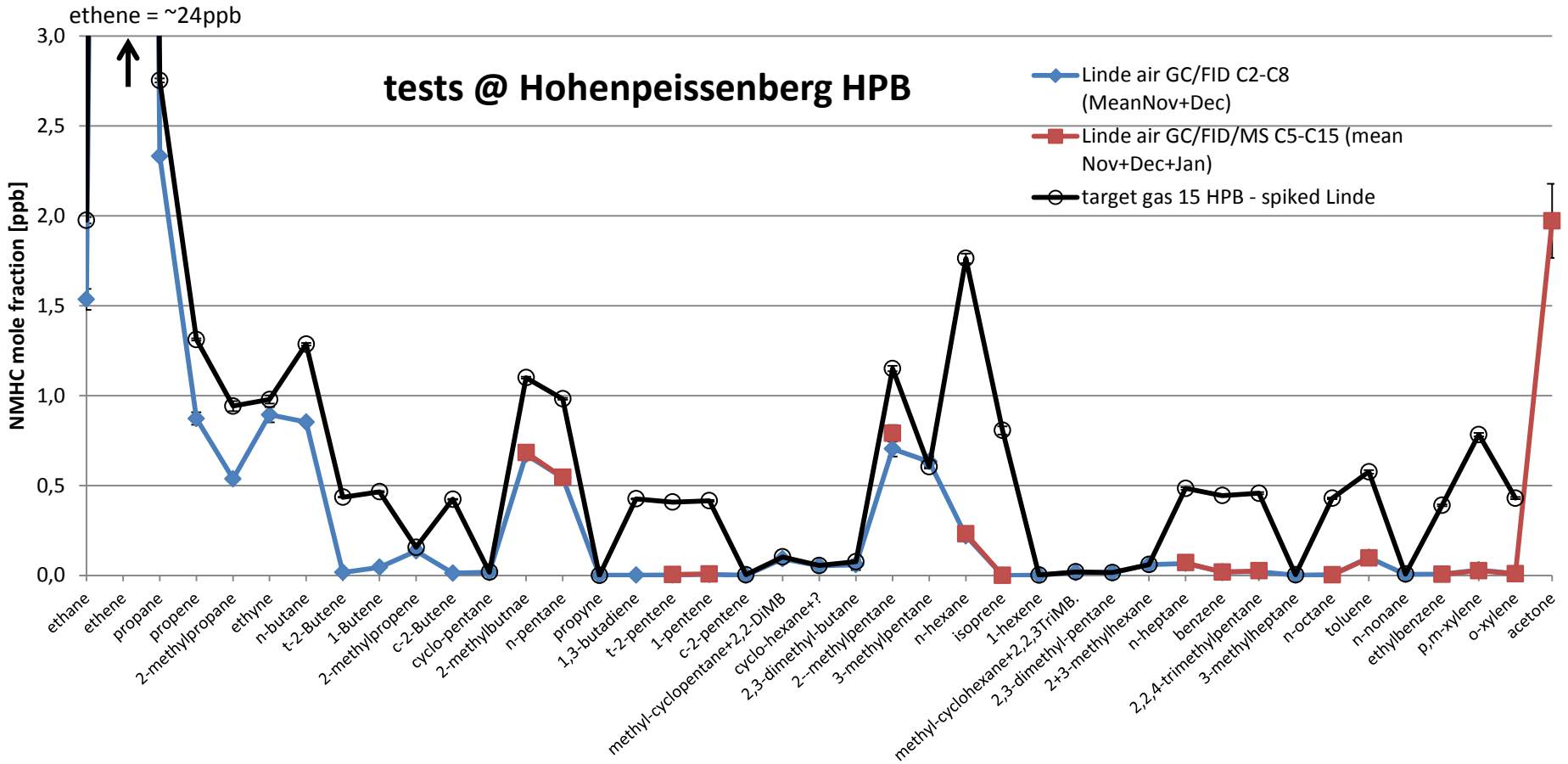
→ ***Still under discussion with NPL***

third parties:

Empa: RIX breathing air compressor (ACTRIS-1 Round Robin)

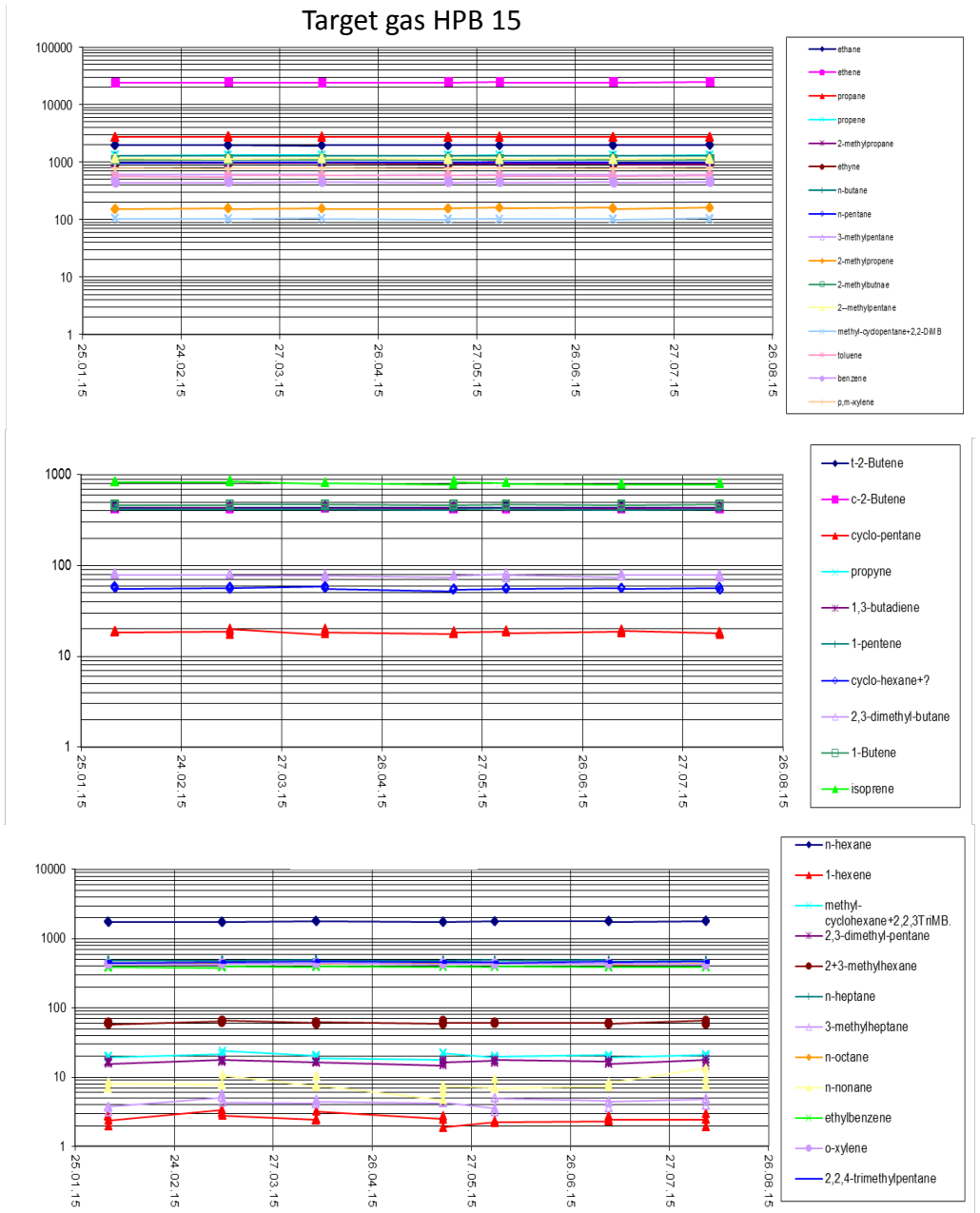
HPB: commercial breathing air spiked with NPL substances

Target gases VOCs



Linde commercial breathing air (blue and red line) was spiked with NPL (30 component O_3 precursor mix), and filled in a 10l aluminum Luxfer cylinder.
Filled in January 2015, series of 3 measurements

Substance	Mean	Sdev
	ppt	*
ethane	1975	0.9%
ethene	24356	1.0%
propane	2753	0.4%
propene	1313	0.5%
2-methylpropane	942	**3.0%
ethyne	979	2.3%
n-butane	1287	0.5%
t-2-Butene	435	0.5%
1-Butene	465	0.8%
2-methylpropene	157	2.2%
c-2-Butene	424	0.6%
cyclo-pentane	18	0.8
2-methylbutnae	1100	0.5%
n-pentane	982	0.5%
propyne		
1,3-butadiene	426	0.6%
t-2-pentene	408	1.0%
1-pentene	416	1.1%
c-2-pentene	4	0.5
methyl-cyclopentane+2,2-DiMB	103	1.4%
cyclo-hexane+?	55	1.6
2,3-dimethyl-butane	77	2.7
2--methylpentane	1151	1.3%
3-methylpentane	604	1.4%
n-hexane	1763	1.5%
isoprene	807	2.7%
1-hexene	3	0.4
methyl-cyclohexane+2,2,3TriMB.	20	1.4
2,3-dimethyl-pentane	16	0.9
2+3-methylhexane	61	2.4
n-heptane	484	1.3%
benzene	444	1.0%
2,2,4-trimethylpentane	457	1.3%
3-methylheptane	4	0.2
n-octane	429	1.0%
toluene	576	1.6%
n-nonane	8	1.8
ethylbenzene	390	1.2%
p,m-xylene	784	1.2%
o-xylene	430	1.5%



* [%] for mean > 100ppt, [ppt] for mean < 100ppt

** since May sdev of 2-methylpropane = 0.3%

Spiked breathing air, 3 replicates measured 1/month