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**ANALYSIS OF ORGANOPHOSPHORUS WARFARE  
AGENTS IN ATMOSPHERIC AIR**

**Project Manager  
Igor' E Pil'dus  
Head of Department of Chemistry**

**Volgograd**

**Research Institute of  
Hygiene, Toxicology and  
Occupational Pathology  
(RIHTOP)**

**Volgograd**



# RESEARCH OBJECTIVE

To address the issue of quantifying  
low (safe) concentrations of  
organophosphorus toxic agents in  
atmospheric air.

# Safe Reference Levels of Exposure (SRLE) in atmospheric air

Sarin –  $2 \times 10^{-7}$  mg/m<sup>3</sup>

Soman –  $1 \times 10^{-7}$  mg/m<sup>3</sup>

VX –  $5 \times 10^{-8}$  mg/m<sup>3</sup>

# **STAGES OF THE WORK**

## **1. Purchase, assembling and mastering of the analytical facilities required for the task:**

- Chromatography-mass-spectrometry system Agilent 6890/5973N combined with flame photometric detector;**
- Thermal Desorption system UNITY of Markes International Limited;**
  - \_ Chromatograph 6890N combined with thermoionic and flame photometric detectors.**

# STAGES OF WORK CONTINUED

- 2. Development of conditions for production of sarin, soman and Vx derivatives.**
- 3. Development and evaluation of methods to prepare standard air-vapor mixtures of substances under study (and/or their derivatives).**

# **STAGES OF WORK CONTINUED**

## **4. Development of analytical procedures:**

- **sample preparation;**
- **sampling methods/conditions;**
- **optimal thermal desorption conditions;**
- **optimal conditions of gas chromatography analysis;**
- **evaluation of the effects of meteorological conditions and potential interfering admixtures.**

# ANTICIPATED RESULTS

Analytical measurement of organophosphorus warfare agents in atmospheric air at the levels:

- sarin -  $2 \times 10^{-7}$  mg/m<sup>3</sup>

- soman -  $1 \times 10^{-7}$  mg/m<sup>3</sup>

- VX -  $5 \times 10^{-8}$  mg/m<sup>3</sup>

# TECHNICAL APPROACHES AND METHODOLOGY

**Resolution of detection difficulties related to the lability and high adsorption activity of organophosphorus toxic agents :**

- ◆ When possible, use of gas chromatography on stable derivatives of these compounds.
- ◆ Direct detection of these toxic agents by a variety of modern techniques, such as, thermal desorption systems that are equipped with inert analytical units

# ACHIEVED RESULTS

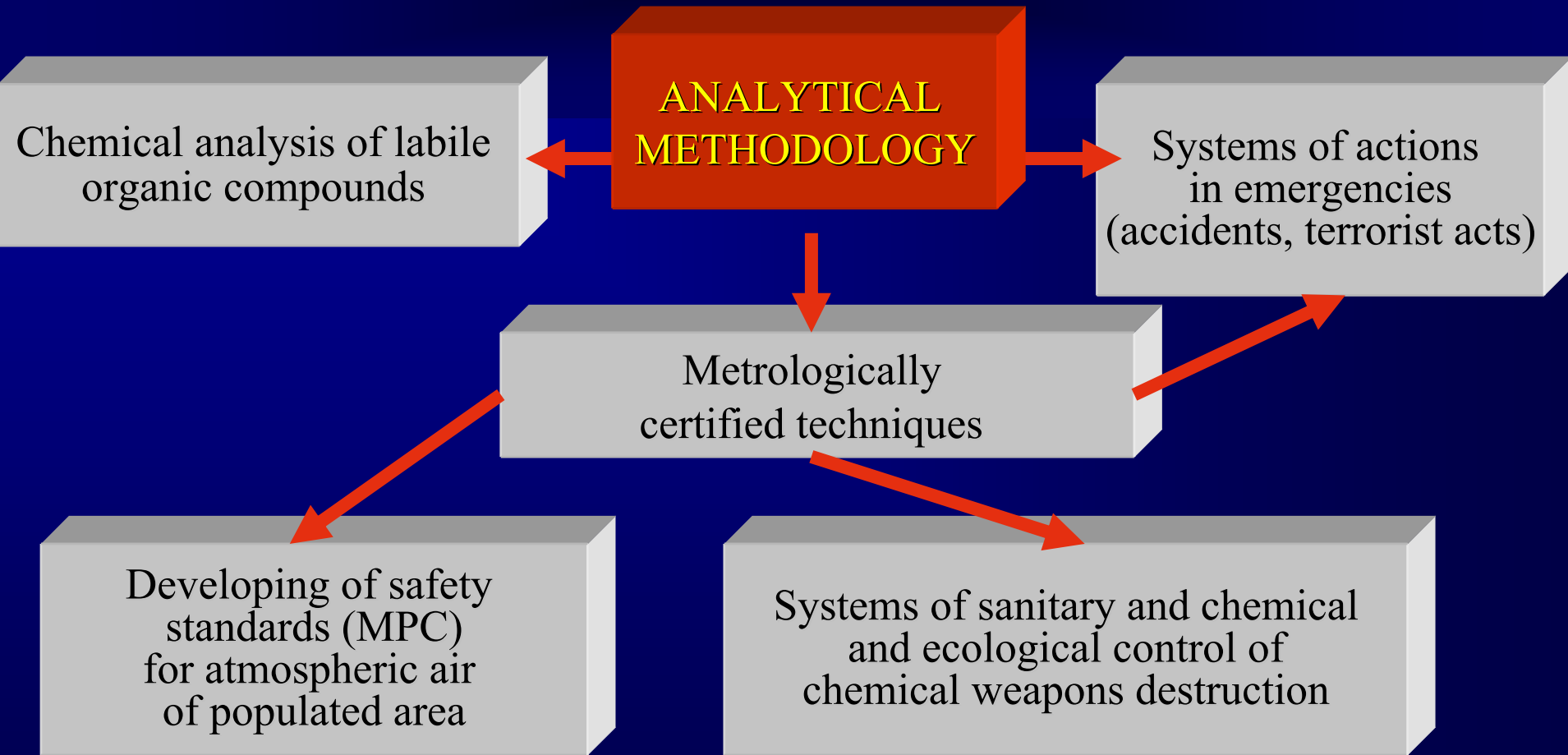
## RIHTOP

- sarin  $1 \times 10^{-5} \text{ mg/m}^3$
- soman  $5 \times 10^{-6} \text{ mg/m}^3$
- VX  $1 \times 10^{-5} \text{ mg/m}^3$

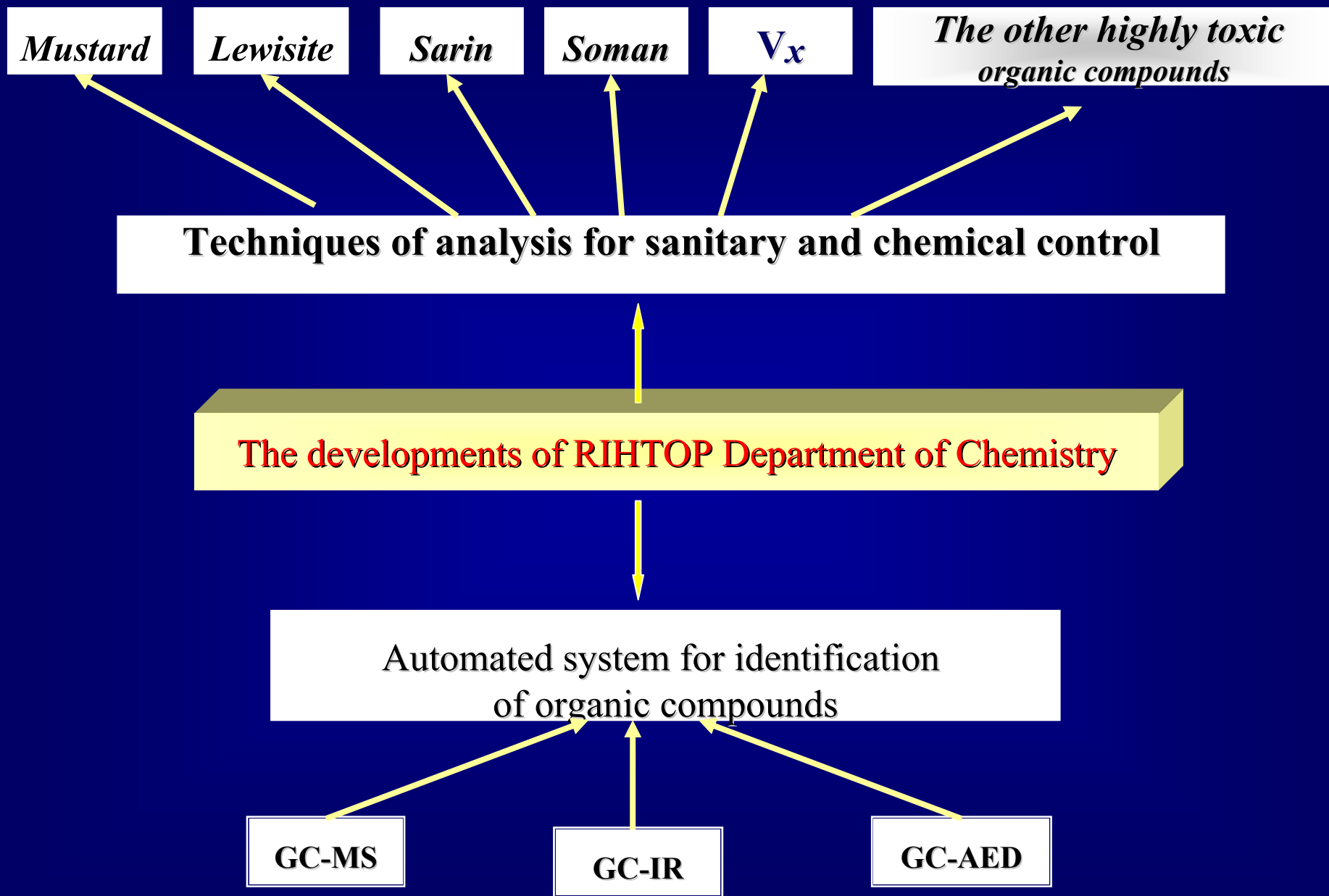
## Literature Data

- $6 \times 10^{-5} \text{ mg/m}^3$
- $5 \times 10^{-7} \text{ mg/m}^3$

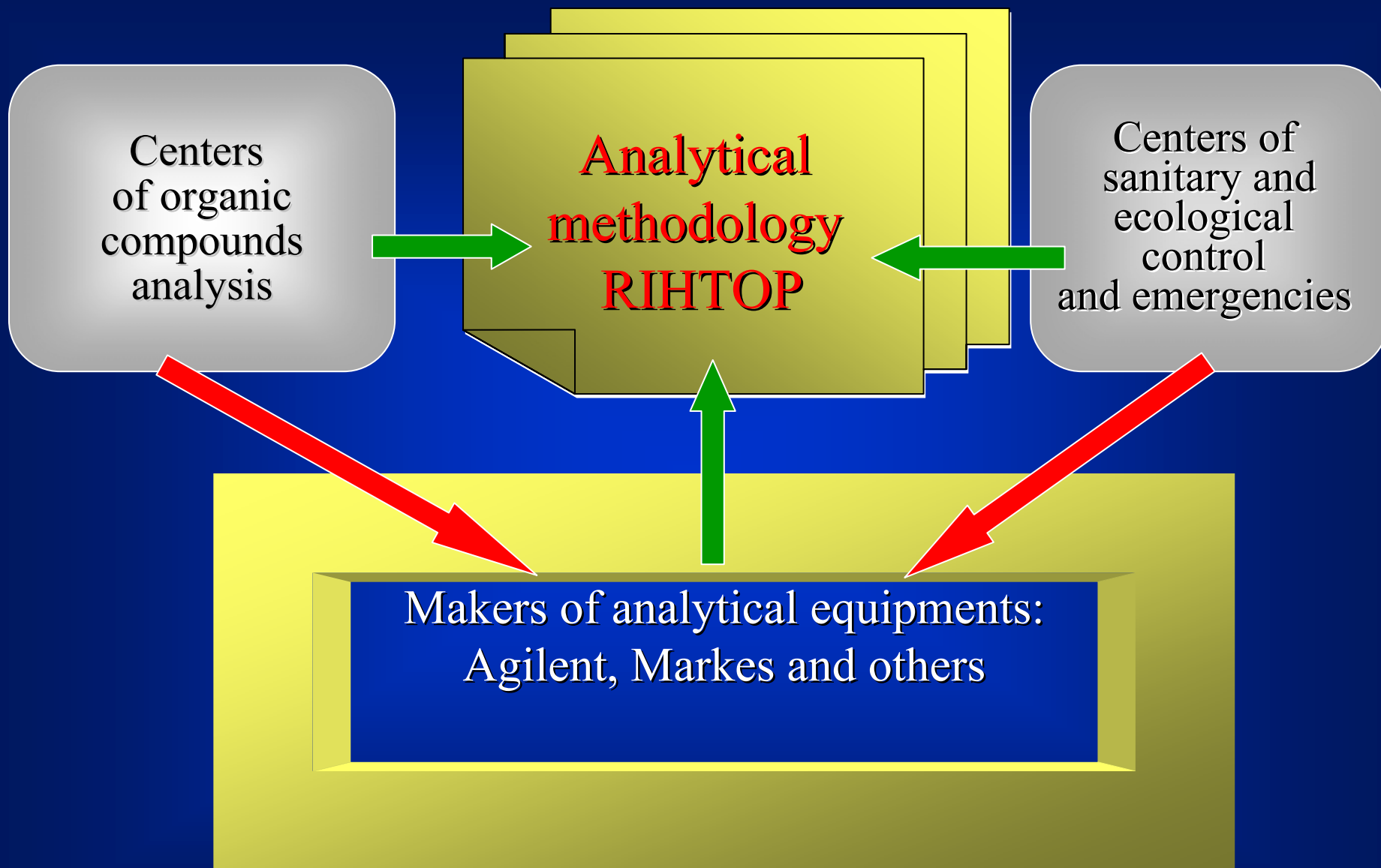
# APPLICATION OF THE RESULTS



# PREREQUISITES OF THE PROJECT IMPLEMENTATION



# COMMERCIAL PARTNERSHIP



# CONTACT INFORMATION

Igor' E PIL'DUS

*Head of Department of Chemistry*

Research Institute of Hygiene,  
Toxicology and Occupational Pathology (RIHTOP),  
Volgograd

**Telephone:** (8442)-39-73-36; 39-11-40

**Fax:** (8442)-39-25-77

**E-mail:** [pildus@rihtop.ru](mailto:pildus@rihtop.ru)

