

***General Report for
CEN / TC 264 WG 25
Field Work, Rende***

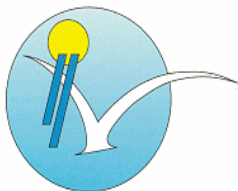
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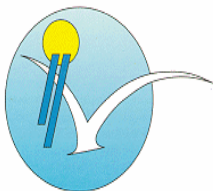
Franco Cofone



Report of Lab A

“REFERENCE METHOD FOR THE DETERMINATION OF TOTAL GASEOUS MERCURY IN AMBIENT AIR”

<p>MINIMUM VALIDATION PROGRAMME CEN/ TC 264 WG 25 FIELD TEST – S.Lucido, Rende</p>



1. Background

This report is made by the Institute for Atmospheric Pollution of the C.N.R. (CNR-IIA) as response to a call by the CEN/TC 264 /WG 25 for the preparation of the field test, which is part of the Minimum Validation Programme (MPV). The MPV is funded by the DG Environment of the European Commission.

2. Aim/Overview

The purpose of the laboratory and field tests is to develop a draft standard for TGM, as defined in the Directive. Methods available for determining ambient concentrations of TGM will be tested for 2 months at each site over a period of 12 months using automated equipment currently used in Europe for automatic determinations of mercury (TGM) levels in ambient air. Each laboratory will possibly use two units of each type of automated TGM instruments. The data obtained by each laboratory will be compared. For the information on the performance characteristics field validation tests will be carried out at four measurement sites in Europe (two coastal/background and two local/industrial sites). All sampling will be carried out with the same type of sampler/analyser and at each measurement site one lab will be responsible for operating all instruments. Site requirements shall be in accordance with the description in Directive 2004/107/EC. It is foreseen to perform the inter-comparison at two background sites located one in South Europe and one in North Europe and at two local/industrial sites, located in areas characterised by different types of emission sources (coal power plant and a chlorine-alkaline plant).

3. Objectives

- ✓ The general objective is to define the performance characteristics of the complete measurement method.
- ✓ To estimate the uncertainty components of all parts of the measurement method
- ✓ To develop a standard using all the information

The report shows the results obtained by seven automatic analysers during a sampling period of 24 hours, from the 6th of November 2006 to the 8th of January 2007, performed at the Marine Monitoring Station (EMEP type) of the CNR-IIA, located on a small headland 49m above sea level, near the village of San Lucido on the Tyrrhenian coast of Calabria (39° 19' N; 16° 02' E), South of Italy. The analytical work was performed according the method set on documents CEN/TC 264/WG 25 N 900 and CEN/TC 264/WG 25N 16.



Marine Monitoring Station of the CNR-IIA at S. Lucido.

4. Instruments

4.1 N°2- Tekran 2537A Analysers



4.2 N°2 - Lumex RA-915 + Mercury Analysers.



4.3 N°2 - Mercury Instruments UT-3000.



4.4 N°1 - Psa Sir-Galahad



5. Principles of Operation

	<i>CVAAS</i>	<i>CVAFS</i>
<i>Tekran 2537A</i>		●
<i>Lumex RA-915+</i>	●	
<i>Mercury Instr.</i>	●	
<i>Psa S.Galahad</i>		●

6. Analytical Conditions

The analytical conditions were performed according to the Documents CEN/TC264/ WG25 N900 and CEN/TC264/ WG25 N16. Measurements have been performed connecting the inlets of all seven analysers to a single manifold with a constant internal temperature monitored. In addition, meteorological parameters (i.e. temperature, pressure, wind speed and direction) have also been recorded.

7. Analysers Parameters

Parameters	Analyser			
	Tekran 2537 A	UT-3000	LUMEX	PSA, Sir Galahad II
Date / Time	X	X	X	X
Instrument no	X	X	X	X
Channel				X
Correction factor	X			X
Signal (baseline + peak height)	X			X
Peak height	X			X
Peak area	X			X
Concentration	X	X	X	X
Slope	X	X		X
Intercept	X	X		X
Correlation coefficient	X	X		X
Baseline	X	X	X	X
Instrument status	X	X	X	X
Method name / no	X			X
Measurement mode				X
MFC (293 K, 1 atm)	X	X		X
Volume	X	X		X
Unit	X	X	X	X
Mass	X			X

8. Maintenance Procedure

Maintenance procedure	Analyser			
	Tekran 2537 A	UT-3000	LUMEX	PSA, Sir Galahad II
Change dust filter	weekly	weekly	monthly	weekly
Change zero filter	monthly	yearly	yearly	-
Perform detector test	-	-	-	weekly
Check gas tight syringe	-	-	-	weekly
Check needle for blockages	-	-	-	weekly
Perform manual calibration	at beginning of campaign; every third week when you change gold trap	at beginning of campaign; every third week calibration point check	manual self diagnostic at beginning of campaign	weekly

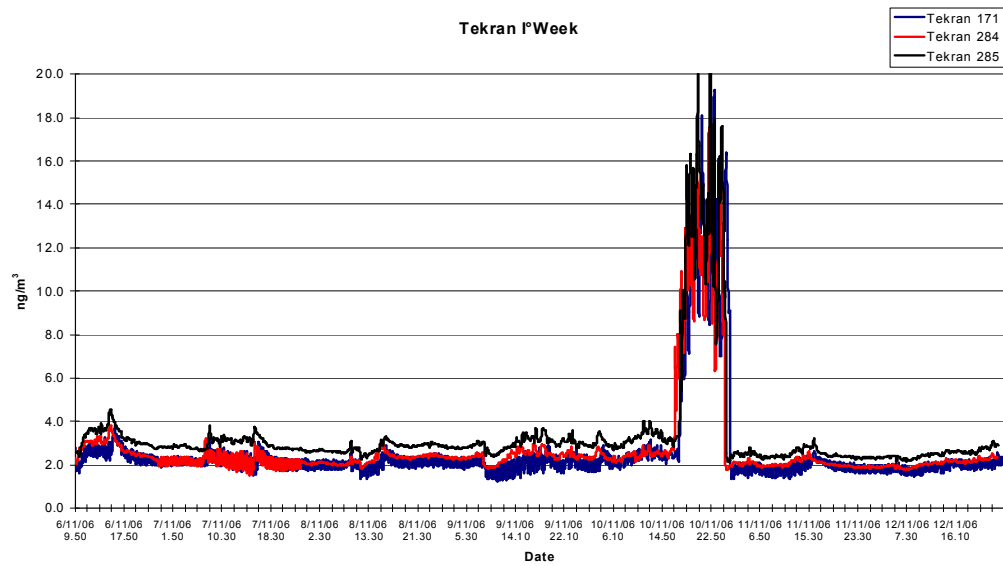
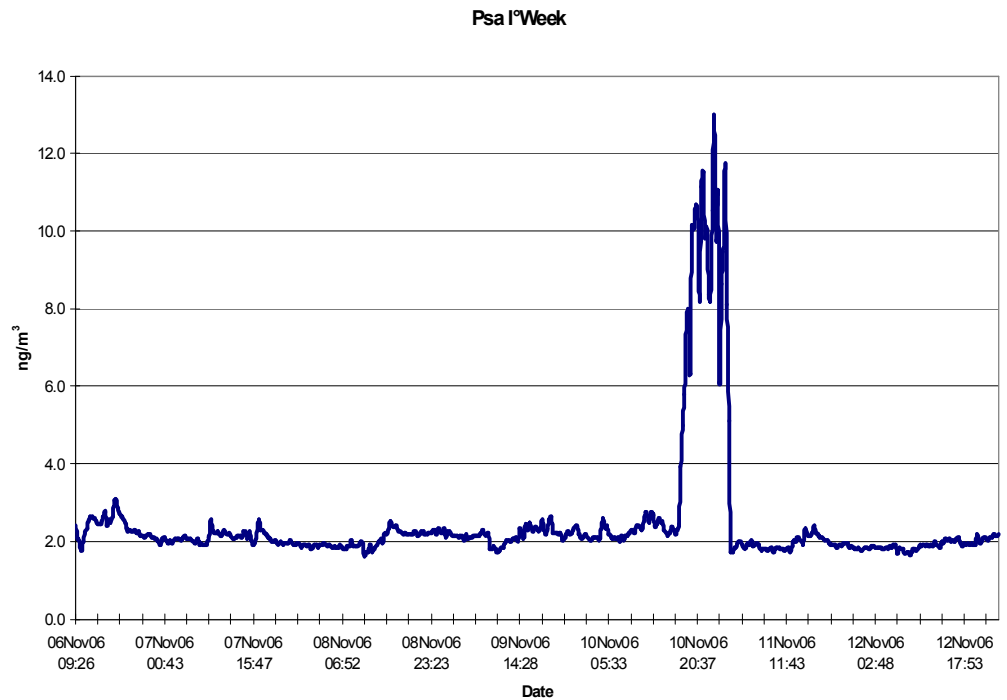
Automatic calibration correction	weekly	-	automatic baseline check (every 15 min)	-
Replace calibration port septum	every manual calibration	every manual calibration	-	monthly
Replace calibration vessel septum	every manual calibration	before shipment	-	monthly
Replace FEP sampling line	at beginning of campaign + at the end of the first month	at beginning of campaign + at the end of the first month	-	at beginning of campaign + at the end of the first month
Flow rate check	at beginning of campaign	at beginning of campaign	-	at beginning of campaign
Leak test	at each new site	at each new site	at each new site	at each new site
Carrier gas pressure	50 psi	-	-	40-60 psi
Perm source verification	every manual calibration	-	-	-
Clean cartridges	weekly	-	-	weekly
Replace cartridges	every third week	-	-	-
Download data	daily	weekly and clear memory	daily	daily
Frequency measurements	every 5 min	every 15 min	every 10 s	every 30 min
Trouble shooting	contact Tekran	check manual, contact MI	contact Lumex	contact PSA

9. Results of field tests

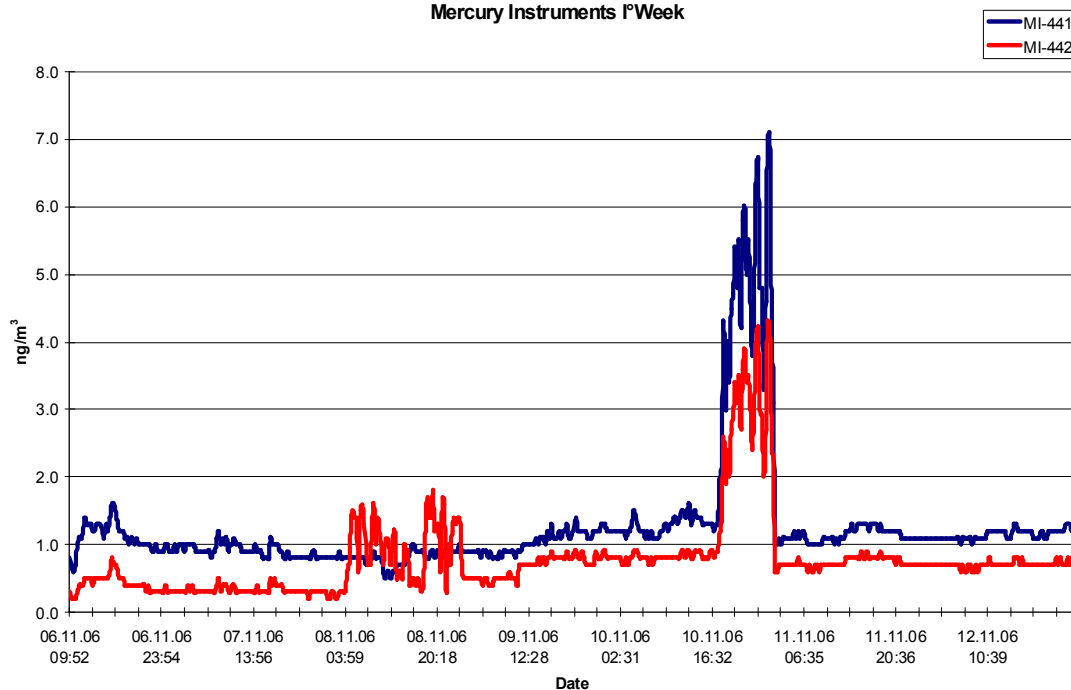
The results are in excel file, called Cen Graph&Data.

10. Graphs

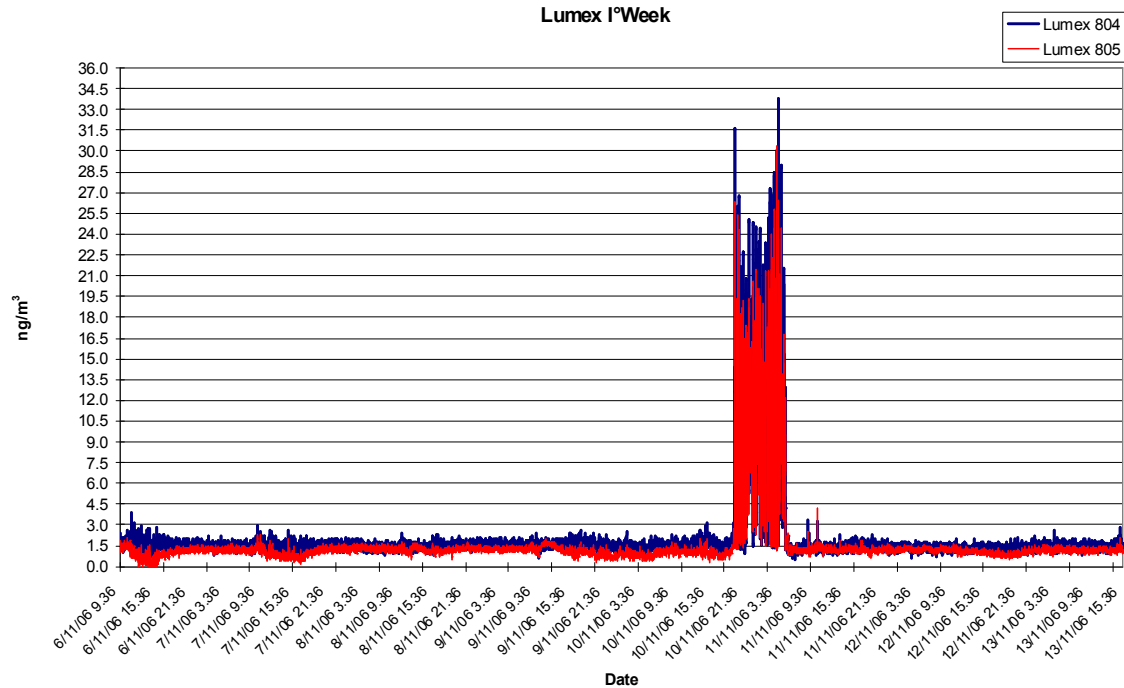
9.1- First Week



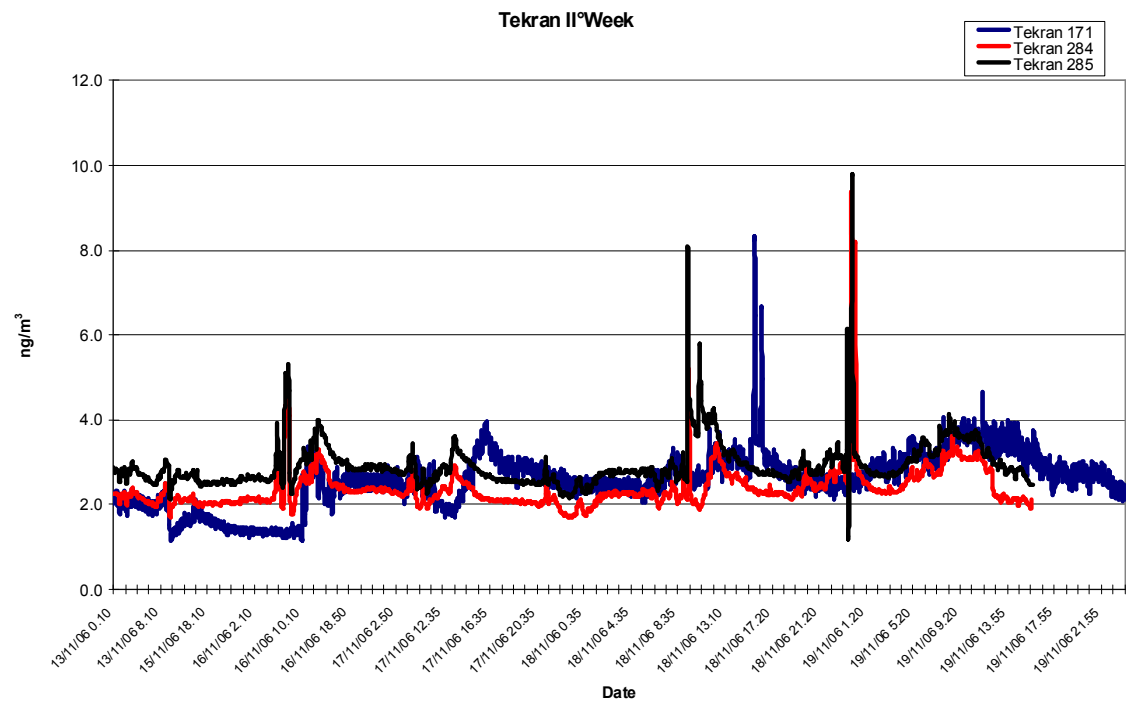
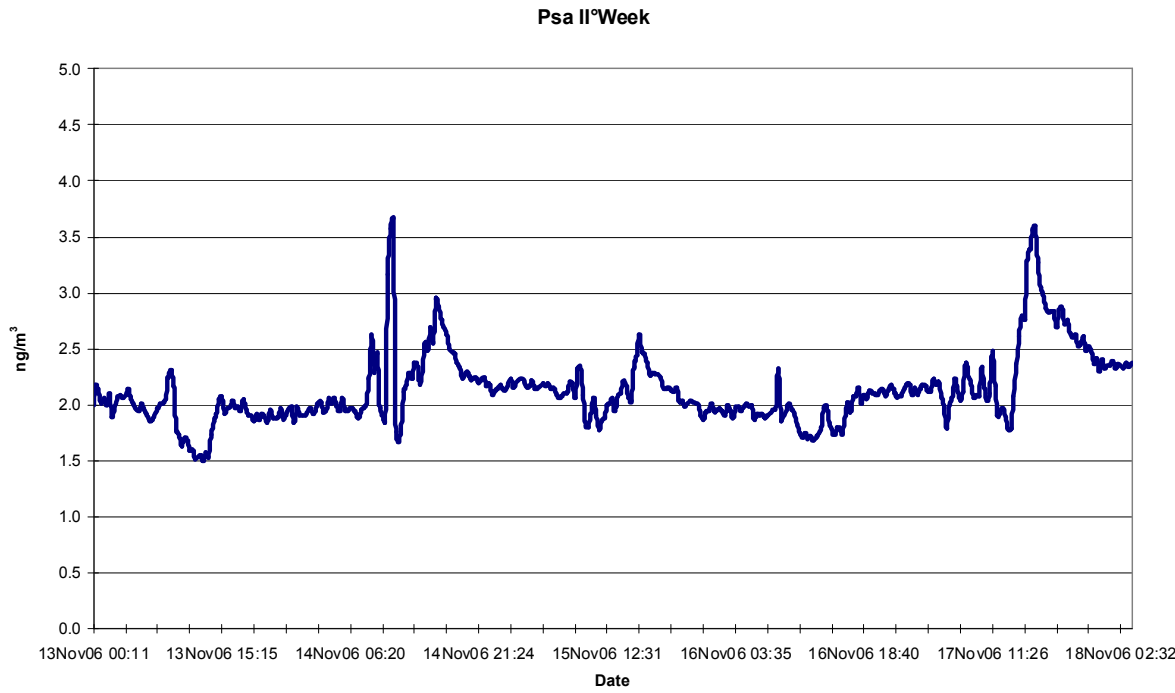
Mercury Instruments 1st Week



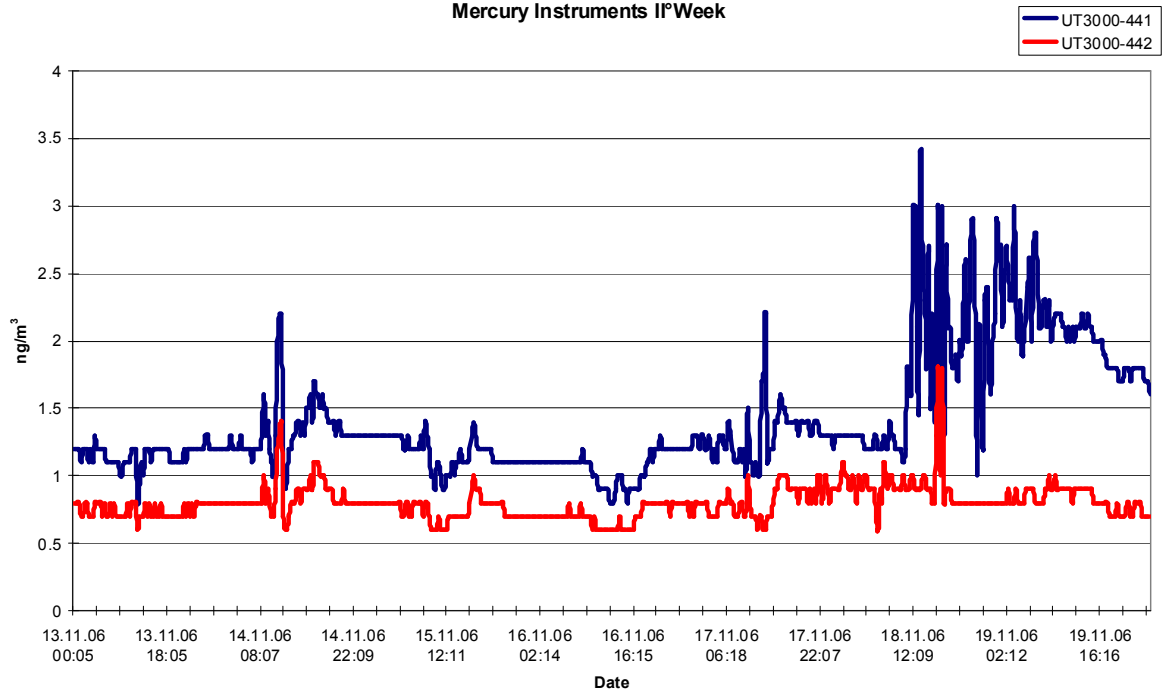
Lumex 1st Week



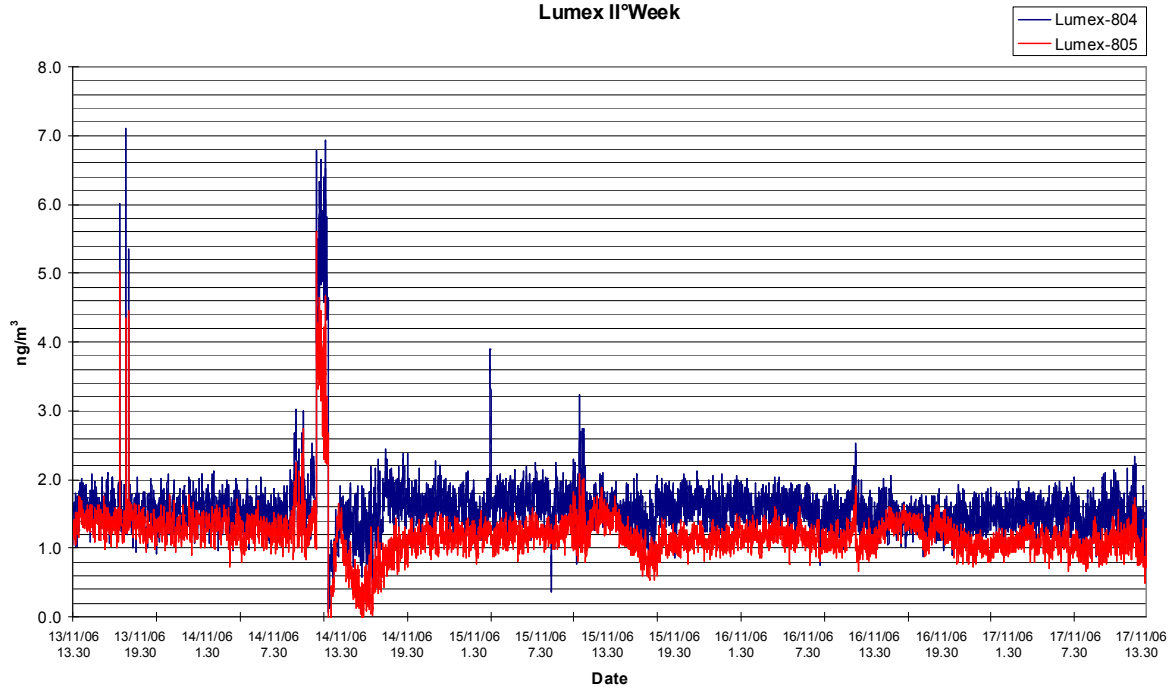
9.2- Second Week



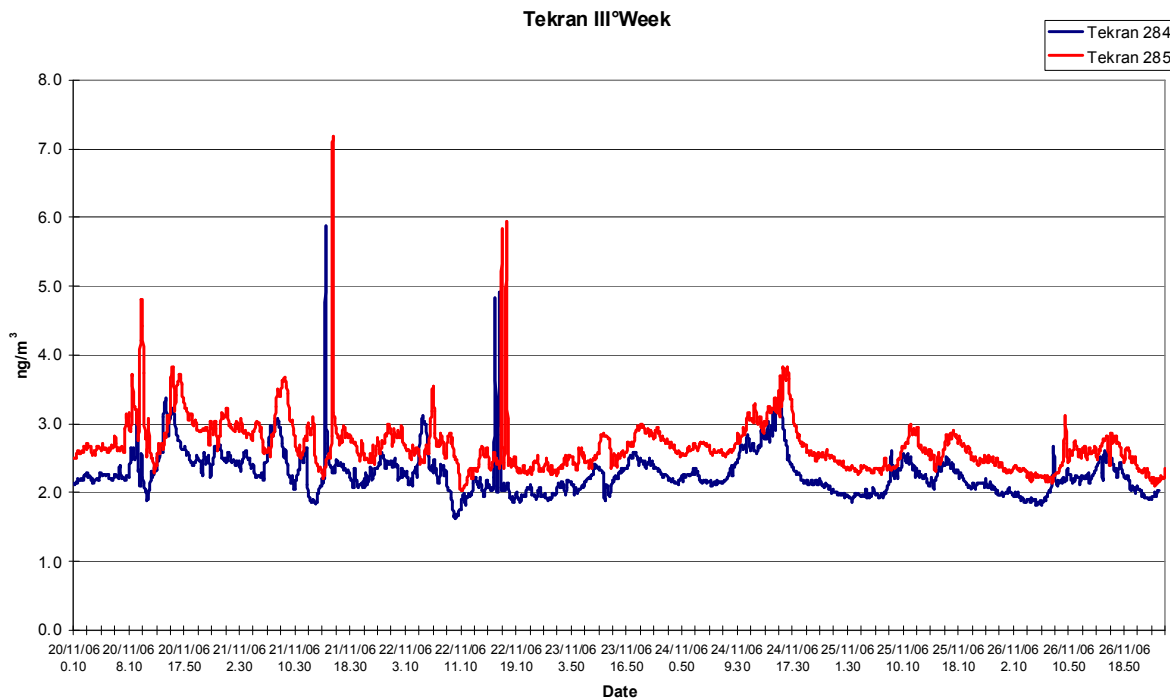
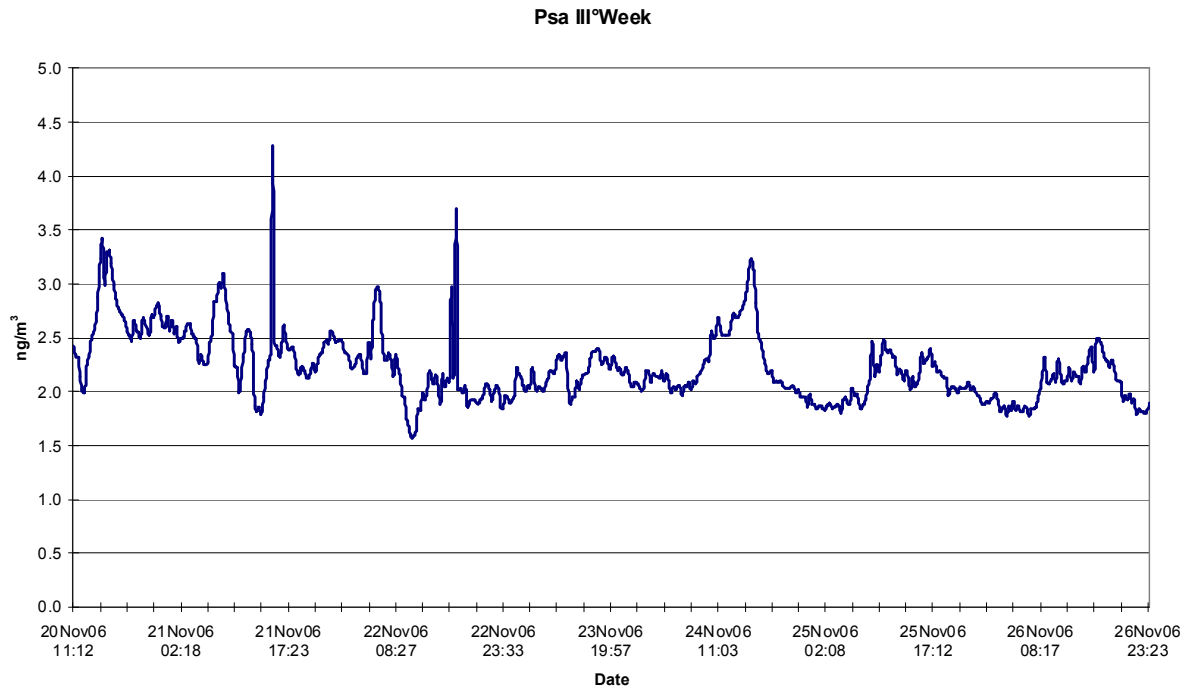
Mercury Instruments II^oWeek

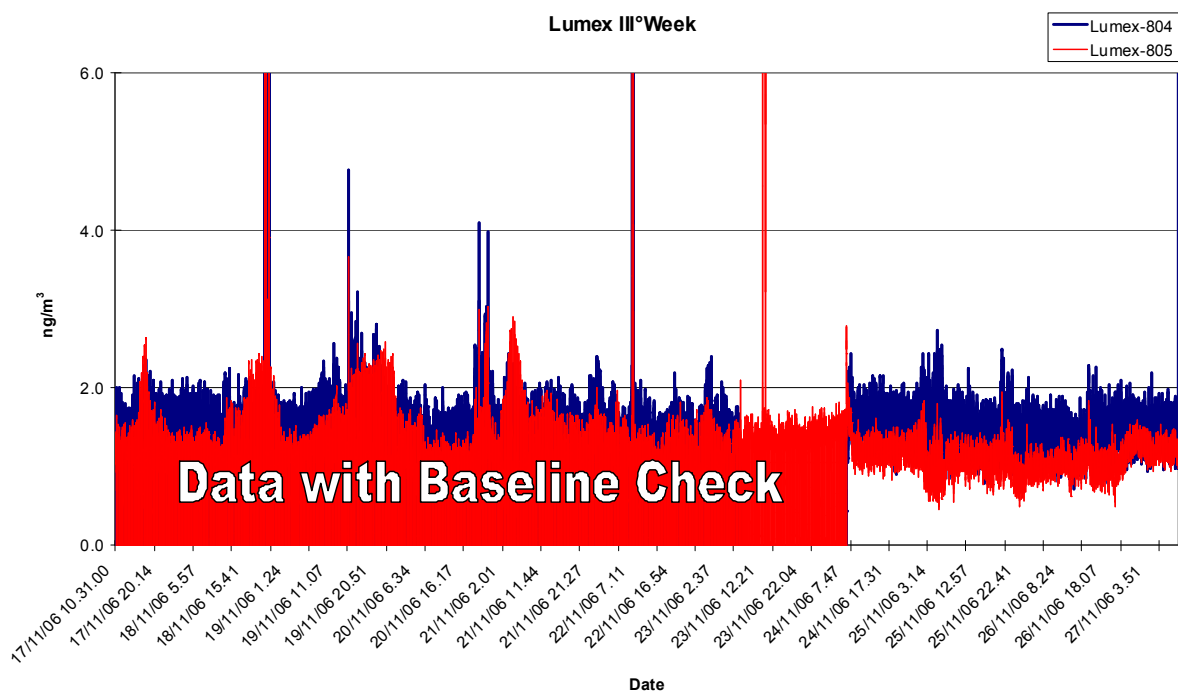
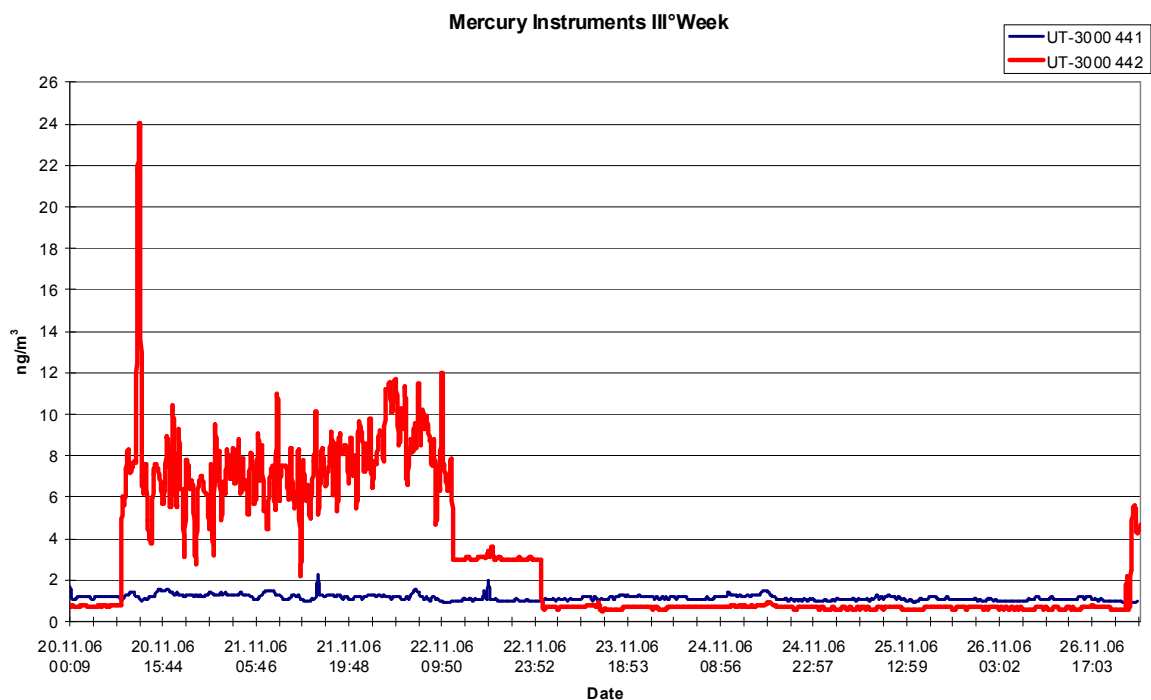


Lumex II^oWeek

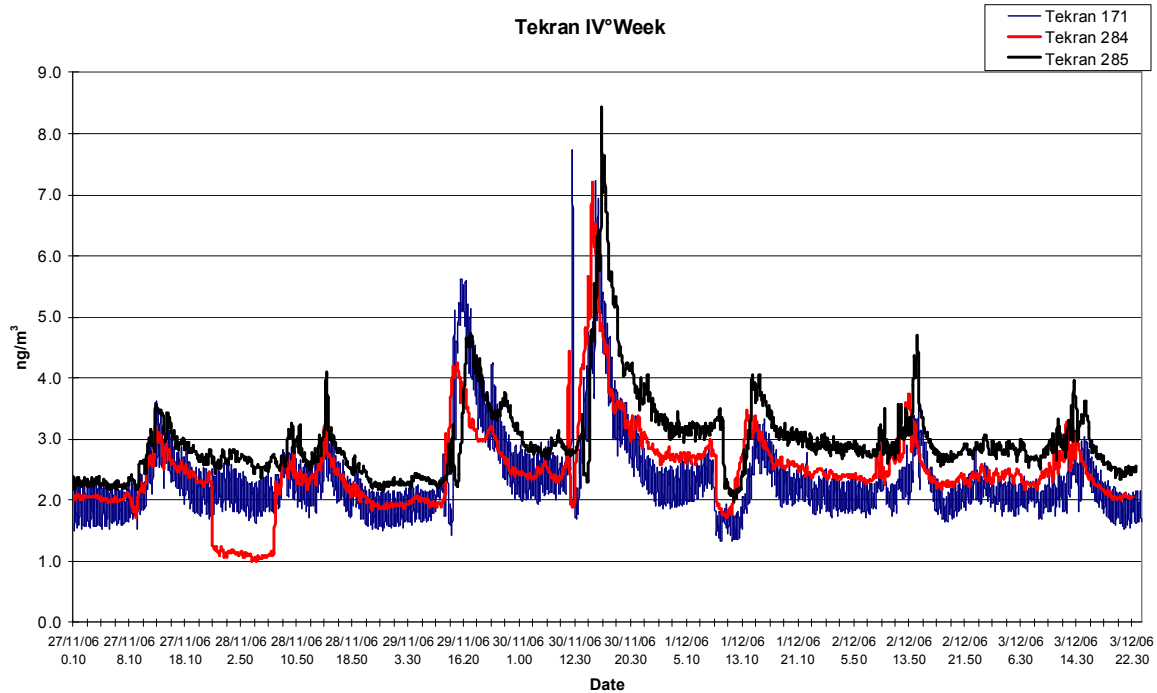
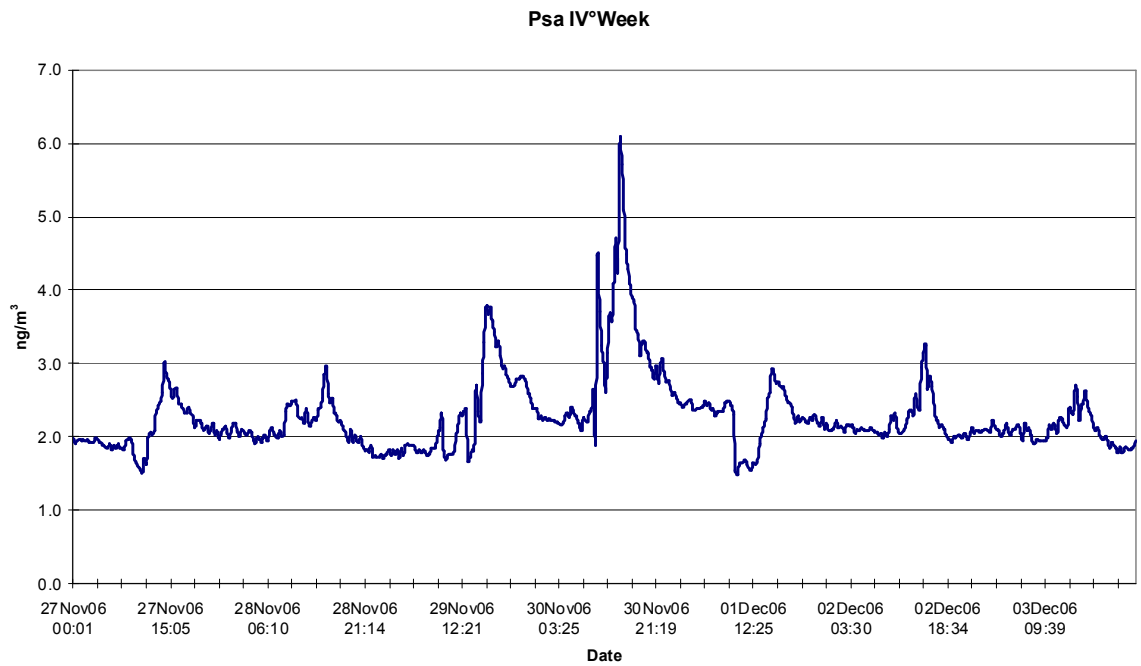


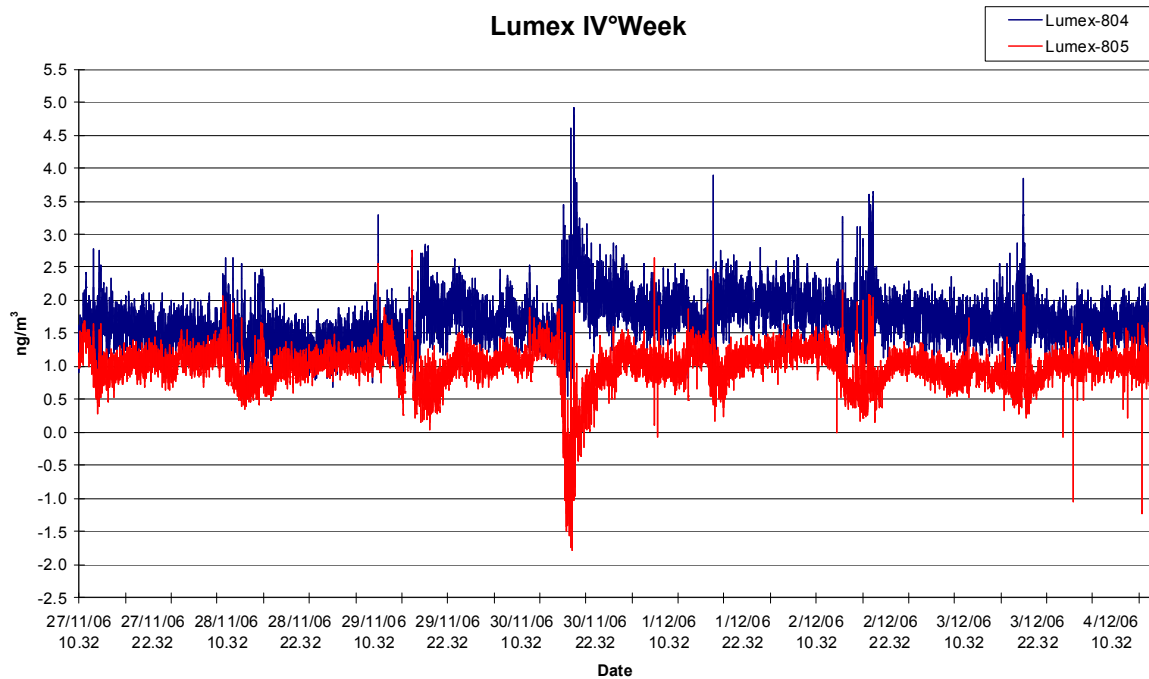
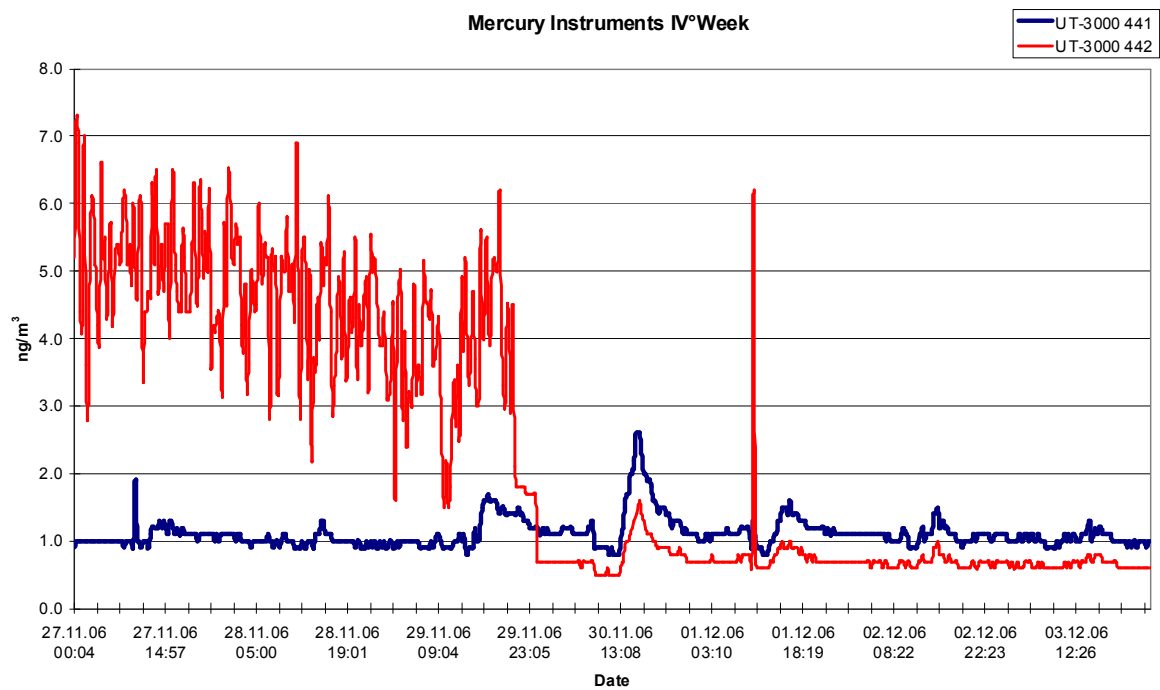
9.3- Third Week



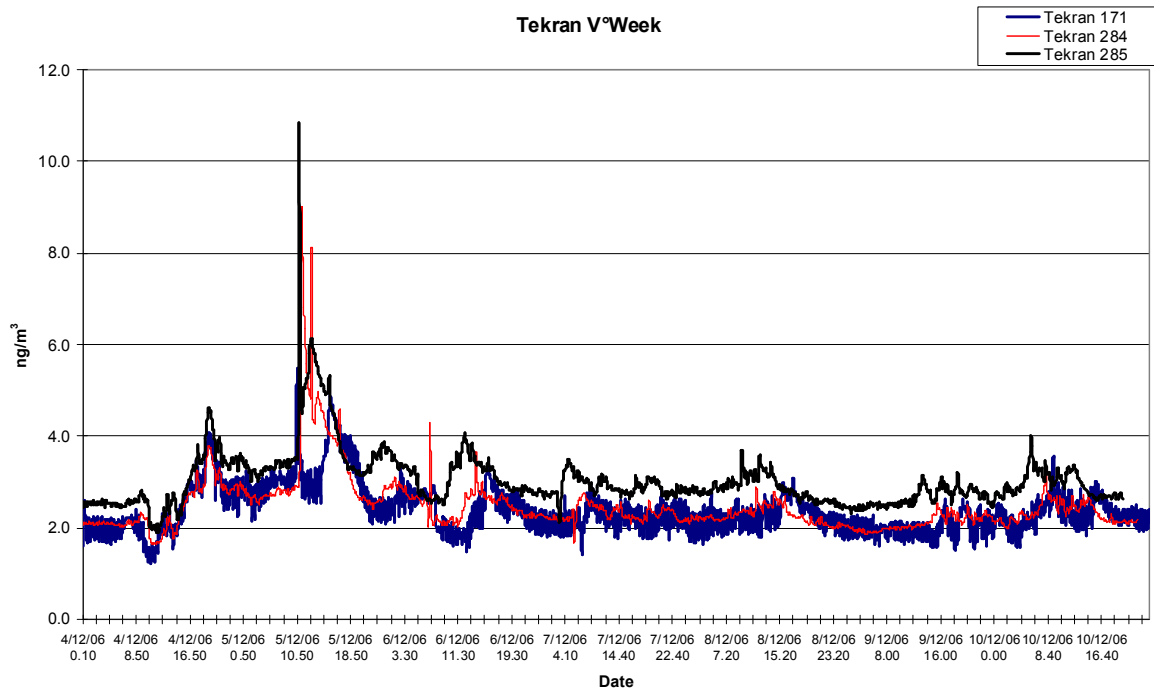
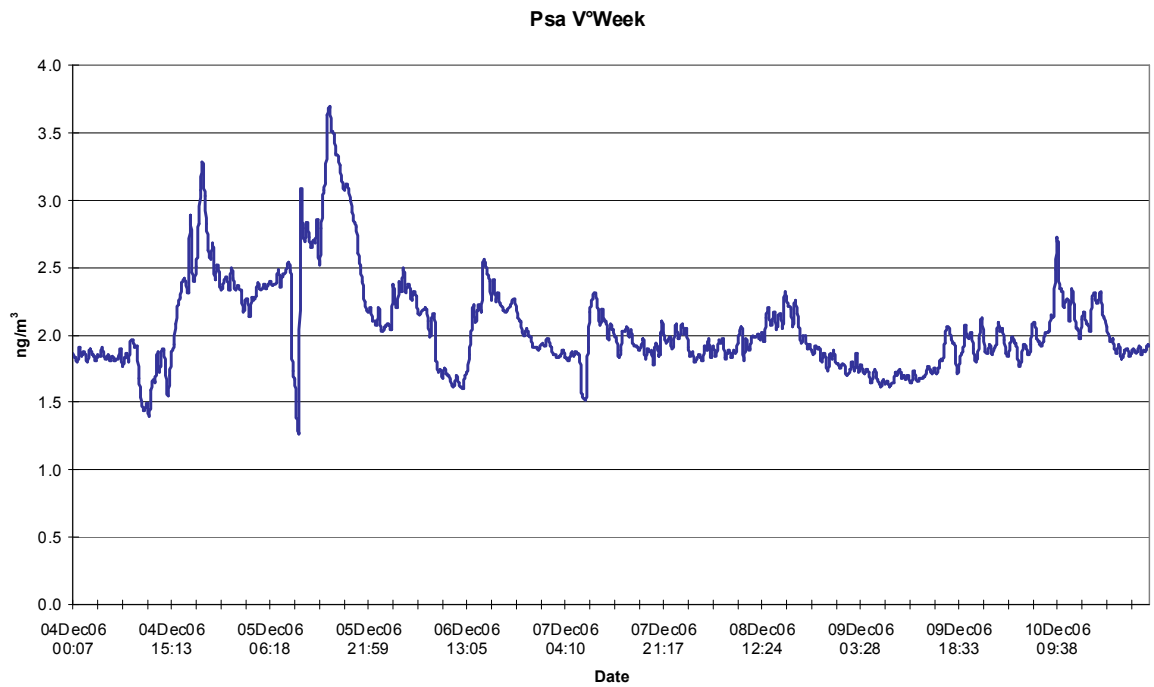


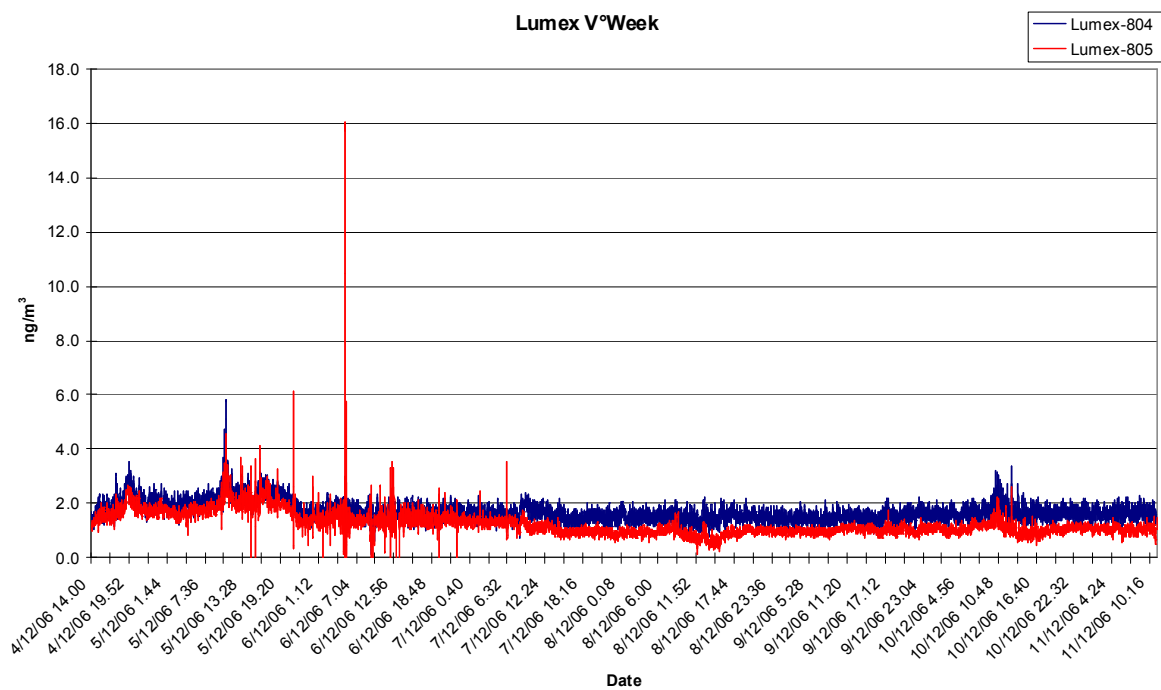
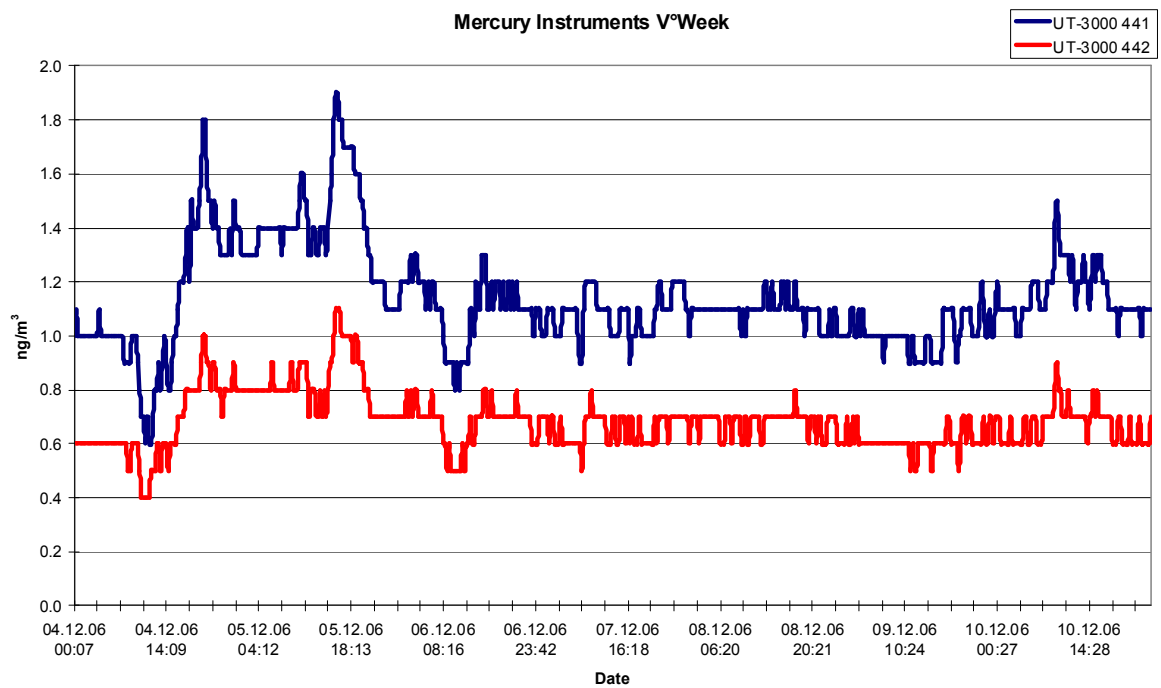
9.4- Fourth Week



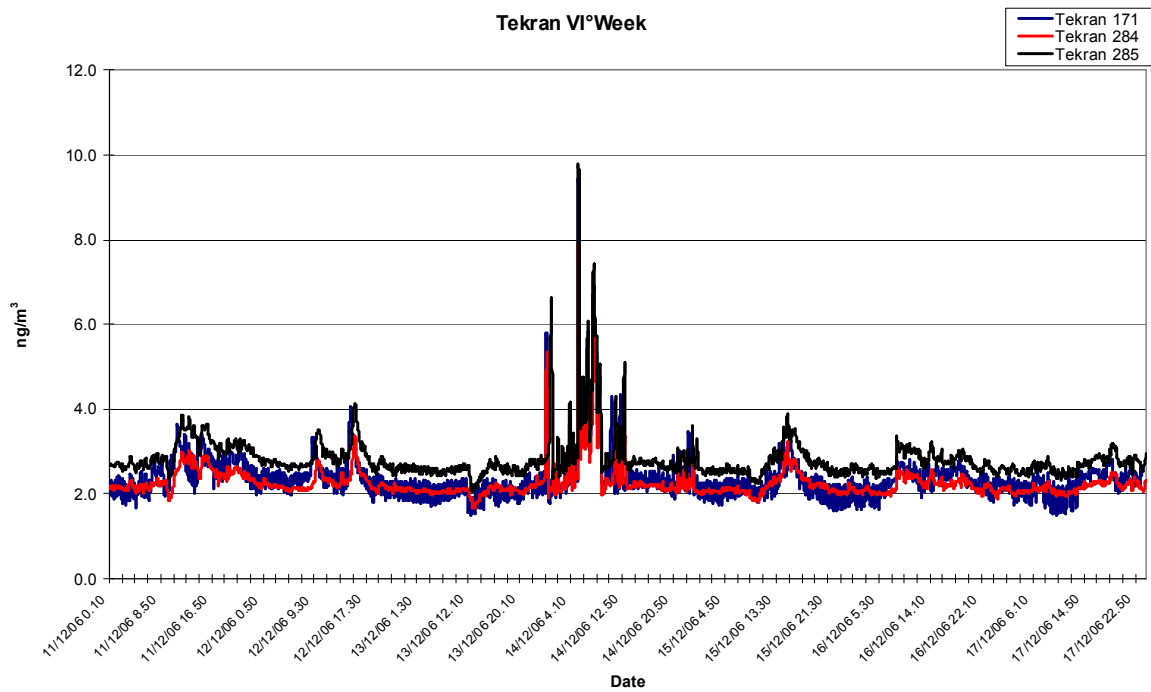
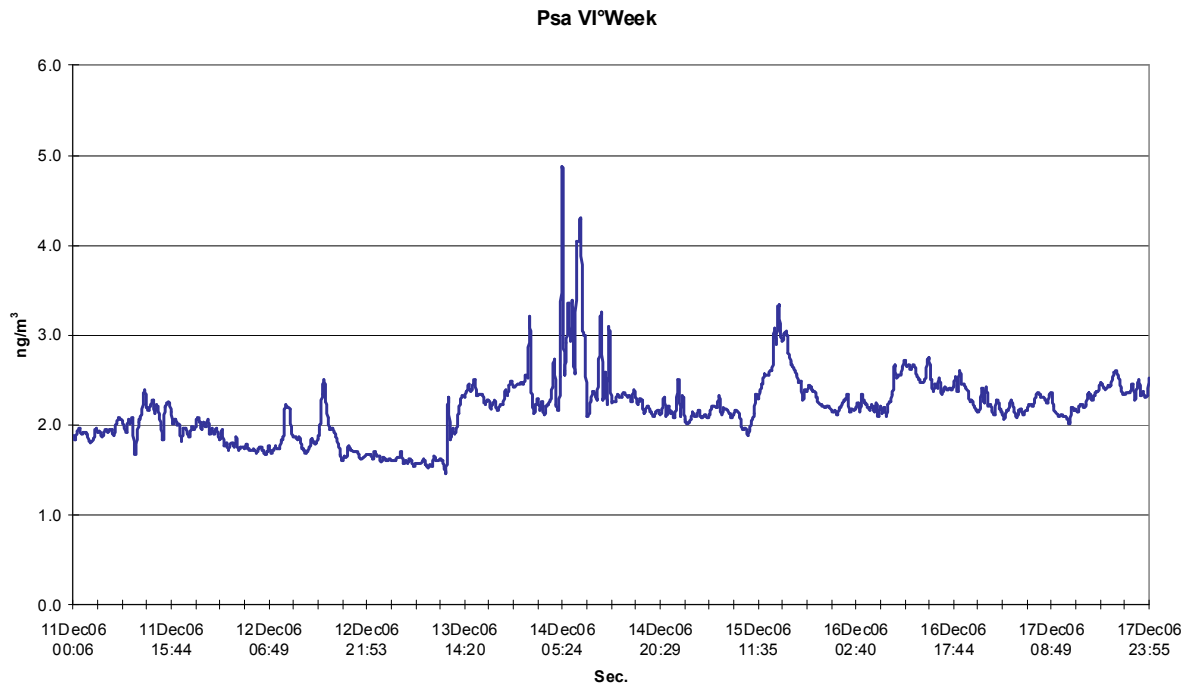


9.5- Fifth Week

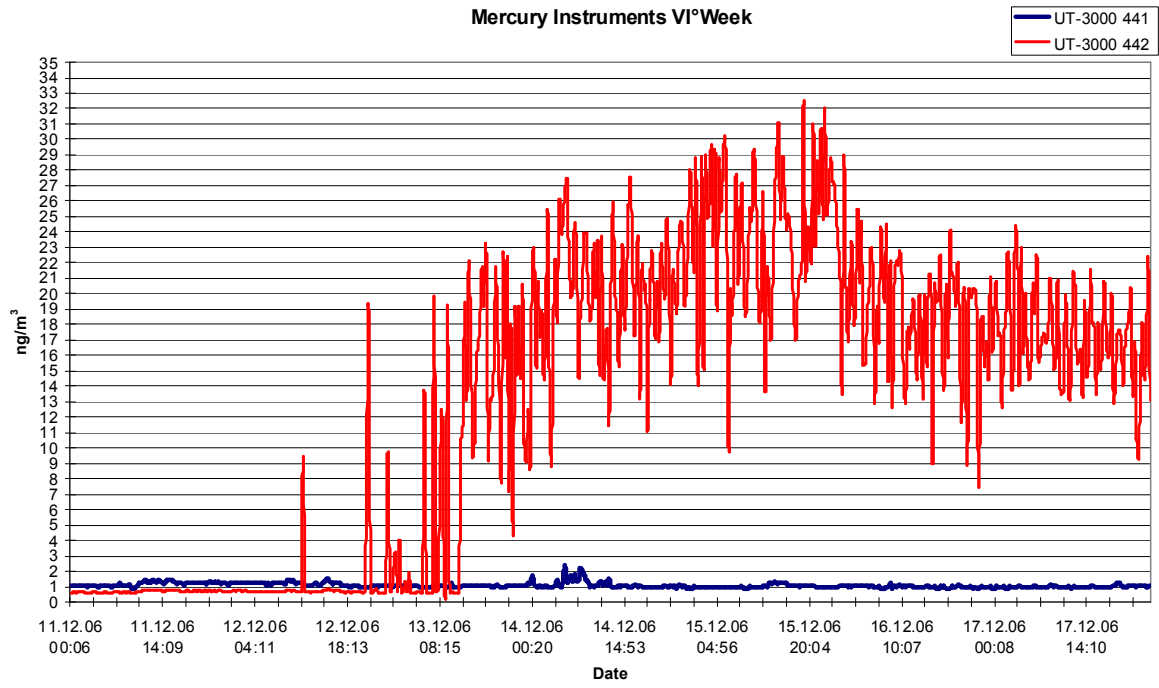


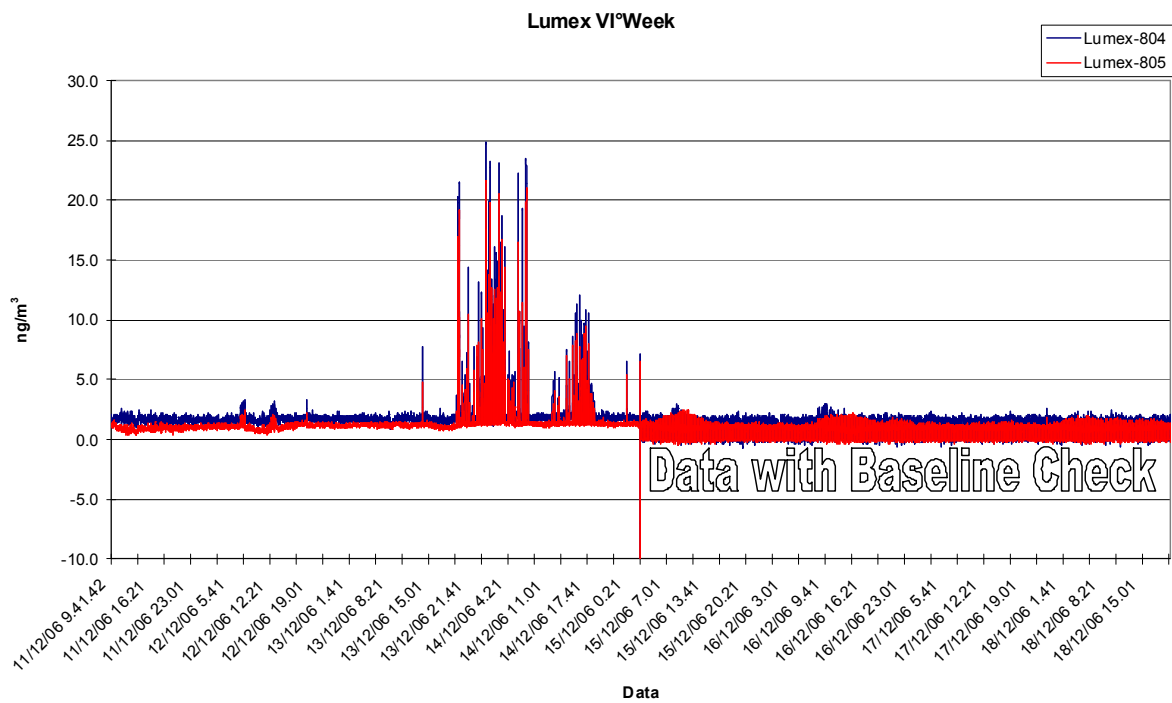


9.6- Sixth Week

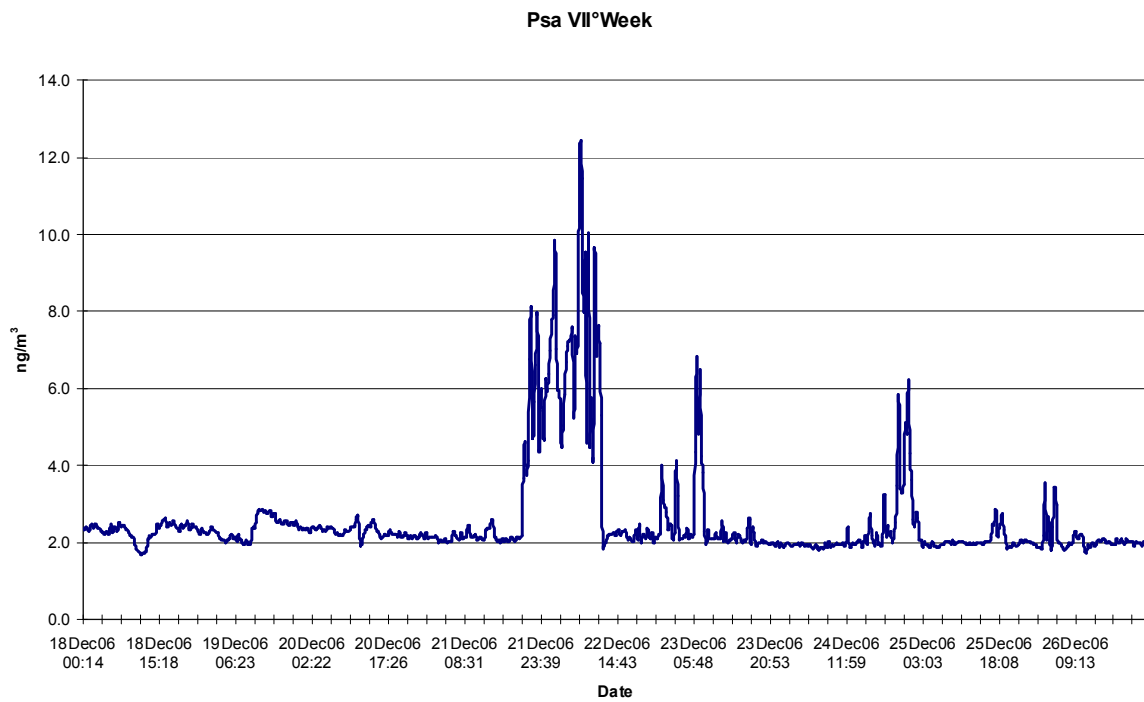


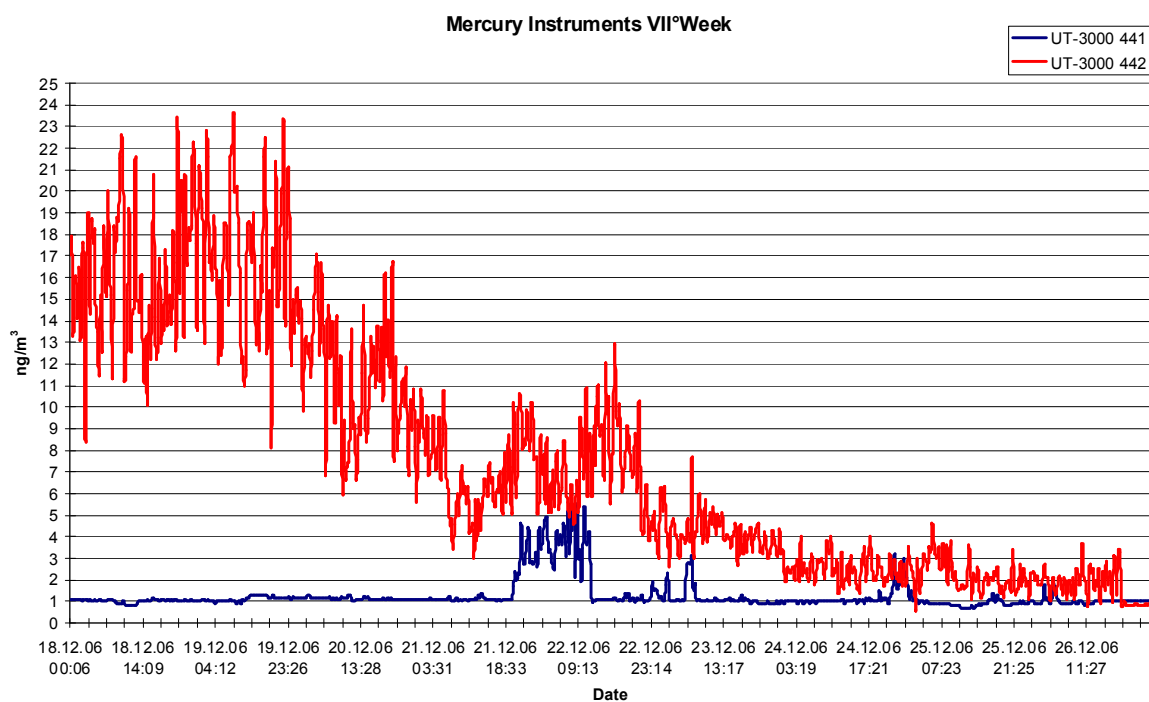
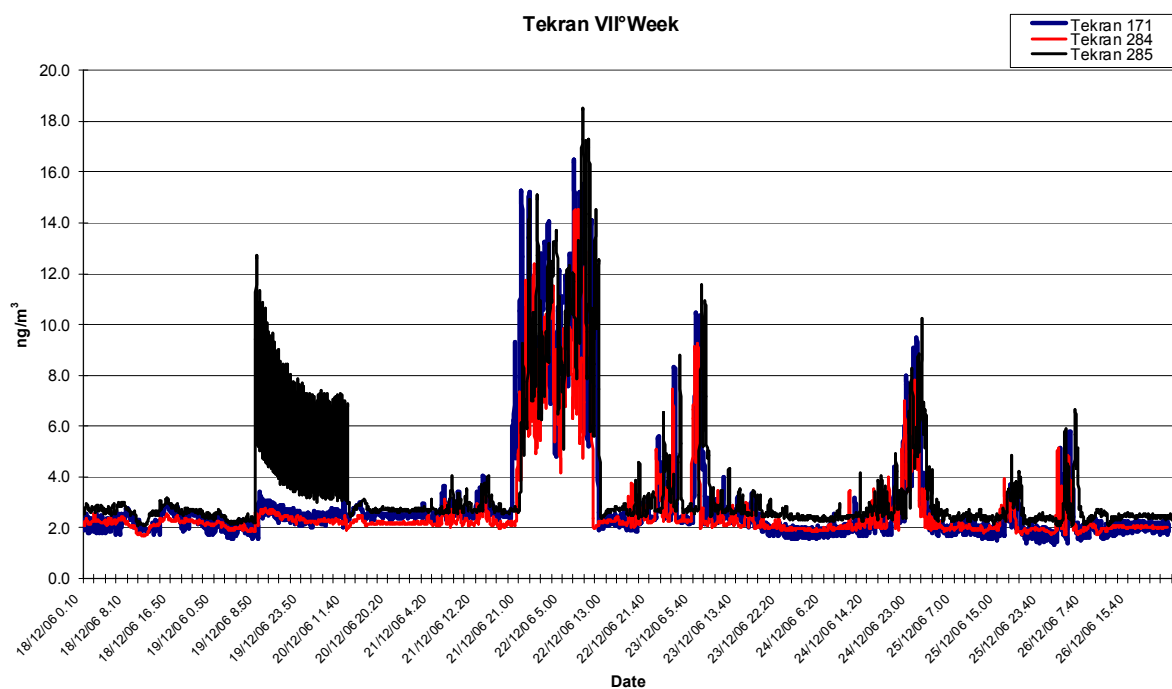
Mercury Instruments VI°Week

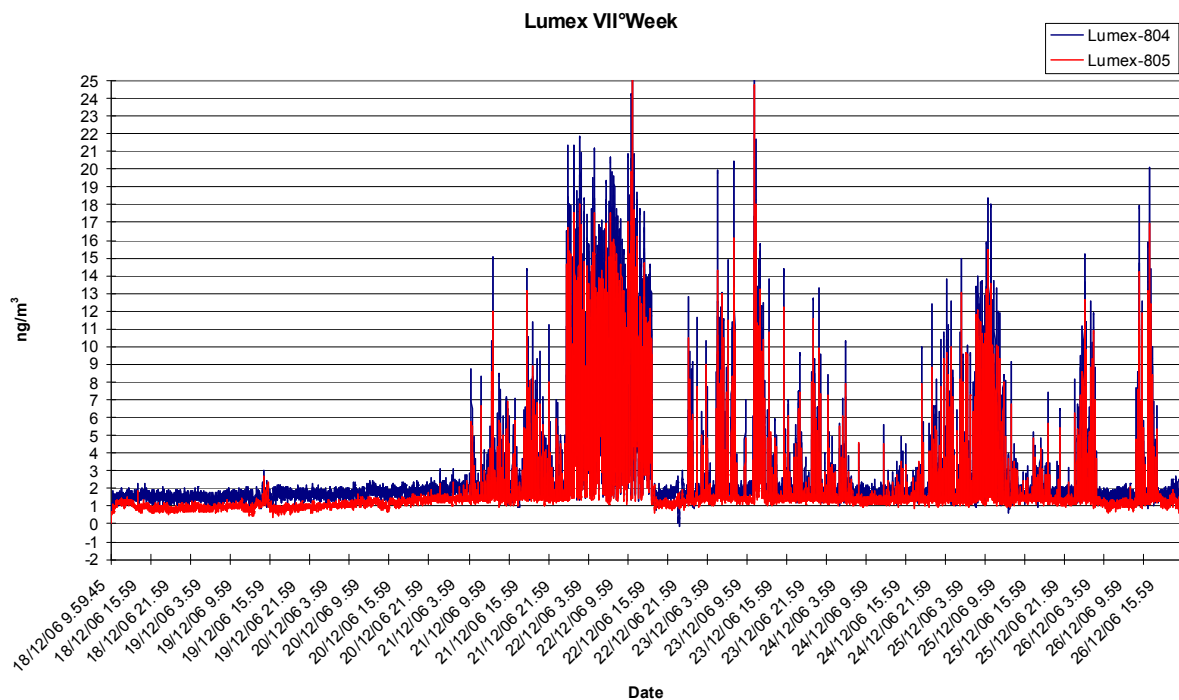




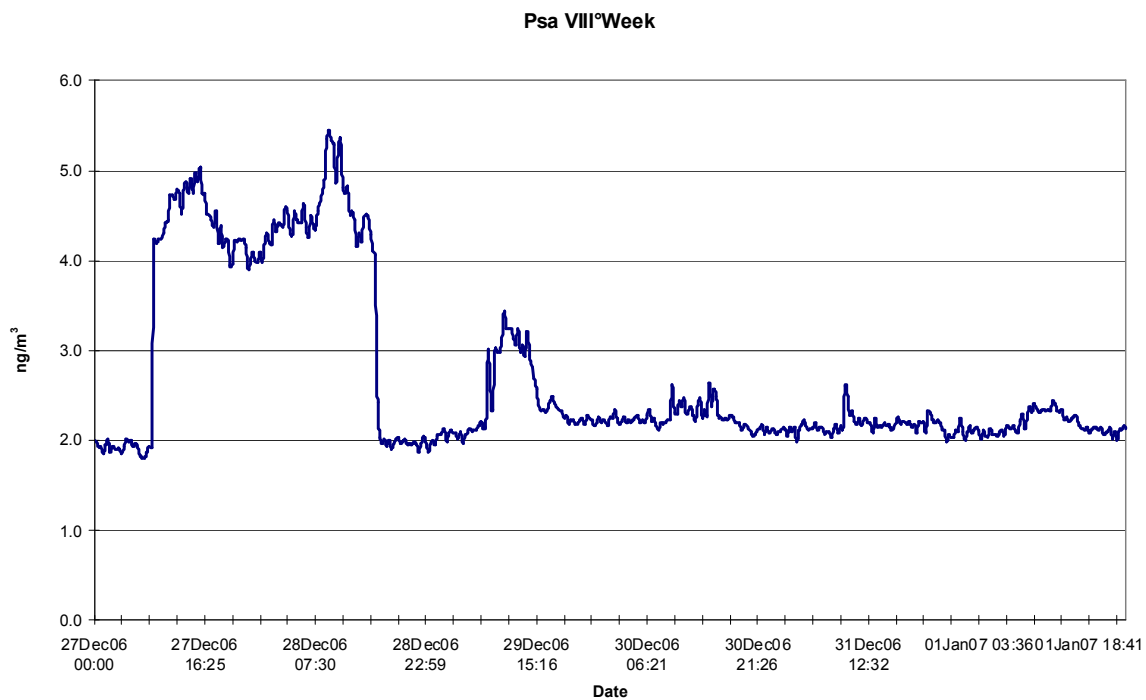
9.7- Seventh Week

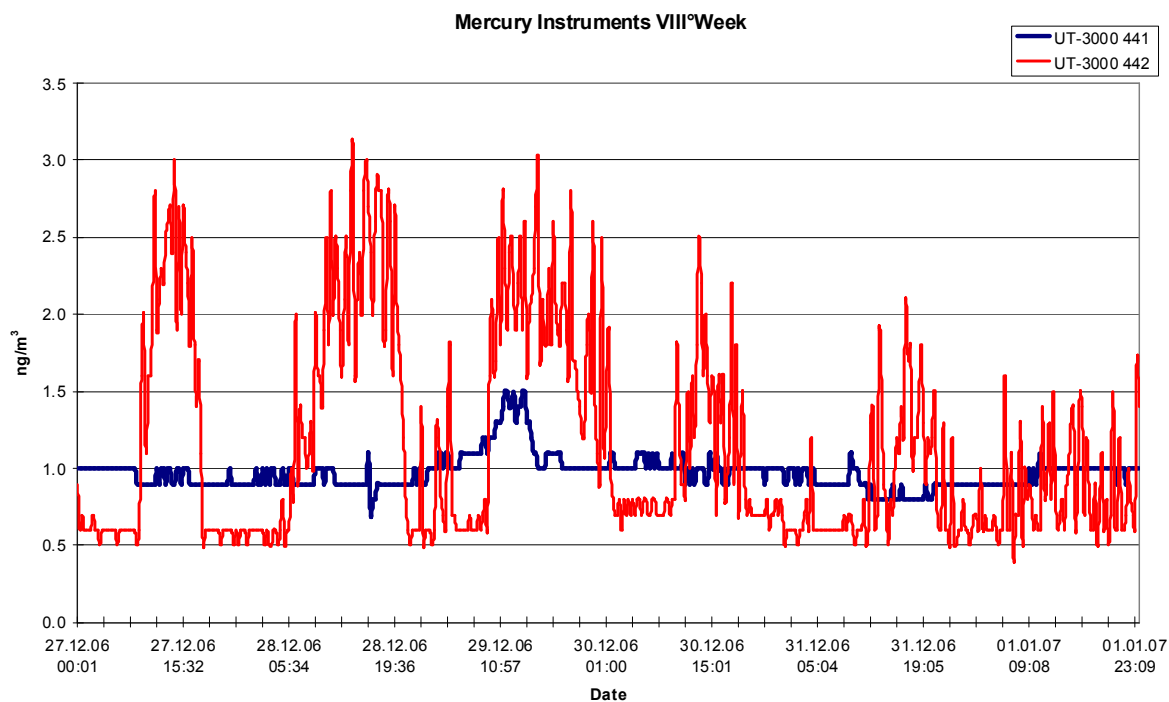
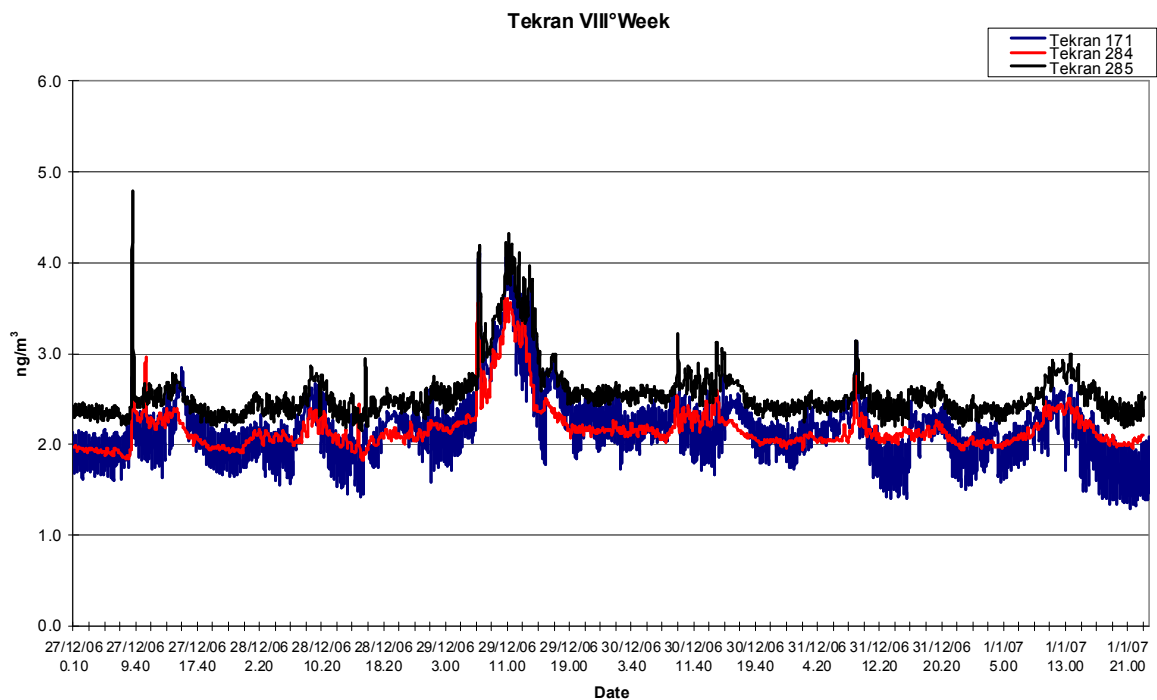


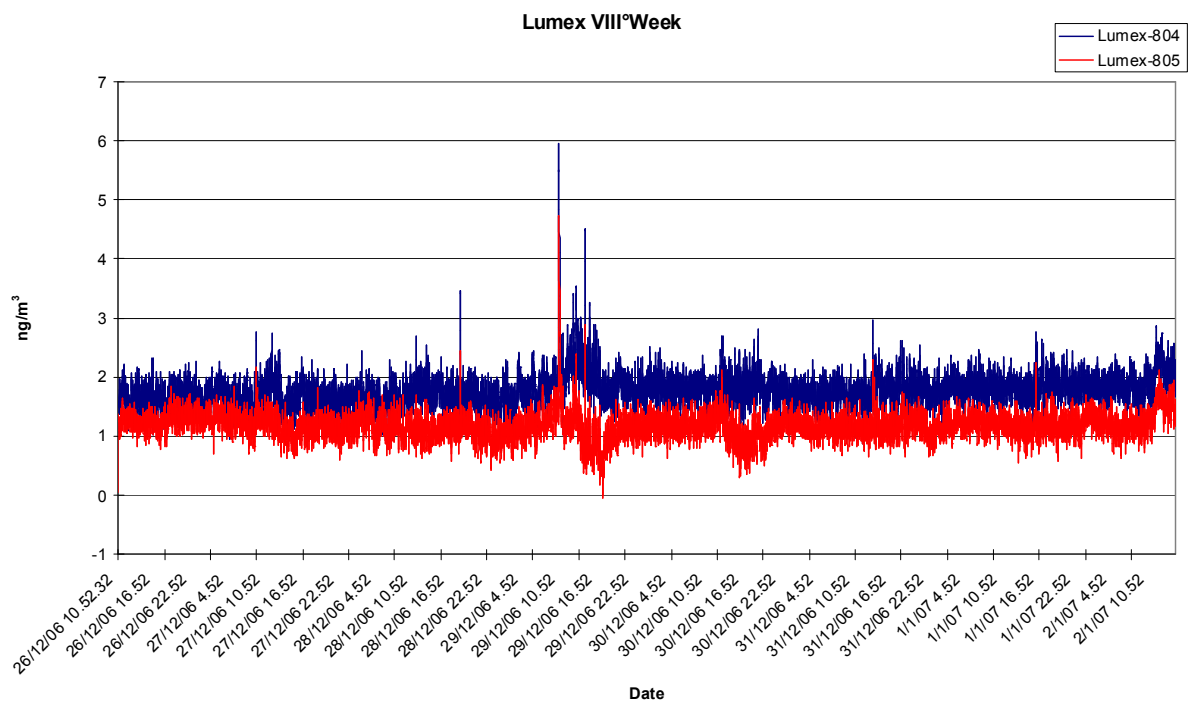




9.8- Eighth Week

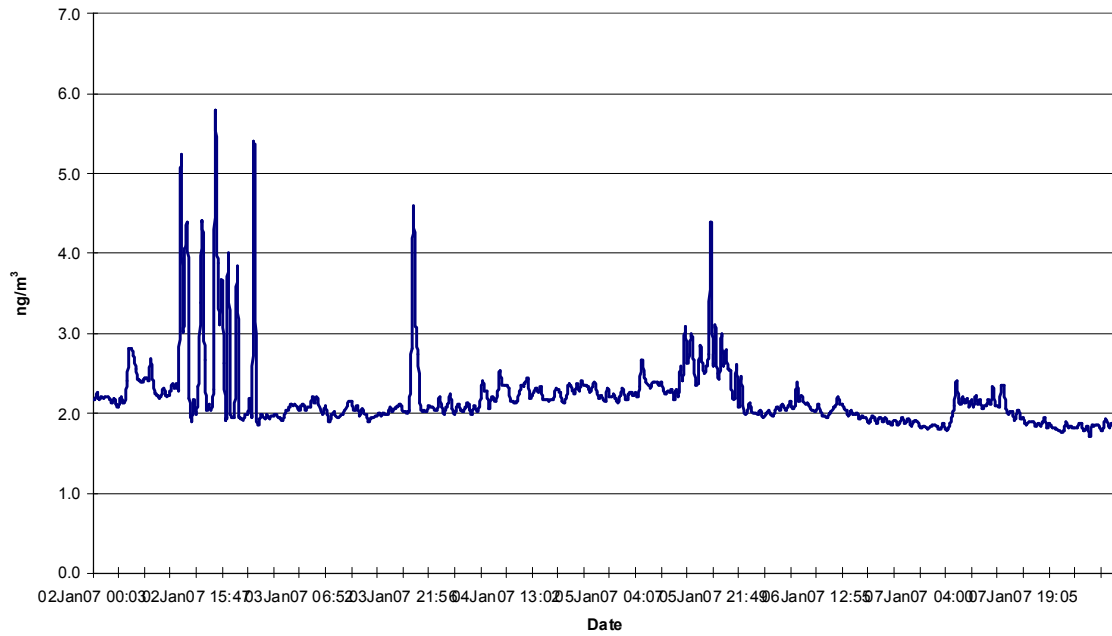




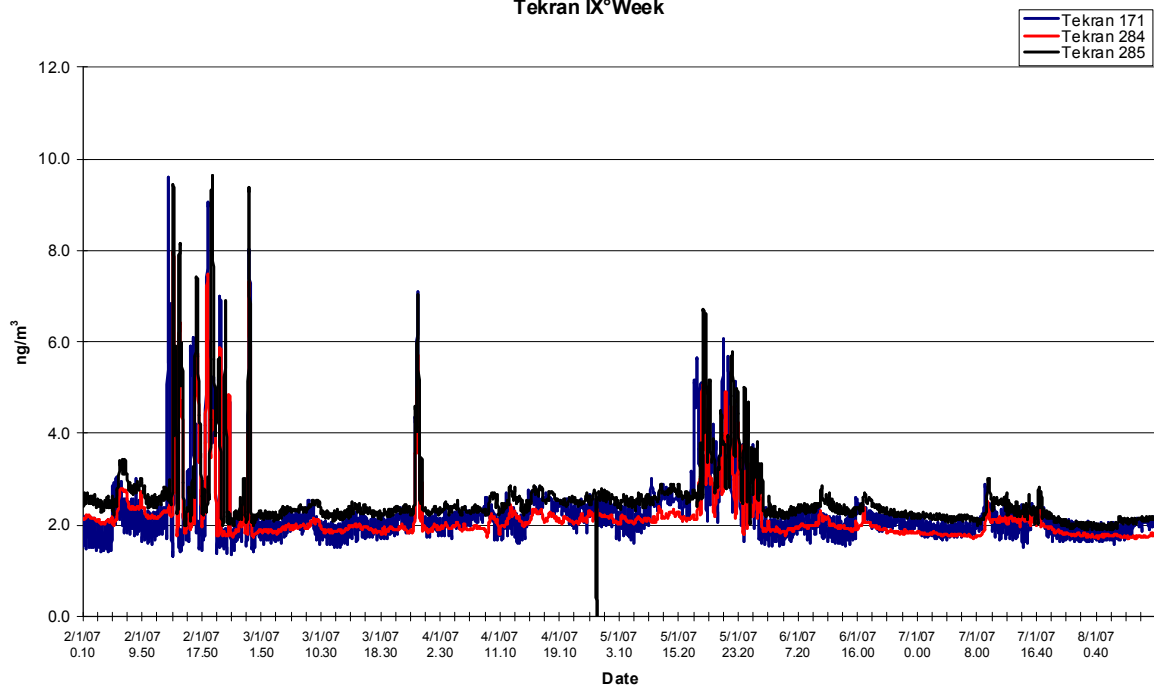


9.9- Ninth Week

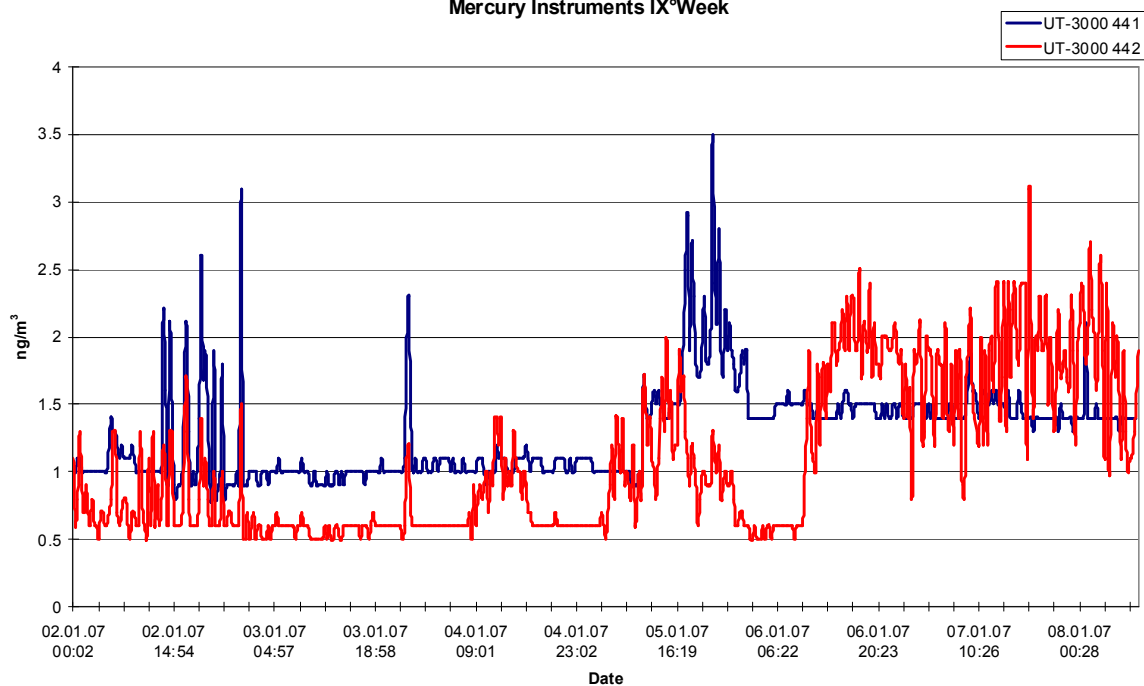
Psa IX°Week



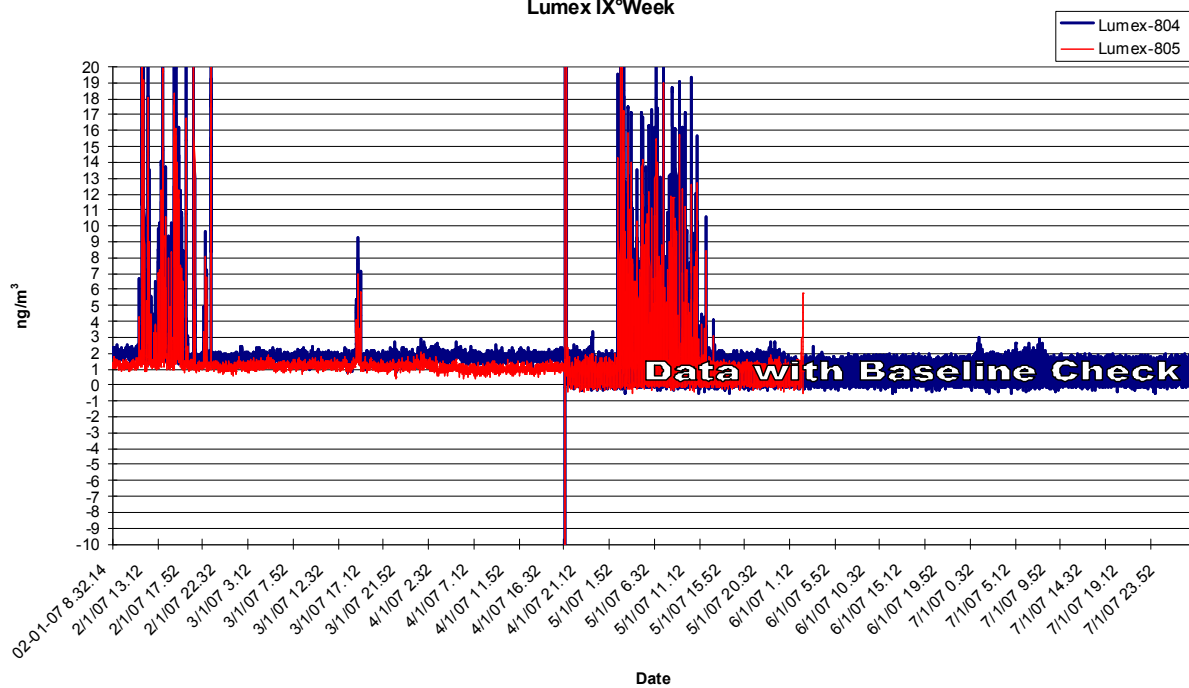
Tekran IX°Week



Mercury Instruments IX^oWeek



Lumex IX^oWeek



11. Technical Information

Detailed information on Calibration data are reported in the excel measurement data file.

- ✓ Problems occurred during the first week of the intercomparison due to elevated concentrations recorded.
- ✓ Problems occurred with the lamp stability of one of the two Tekran analysers during the first period of the intercomparison and needed several regulations each day of the sampling period.
- ✓ The Mercury Instruments showed stability problems.
- ✓ The Software of the Lumex analysers was often instable therefore the data importation procedure in Excel was very difficult for the baseline checked every 30".
- ✓ The calibration points for the instruments was choosen for monitoring the instruments stability, for a wide range.
- ✓ The calibration source for Psa was not used.
- ✓ Problems occurred quite often with the gas-compressor for the Psa.