The Role of Designated Laboratories

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Operational requirements for an OPCW Designated Laboratory

- An OPCW Designated Laboratory must be able to...
  - receive potentially toxic samples
  - receive samples with short notice
  - make qualitative analysis of chemical weapons related chemicals
  - complete the analysis within the set time limits
  - fulfil the reporting criteria set by the OPCW
Criteria for Designation

- Laboratories should…  
  • have an internationally recognised quality assurance system  
  • have obtained accreditation by an internationally recognised accreditation body for tasks for which they are seeking designation  
  • regularly participate and perform successfully in inter-laboratory proficiency tests

- Laboratories must…  
  • have participated in at least three out of the last five proficiency tests  
  • have performed successfully in their last three consecutive proficiency tests

[ref. C-I/DEC.61, 1997]
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The OPCW has designated world-wide:

- **16** laboratories for the analysis of CWC-related samples in environmental samples: China (2), France, Germany, India, Iran, Netherlands, Republic of Korea, Russian Federation (2), Singapore, Sweden, Switzerland, United Kingdom, United States (2)

- **16** laboratories for the analysis of CWC-related samples in biomedical samples: Australia, China (2), Finland, France, Germany, India, Iran, Netherlands, Republic of Korea, Russian Federation (2), Singapore, Sweden, United Kingdom, United States

- Director General nominates the designated laboratories and selects the designated laboratories for analysis of on-site samples
Sampling and Analysis: Imaginary Real Sample

Step 1
Inspectors to Country X

Step 2
On-Site Analysis

Step 3
Recoding and distribution

Step 4
Analysis and reporting

OPCW Laboratory
The Netherlands

Designated Laboratory 1:
E.g. VERIFIN Finland

Designated Laboratory 2:
E.g. Spiez Laboratory, Switzerland

Persons

Samples

Report
Samples

- Different matrices
  - water, soil, air, etc.
  - pieces of ammunitions, concrete, paint, rubber, etc.
  - solvents, decontamination solution, waste, etc.
  - wipe, filters, etc.
  - pure chemicals

- Typical environmental sample
  - 50 g soil or 50 ml water (50 000 000 µg)

- Biomedical samples
  - Urine, Plasma, Hair, Tissue
The banned chemicals are listed in Schedules 1-3

- A. Toxic chemicals
- B. Starting materials

The spectrum of toxic chemicals is wide
- From small (e.g. phosgene) to large (e.g. ricin) chemicals
- Nerve agents, mustards, blood agents, incapacitating agents, toxins
- Variety of chemical and physical properties
  - neutral chemicals, acids, bases, volatiles and non-volatiles
"Toxic Chemical" means:

- Any chemical which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals. This includes all such chemicals, regardless of their origin or of their method of production, and regardless of whether they are produced in facilities, in munitions or elsewhere.

- General Purpose Criteria
Sampling and distribution of samples

- Representatives of Inspected State Party or OPCW inspectors take the samples
- Samples are analyzed in the OPCW mobile laboratory, but can be sent to the OPCW Laboratory for recoding and distribution to designated laboratories
- Confidentiality issues and chain-of custody highlighted
Actions before receiving the samples

- Request from the OPCW laboratory to the designated laboratory
  - Biomedical or environmental samples collected
  - Ability of laboratory to receive environmental or biomedical samples taken by the inspection team
- Reply requested in 24 hours
- Preparation of laboratory for arrival of samples
When the designated laboratory of the OPCW might get samples?

- Routine inspection
  - Verification of declared chemicals
  - Search for non-declared Scheduled chemicals

- Challenge inspection
  - Search for non-declared Scheduled chemicals

- Allocation of Alleged use
  - Search for Scheduled chemicals or Riot Control Agents (in war)
  - e.g. samples from Syria
    - after UN Secretary General Ban Ki-moon request for the OPCW for technical assistance
  - Safe access to country
  - Chain-of-Custody
Mr Dominique Anelli, former head of the OPCW Demilitarisation branch

Working together for a world free of chemical weapons
RECOMMENDED OPERATING PROCEDURES FOR ANALYSIS IN THE VERIFICATION OF CHEMICAL DISARMAMENT

2011 Edition
Blue Book 2011 edition
http://www.helsinki.fi/verifin/VERIFIN/english

• “Recommended Operating Procedures for Analysis in the Verification of Chemical Disarmament”
  • Editor: Paula Vanninen
  • 48 authors/reviewers
  • 14 laboratories
  • 12 countries + OPCW laboratory
  • AMMSLTA; China, Danish Emergency Management Agency, Denmark; Dstl, UK; DGA CBRN Defense, France; DSO, Singapore, CBC, USA; FOI, Sweden; LAVEMA, Spain; OPCW; FFI, Norway; Teal Consulting, USA; Vertox, India; Spiez Laboratory, Switzerland; VERIFIN, Finland
Identification: OPCW rule for unambiguous identification: chemical identified by two, if possible spectrometric, methods

- Identification by
  - Comparison with spectrum of authentic chemical
    - Microsynthesis may be required
  - Comparison with library spectrum
    - NIST library
    - OPCW Official Central Analytical Database (OCAD):
      - AMDIS library: e.g. own library, NIST library
  - Spectral interpretation
  - OPCW identification criteria
    - Internationally accepted
    - Retention time/index window
    - Spectrum match: expert’s evaluation, match factor
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Results already in 1-24 hours after arrival of samples

Samples from the OPCW: 14 calendar days for reporting
Challenges in analysis of CWC related chemicals

- "Grey area" incapacitating agents - "slippery road"
  - Law enforcement: hostages in Moscow theatre
  - Chemicals effecting Central Nervous System
- Trace analysis
  - Environmental samples in allocations of use
  - Biomedical samples
    - Sample amount limited
  - New identification criteria analyzed by the SAB and put into practice by the TS
    - Tested in the PTs
Role of the designated laboratories in the SAB’s work

- Experts from the designated laboratories participate actively in the SAB’s work
  - as nominated SAB members
  - as nominated members to the temporary working groups of SAB
    - Sampling & analysis
    - Verification
    - Outreach and education
- Expertise on verification analysis, toxic chemicals, synthesis, decontamination, on-site analysis etc..
- Knowhow on the CWC
- Knowhow on threats to the CWC like CNS acting chemicals