

Main Directions of Ecological Developments of Research Institute of Hygiene, Toxicology and Occupational Pathology (RIHTOP): Experience and Prospects

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The main focus of RIHTOP attention is industrial personnel and population exposed to the impact of chemical weapons storage and destruction facilities under their normal operation and emergencies. Monitoring is intended not only for determining the degree of industrial facility impact on human body, but also for exposure management. The latter is necessary for making decisions related to correction of ecological situation.

Development pressure management is conducted on the base of dynamic model. This model takes into account the connection between values of environmental quality and data on the condition of human body adaptive systems. For designing of such model, it is necessary to solve the following tasks along with organization of ecological monitoring on priority pollutants in certain region:

1. To substantiate toxicological safety standards of particularly hazardous substances:
 - For the air and surfaces of equipment and building structures of industrial zone;
 - For atmospheric air of residential areas;
 - For water of water reservoirs;
 - For soil of residential areas.
 - Emergency limits of exposure and acute exposure guideline levels (AEGL).
2. To develop methods of chemical substances analysis at guideline safety levels.
3. To develop and conduct works on health risk assessment and management with respect to industrial personnel and population:
 - from exposure to stationary sources of atmospheric air chemical pollution;
 - from using of pesticides in crop production.
4. To develop and organize health monitoring of industrial personnel and population living in the zone of impact of possible releases from chemical facilities:
 - organization of collection and processing of monitoring data on condition of industrial zone and environment;
 - organization of collection and processing of the data on medical surveillance of industrial personnel and population health condition;
 - development, creation and maintenance of health registries.

All mentioned tasks were being successfully solved and are solving now within the framework of both Russian state programs and international projects.

RIHTOP is one of main developers of medical and ecological supporting activities for the works conducted in accordance with Russian program on chemical weapons destruction. In particular, almost all Russian safety standards for chemical weapons which

are to be destructed (table 1) and appropriate techniques of chemical analysis were developed by RIHTOP personnel.

Table 1

Russian Safety Standards for Poisoning Substances

Name of the substance Type of the standard, units of measure	Sarin	Soman	Vx	Lewisite	Mustard
MPC in the air of working zone, mg/m ³	2x10 ⁻⁵	1x10 ⁻⁵	5x10 ⁻⁶	2x10 ⁻⁴	2x10 ⁻⁴
MPC in the water of water reservoirs, mg/l	5x10 ⁻⁵	5x10 ⁻⁶	2x10 ⁻⁶	5x10 ⁻⁴	5x10 ⁻⁴
SRLI in atmospheric air, mg/m ³	2x10 ⁻⁷	1x10 ⁻⁷	5x10 ⁻⁸	4x10 ⁻⁶	2x10 ⁻⁶
MPC in soil, mg/kg	2x10 ⁻⁴	lack	lack	1x10 ⁻¹	5x10 ⁻²
MPL on surface of equipment, mg/dm ²	1x10 ⁻⁵	1x10 ⁻⁶	2x10 ⁻⁶	3x10 ⁻³	7x10 ⁻⁵

Significant amount of research works conducted at RIHTOP are related to the development of organizational questions of medical support and ecological monitoring with reference to blistering agents destruction facilities.

Specific developments in the field of information technologies take particular place among Institute scientific activities (expert systems for syndromal diagnostic, health risk assessment, registers and data bases).

RIHTOP workers implemented the following scientific developments within the framework of international projects (table 2):

Table 2

The Projects Which were Conducted at RIHTOP

Project Number at ISTC	The Project Title	Collaborator
2345	Programs of recognition of organophosphorus chemical substances under acute poisonings.	Lawrence Livermore National Laboratory, USA, "Atlantic Logistics, Inc."
2733	Development of acute exposure guideline levels of hazardous chemical substances.	USA Environmental Protection Agency
Numberless	Population health risk assessment from exposure to harmful emissions of stationary enterprises.	USA Harvard University

3 program applications of RIHTOP are under consideration at ISTC (table 3):

Table 3

RIHTOP Projects Which are Under Consideration at ISTC

Project Number at ISTC	The Project Title	Collaborator
3320	Development of analytic methodology for quantitative determining of organophosphorus poisoning substances in atmospheric air	Aberdeen Proving Ground, USA
3316	Decontamination of surfaces after terrorist attacks: development of safety standards.	Environment Canada, Canada
3328	Investigation of molecular forms of human blood choline esterase as biomarkers of exposure to organophosphorus substances.	There is no collaborator

The project on vivarium renovation are under consideration in Civilian Research and Development Foundation (CRDF). The project is designed for working with laboratory animals in accordance with GLP requirements. Availability of vivarium complying with international regulations will enable RIHTOP to expand the range of its services significantly and conduct scientific researches not only in chemistry and toxicology, but also in the field of pharmaceutical industry.

At present the following themes are prepared for submitting at ISTC or CRDF or are under discussing with potential collaborators:

- Medical response system under chemical emergencies.
- Investigation of sarin, soman and mustard stability in chlorinated drink water.
- Computational toxicology: a unified modeling procedure: from exposure to disease endpoints.