

OPCW Proficiency Tests at TNO

History, scores and spin-off

TNO | Knowledge for business



Outline

- The Chemical Weapon Convention
- History of OPCW - Proficiency Tests
- Proficiency Tests at TNO-NL
 - Designated status: scores **A** and **B**
 - Preparation of PT-samples
 - TNO High-Tox facility
- Spin-off
 - TNO participates in OPCW Analytical skills courses
 - TNO provided Laboratory Assistance in Uganda and Vietnam
 - TNO Response team on standby

1997: Chemical Weapon Convention, Paris

- Treaty (170 pages)
 - Ban on all chemical weapons: prohibition of the development, production, acquisition, stockpiling, retention, transfer or use;
 - Verification activities by inspection teams
 - on-site analysis
 - off-site analysis by **designated** laboratories → **PT**
 - Opened for signature in January 1993
 - Entered into force in 1997
 - Treaty Organisation OPCW in Den Haag
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- A world map with a light green background. Countries that have signed the Chemical Weapons Convention are highlighted in a darker green. These include most of Europe, North America, and parts of Africa and Asia. Countries that have not signed are highlighted in orange, including Iraq, Libya, and North Korea. The map is positioned behind the text on the right side of the slide.

1989 - 1995: Preliminary Tests (in which TNO participated)

1989-1993: Four International Round Robin tests, coordinated by Verifin (Finland).

Aim: development of Recommended Operating Procedures (ROP's) for the future verification of the Chemical Weapon Convention Blue Books.

1994-1995: Provisional Technical Secretariat for the OPCW Preparatory Commission organizes Interlaboratory Comparison Tests as trial proficiency tests.

Aim: establish procedures for OPCW PT scheme.



1996 - OPCW Official Proficiency Tests

- PT's are conducted in accordance with **ILAC-G13** to certify laboratories for the analysis of authentic samples under the provision of **Chemical Weapons Convention**.
- Laboratories that have **successfully** completed **three consecutive** tests (i.e. **three A's** or **two A's and one B**) are **designated** by the Director General of the OPCW for analysis of authentic samples. (Also: the laboratory must have **national** accreditation)
- To maintain the Designated Laboratory status, a laboratory must **participate in** and **pass** at least **one of the two PT's** offered per calendar year.
- The OPCW PT is **qualitative**, that is the laboratories must determine if any of a very large set of **chemicals relevant to the Convention** are present in the samples.
- Two of the designated laboratories perform either **sample preparation** or **evaluation** of the test results.
- 2010: **Eighteen** laboratories from 16 Member States are designated

Quality Documents in OPCW PT's

The tests are to be conducted in accordance with the following set of quality documents:

- “Standard Operating Procedure for the **Organisation** of OPCW Proficiency Tests”, QDOC/LAB/SOP/PT01, since 2001 accredited by the Dutch Accreditation Council; **Thirteen** quality system standards and official documents are being used as references in this SOP;
- “Work Instruction for the **Preparation of Test Samples** for OPCW Proficiency Tests”, QDOC/LAB/WI/PT02;
- “Work Instruction for the **Evaluation of Results** of OPCW Proficiency Tests”, QDOC/LAB/WI/PT03.

Tool: OPCW Central Analytical Database (OCAD)

- An analytical database of compounds in an OPCW context is **not commercially available**;
- The OCAD is intended solely to aid in the analysis of chemicals of **relevance to the CWC**;
- Database has been created based on **contributions of several laboratories**.

Performing the OPCW proficiency test

Days/weeks **before** the start of the PT: testing and qualification of the analytical systems (GC, GC-MS, LC-MS etc), meetings on who will do what, set-up of a study-plan.

Day 1 : Samples arrive at TNO: status of samples is checked (damage, leak), registration;

Day 15: Report has to be delivered at OPCW via postal service or e-mail

Day 1- day 15:

- Analysis of samples, sample preparation: clean-up, derivatization, extraction;
- Identification of spiking chemicals;
- Synthesis of standards;
- Daily meetings on progress and how to continue;
- Writing and checking the report.

Method of evaluating laboratory performance

Performance criteria fulfilled ¹	Identification of chemicals	Performance scoring ²	Performance rating
Yes	Laboratory identifies all chemicals	Maximum score	A
Yes	Laboratory identifies all chemicals except one	Maximum score minus two	B
Yes	Laboratory identifies more than half of the chemicals	Score between zero and maximum minus two	C
Yes	Laboratory misses more chemicals than it identifies	Negative score D	D
No	Laboratory reports for instance a false positive or an irrelevant chemical	No score	Failure

¹ See PC-XI/B/WP.6 Annex 1, paragraph 2. PC-XI/B/WP.6 OPCW The criteria for acceptable performance

² For practical application of the scoring rules reference is made to the Note by the Executive Secretary on the Results of the Third Commission Inter-Laboratory Comparison Test: Trial Proficiency Test (PC-XII/B/3).

OPCW PT's in which TNO participated

year	PT-test nr.	score	
1996	1st	B	Pinacolylalcohol was missed
1996	2nd	A	
1997	3rd	A	Evaluation of the results was carried out
1998	4th	B	3-quiniclidinylbenzilate (BZ; an incapacitating agent) was missed
1999	6th	A	
2000	7th	A	Evaluation of the results was carried out
2000	8th	A	
2001	9th	B	Chloropicrin was overlooked in a complex mixture with chlorinated solvents
2001	10th	A	Sample preparation was carried out
2002	12th	A	
2003	14th	A	
2004	16th	B	Insufficient analytical data to support the identification of one of the spiking compounds
2005	18th	A	
2006	19th	A	
2007	22nd	A	
2008	24th	A	
2009	26th	A	Sample preparation was carried out
2010	28th	?	To be performed in October 2010

The Netherlands Ministry of Foreign Affairs finances the OPCW PT's at TNO.

Preparation of PT Samples (example)

- Test Scenario

The **test scenario** and the **spiking** and **background** chemicals are discussed and agreed in advance with the OPCW

- Preparation of the Samples & Sample Composition

- Spiking Chemicals: synthesis/purchase, analysis (quality control)
- Background chemicals
- Preparation of bulk solutions
- Preparation of water samples
- Preparation of organic samples
- Bulk solution analysis prior to shipping
- Splitting, coding, packaging, transportation

- Studies After Sample Dispatch

- Qualitative Analysis
- Homogeneity & Stability Studies (Quantitative Analysis)

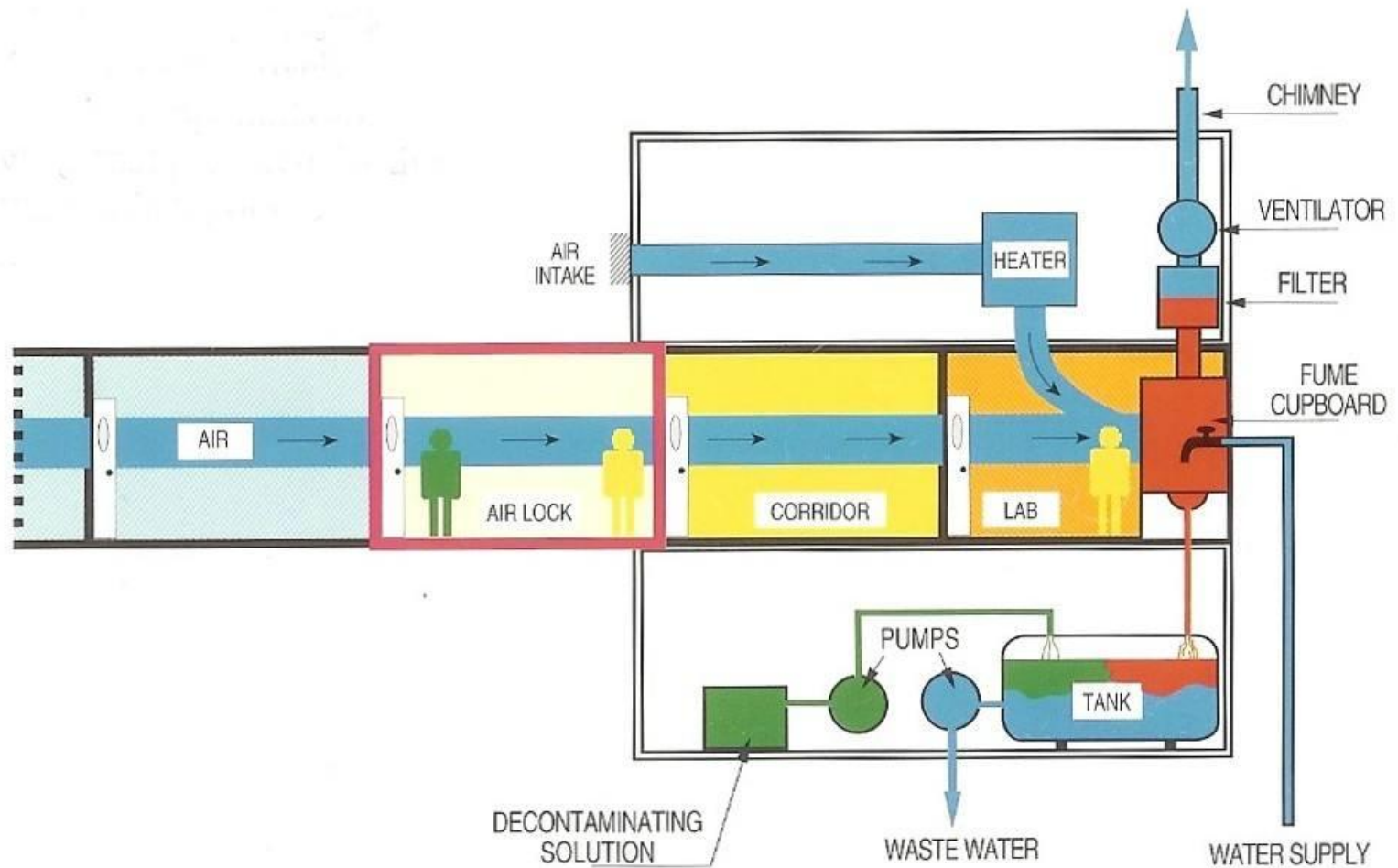


Working with chemical warfare agents

- Only in special laboratories with proper facilities, containment, when relatively large quantities (> 10 mg) are involved
- Extensive safety regulations related to
 - Synthesis
 - Storage
 - Transport
 - Decontamination
- Emergency medical countermeasures (rescue team on stand-by)



Total containment in the TNO “High Tox lab”

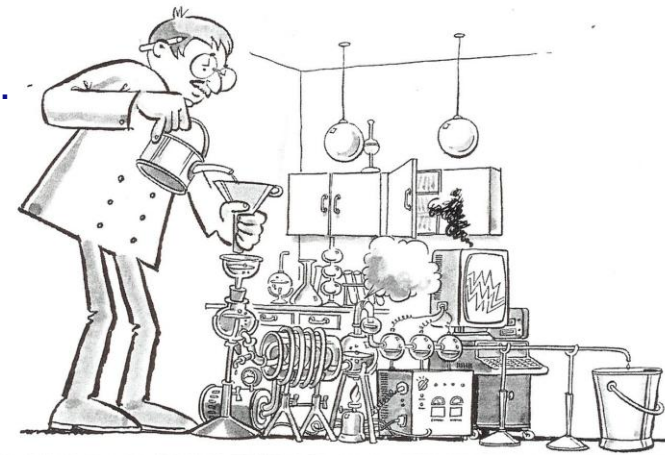


TNO participates in OPCW Analytical skills courses

Training by TNO specialists in co-operation with the Technical University Delft

Aims

- to enhance national capacities in the Member States by offering training in analytical chemistry to personnel from the industry, academic institutions, and government laboratories.
- to facilitate analysis of chemicals related to the national implementation of the Convention;
- to broaden the pool of manpower from which National Authorities and the Secretariat can draw in the future;
- to facilitate the adoption of good laboratory practices.



TNO provided Laboratory Assistance in Uganda and Vietnam

Provided under an OPCW Project on Laboratory Assistance. The hardware, a GC-MS, was funded by the **European Union*** and the personnel costs were funded by the **Netherlands Ministry of Foreign Affairs**.

Aim: Improving the technical competence of laboratories in developing countries and in countries with economies in transition.

Assistance consisted of two weeks **on-site** training of technical personnel in analytical procedures and on a GC-MS system, with special attention to the analysis of **chemicals related to the CWC**.

* As part of European Union (EU) Joint Action on support for the OPCW's activities in the framework of the EU Strategy against Proliferation of Weapons of Mass Destruction

TNO Response team on standby

- TNO supports the Netherlands government (Ministry of Interior) by maintaining a permanent identification team to respond to possible C-terrorism
- TNO ID-teams are **ready** and **on standby** since 2002
- Team is **available on call** during 24 hours a day throughout the whole year
- **Five teams** are available with a one week duty every 5 weeks
- Expertise to do this is obtained through a long lasting support by the Netherlands Ministry of Defence in the project 'Sampling and identification of B/C-agents'



