

Present State of the French-German Initiative : radioecological data base.

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ABSTRACT

During the IAEA Conference of Vienna in 1996, ten years after Chernobyl Accident, the French and German Ministers of Environment jointly announced their co-operation initiative with the Ukraine, Belarus and Russia over scientific projects concerning the aftermath of the Chernobyl disaster

According to that decision, in July 1997, a general Agreement was signed between IPSN, GRS and the Chernobyl Centre, describing the topics of co-operation and defining three projects:

Project n°1: Safety of the Sarcophagus

Project n°2: Radioecological impact of the accident

Project n°3: Health effects of the accident on the populations

These actions are envisaged for three years

In the frame of the Initiative, for the Radioecology Project IPSN and GRS have chosen different topics, in the field of environmental studies, including those on wastes. All the studies are tripartite, the three concerned countries, Ukraine, Russia and Belarus are contributing to the final results.

The purpose of the different programs is almost to build databases, general and specific according to the subprojects, and for some of them to compare the real transfer of radionuclides with model assessments.

General studies

An Ecological Portrait of the contaminated zones shall be done in the frame of the Subproject 0. This action is to gather in a database all common ecological information, which could be useful for at least two of the other subprojects hereafter, described.

The georeferenced map of the initial contamination shall be drawn in the Subproject 1

Wastes studies

The subproject 2 have for main topic to collect and organize in a specific data base the information on wastes and disposal, in order to built a tool for the strategic management of the wastes in Ukraine, Russia and Belarus.

Transfers studies

The subproject 3 have been organized in four subprojects, about transfers from soil to plant (SP3a), from plants to animals (SP3b), transfers by "run-off" (SP3c) and transfers in the aquatic environment (SP3d).

The transfer and its modelling in the urban environment is the topic of Subproject 4

Countermeasures studies

The efficiency, cost and reliability of the different countermeasures in the natural and agricultural environment are studies in the Subproject 5

The nine specific agreements were signed in December 1998, and the work started in March 1999.

The presentation shows, first the structure of the whole project and the later uses of the expected results, then the results of the first months of work in the different topics, especially the thoughts about the structure of the databases and the links between the different part of the Radioecology project.

FRAME OF THE PROJECT

During the IAEA Conference of Vienna in 1996, ten years after Chernobyl Accident, the French and German Ministers of Environment jointly announced their co-operation initiative with the Ukraine, Belarus and Russia over scientific projects concerning the aftermath of the Chernobyl disaster.

According to that decision, in July 1997, a general Agreement was signed between IPSN, GRS and the Chernobyl Centre, describing the topics of co-operation and defining three projects, among them the Project n°2 has for purpose to study the radioecological impact of the accident.

These actions envisaged for three years.

In the frame of this Initiative, for the Radioecology Project IPSN and GRS have chosen different topics, in the field of environmental studies, including those on wastes. All the studies are tripartite, the three concerned countries, Ukraine, Russia and Belarus are contributing to the final results.

CONTENT AND STRUCTURE OF THE PROJECT

The purpose of the different programs is almost to build databases, general and specific according to the subprojects, and, for some of them, to compare the real transfer of radionuclides with model assessments. The general scheme of the project is shown on the figure next page.

General studies

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The georeferenced map of the initial contamination shall be drawn in the Subproject 1.

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The transfer and its modelling in the urban environment are one of the topics of Subproject 4.

Countermeasures studies

The efficiency, cost and reliability of the different countermeasures in the urban environment are studied in and Subproject 4, in the natural and agricultural environment in Subproject 5.

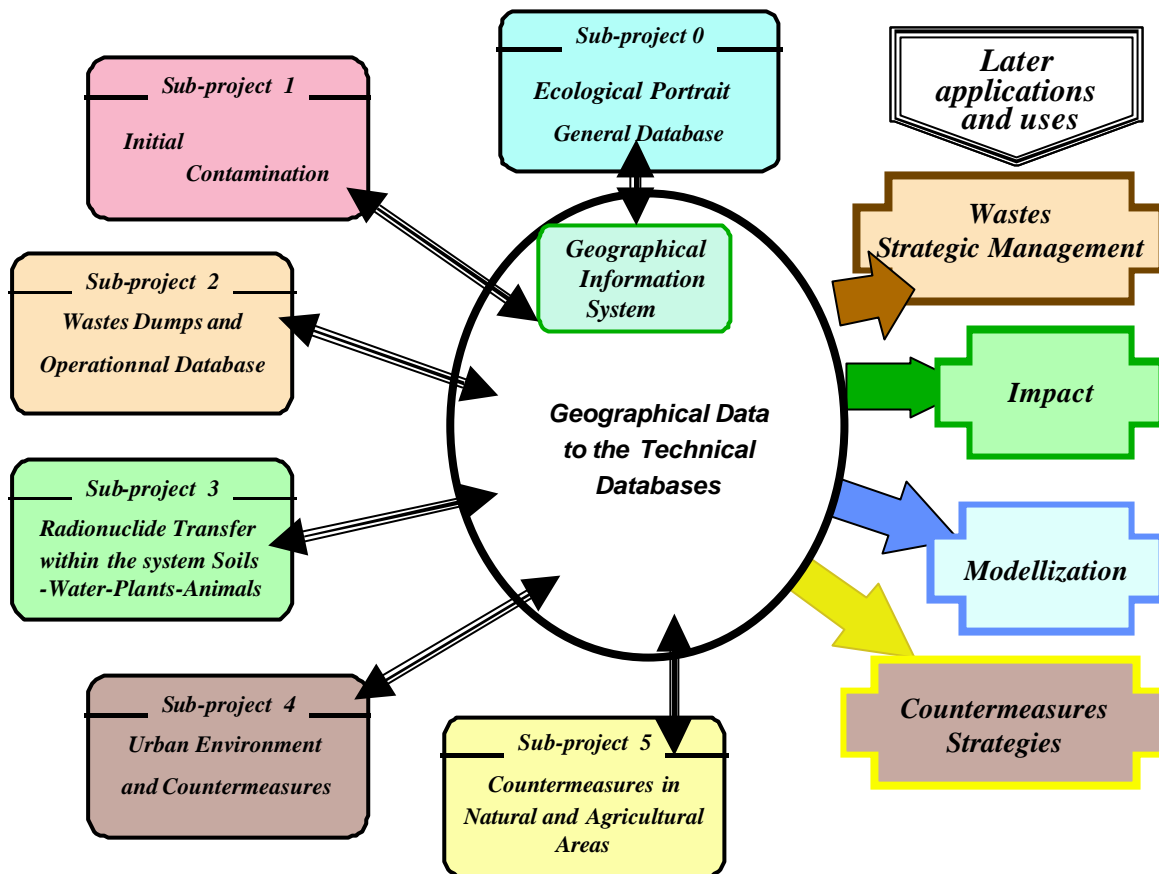


Figure 1: General scheme of the Radioecology Project

PROGRESS OF THE PROJECT

Starting work.

The first discussions between IPSN/GRS and the eastern Institutes began in December 1997 during a workshop in Kiev where the basic content of the nine subprojects and the financial aspects were treated. The position of IPSN and GRS was that, according to independence of the contamination areas in respect to the national boundaries, each of the subprojects should associate at least one Institute or Organisation of each of the three countries, Ukraine, Belarus and Russia.

The Institutes, which should be retained for the works, chose then a Project Manager and national Co-ordinators were named for each of the nine subprojects.

The final decisions about programs, repartition of the tasks and financing by IPSN/GRS needed two plenary meetings of the Project Review Group (April and November 1998) with the participants.

The nine specific agreements were signed in Kiev after the second PRG meeting in November 1998 and, because of some troubles in the advance payment, the work started in March 1999.

Each subproject has an expected duration of three years, divided in six periods of six months.

Results of the first working period

The below presentation shows the results of the first months of work in the different topics, especially the thoughts about the structure of the databases and the links between the different part of the Radioecology project.

General studies

Ecological Portrait (Subproject 0)

The purpose of the SP0 is collecting, securing and validating all ecological data of environmental parameters of the contaminated regions which could be useful for the other Subproject of the Project n°2, but also, if needed, for the project n°3 "health effects". These data should be organised in a general georeferenced database, related to particular databases resulting from the other Subprojects 1, 2, 3 (a to d), 4 and 5.

This Subproject is mainly performed by

- Ukrainian Ministry of Emergency Situations and Intelligence Systems Geo Ltd for Ukraine (SP Manager Leonid Tabachny)
- IBRAE for Russia
- State Committee for Hydrometeorology for Belarus

The present progress for the first six months period led to define:

- the principal themes to be included in the database:
 - ❖ Hydrography, Meteorology, Topography, Vegetation, Land use, Pedology,
 - ❖ Non-agricultural lands, Transportation, Borders...
- the requirements for the subproject,
- the conceptual database design and unification between the three countries.

These last two points are to be clarified and agreed by the SP Managers of the other Subprojects

The second step shall lead to:

- ❖ Analysis of Working reports for Period 1 for all the other Subprojects,
- ❖ Correction according to the analysis to the databases structures of the prototype,
- ❖ Development of recommendations for the other SP
- ❖ Developing Database prototype
- ❖ Co-ordination with SP2 database prototype

Initial contamination (Subproject 1)

The general objective for this Subproject is collecting, analysing and verification of data of initial contamination and its changes occurred during the post accident period.

The principal participants are:

- IBRAE for Russia (SP manager Igor Linge)
- Intelligence Systems Geo Ltd for Ukraine
- State Committee for Hydrometeorology for Belarus

After six months working, the results are:

- Collection and classification of data release,
- Collection and classification of data on the contamination of the territories,
- Meteorological conditions during the accident.

During the second step, the work to be performed is:

- ❖ Development of the structure of the databases (contamination, meteorology) and its agreement with the GIS system,
- ❖ Processing of the contamination and meteorological data,
- ❖ Creation of the databases and filling,
- ❖ Preparing the common databases including GIS,
- ❖ Analyses and compilation of recommended data of releases

Wastes dumps and wastes strategic management (Subproject 2)

Aim of this Subproject is a strategic decision's development and concrete actions on treatment with radioactive wastes due to the Chernobyl disaster.

There are two parts in the work:

- **2a:** creating a database of repositories and wastes, preliminary choice of strategies, actions and technologies of treatment
- **2b:** choice of the best strategic decisions taking into account impact of the Radioactive Waste (RAW) and costs of strategies

Working on this SP, the following organisms:

- SSCER for Ukraine (Pr Emlen Sobotovitch, SP Manager)
- IBRAE for Russia
- Belarus State University for Belarus

The main results obtained during the first period are:

- Acquisition of data on storages and radioactive wastes
- Preliminary analysis of the collected information :
 - ❖ Storage categorisation,
 - ❖ Sufficiency, validity and quantity,
 - ❖ Collection of additional information,
 - ❖ Development of common principle for the categorisation.

The next step shall be devoted to development of the united RAW and storage categorisation and database creation:

- ◇ Development to united categorisation and selecting a typical storage including different categories,
- ◇ Modification of the RAW and storage identifier
- ◇ Development of the database structure

Transfers studies

In this category are grouped four subprojects on different parts of radioecology.

Soils-to-Plants transfers (Subproject 3a)

The subproject aim is

- systematisation, analysis, unification and summarising of the information on spatial and temporal variability of $^{134,137}\text{Cs}$ and ^{90}Sr soil-plant transfer in the contaminated areas,
- presentation of transfer factors as databases with site-specific parameters,
- verification of the forecast of the dynamic contamination of plants in agricultural, semi-natural and natural environments using systematic experimental data.

The main participants are:

- UIAR for Ukraine (Pr Boris Prister SP manager)
- RIARAE for Russia,
- BSU for Belarus

During the first stage the following results were obtained:

- pedological and climatological characterisation of the surveyed zone
- comparison of soil classifications in CIS with FAO/UNESCO classification,
- local and conventional agricultural practices,
- description of method used for determining parameters and measuring radionuclides.

The next step shall be:

- ◇ analysis of transfer models (soils and soil-plant), choice of parameters,
- ◇ identification of site-specific parameters, to be incorporated in database,
- ◇ development of protocol for documenting transfer factors,
- ◇ compilation and generalisation of existing data on $^{134,137}\text{Cs}$ and ^{90}Sr transfers factors and of relevant data sets of parameters related to transfer factors
- ◇ creating and filing a database on soil-plant transfers

Plants-to-Animals transfers (Subproject 3b)

The subproject is aimed at creating a database on ^{137}Cs and ^{90}Sr transfer factors for fodder and edible parts of products of livestock and game to enable assessments of animal contamination.

The main participants are:

- RIARAE for Russia, (Pr Rudolf Alexakhin SP Manager)
- UIAR for Ukraine
- BSU for Belarus

The first period led to the following results:

- Collection and processing of the information on natural and radiological characteristics of the Polesye, Gomel, Kaluga and Bryansk regions
- General characteristics of forests and radioecological conditions
- Database on the radiological and natural characteristics of contaminated areas in different regions of Russia, Belarus and Ukraine.

During the second six-month period, the following goals are to be reached:

- ◇ Creating of database on transfer of ^{137}Cs to the animal feed.
- ◇ Development of requirements to the database structure and its co-ordination with the other executors

- ✧ Database filling for the Jizdrinskiy district of the Kaluga region and for the Khoynikiy district of the Gomel region and different regions of the Ukraine.
- ✧ Database filling for the Ulyanovskiy district of the Kaluga region and for the Braginskiy district of the Gomel region and different regions of the Ukraine.

«Run-off» in natural and agricultural Environment (Subproject 3c)

This subproject has for purpose to clarify the state of the art about the radionuclides transfers in natural and agricultural environments through run-off and water erosion and to propose an assessment model for these transfers.

The participants are:

- SPA Typhoon for Russia (Dr Alexei Konoplev, SP Manager),
- Ukrainian Hydrometeorological Institute (UHMI) for Ukraine,
- State Committee for Hydrometeorology (SCMH) for Belarus.

The present progress of the SP after six months is:

- state-of-the-art review of processes determining transport of radionuclides on catchment
- state of the art review of parameterization methods of hydrophysical, radiochemical and hydrochemical processes determining transport of radionuclides on catchment
- study of existing run-off models, in particular those incorporated in RODOS

The next stage shall consist in:

- ✧ development of the list of the main data sources,
- ✧ elaboration of requirements related to the data base structure and their agreement,

Transfers in aquatic environment (Subproject 3d)

In this subproject, the aim is to use data from contaminated water bodies in CIS for validating TRANSAQUA model, developed previously in France by IPSN. Furthermore it shall permit to improve knowledge about influence of the main biotic and abiotic parameters on the levels and kinetics of accumulation and elimination of radionuclides by fishes and bioindicators.

Taking mainly part to the work:

- Ukrainian Hydrometeorological Institute (UHMI) for Ukraine (Oleg Voitsekovitch, SP manager),
- SPA Typhoon for Russia,
- Belarus State University (BSU) for Belarus

During the first six-month period, the term of reference has been a little changed according to the better knowledge of TRANSAQUA model by the participants. Consequently, the results of the first stage have been:

- radioecological description of the studied water bodies (Belarus, Ukraine and Russia)
- compatibility with TRANSAQUA model
- sources of information necessary for the Validation of the *TRANSAQUA* Model (proposals and discussion)

Following the first stage and according to the changes in term of reference, the expected results for the second period shall be:

- ✧ final agreement of the list of data series,
- ✧ preparation of data series on ¹³⁷Cs in the abiotic components for each selected water body,
- ✧ preparation of data series on ¹³⁷Cs accumulation in selected fishes,
- ✧ analysis and description of the limitations for applying TRANSAQUA model in the contaminated zones of CIS.

Transfers in urban environment (Subproject 4)

The aims of this subproject are to study and modelize the behaviour and transfer of radionuclides in the urban environments and also to analyse the efficiency of decontamination methods in urban areas.

Working on this SP, the following organisms:

- SSCER for Ukraine (Pr Emlen Sobotovitch, SP Manager)
- IBRAE for Russia
- Research Institute of Radiology for Belarus

The efforts in this subproject were first concentrated on:

- literature sources analysis,
- collection and systematisation of urban settlements principal characteristics and selection of typical settlements,
- accumulation of data and model simulation results available on radionuclides transfers in urban areas,
- analysis of applied countermeasures.

The second period shall be devoted to:

- ✧ Collection and verification of dosimetric measurement results,

- ✧ Collection of data on radionuclides retention by the surfaces of different types and soils.

Countermeasures studies

Urban Environment (Subproject 4)

See above

Agricultural and Natural Environments (Subproject 5)

The target of the subproject n°5 is to develop the classification of counter measures carried out in natural or agricultural ecosystems on the territories contaminated after the Chernobyl disaster

The actors in this subproject are:

- Belarussian Research Institute for Soil science and Agrochemistry (BRISSA) for Belarus (Pr lossif Bogdevith, SP Manager),
- RIARAE for Russia,
- UIAR for Ukraine

In the first part of the work, the following results were obtained:

- List of main information sources, including bibliography
- Description of the countermeasures
- Development of a classification of countermeasures and methodology for evaluating their efficiency

The following activities shall be carried out during the next period:

- ✧ Elaboration of requirements for the database structure
- ✧ Creating the database structure

CONCLUSIONS

This "Radioecology" project is now well running for building the different databases for various parts of the environment and pathways for transfer of radionuclides. Their builders and IPSN, GRS and Chornobyl Centre as administrator, after having been defined, constructed and filled, shall use the databases, in a very useful way.

On one other hand, using this database, strategies for optimising management of consequences of the accident, i.e. wastes and countermeasures, shall be developed in order to be applicable in CIS or to any accidental situations. Those works are long term tasks, but necessary to better the situation in the contaminated areas and prepare some tools if, in very lowest levels, other radioecological problems would to be solved.

Another positive aspect of the project is that, in each subproject, each of the three concerned countries has at least one working representative. The work to be done, associating both Ukrainian, Russian and Belarussian experts with the Chornobyl Centre and the French and German leaders is a good way, as all scientists know, to progress with the greatest efficiency. Harmonisation of methods and results should be very constructive for all of us in the future, so that the commons access at the results for all the participants in this project.

IPSN and GRS are very satisfied to bring, in their way, their contributions for solving some great problems the Chernobyl disaster created and to help their Eastern colleagues to overcome the consequences of this terrible accident.