IMPLEMENTATION OF AN AWARENESS TOOL TO POST-ACCIDENTAL ISSUES FOR LOCAL ACTORS

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ABSTRACT: *As part of their partnership agreement signed in 2003, the Institute for Radiological Protection and Nuclear Safety (IRSN) and ANCCLI (National Association of Local Liaison Committees) decided in late 2009 to launch an action for the preparedness of local stakeholders to post-accidental situations. This shared commitment has resulted in the establishment of a working group involving representatives of IRSN and the Standing Group "Territory and Nuclear Post-Accidental phase" of ANCCLI.*

The purpose of this group is to develop a learning tool and train local people about the post-accidental consequences of an accident affecting a French nuclear facility but also to prepare them for an accidental situation by identifying post-accidental issues of their territory.

The tool, called OPAL, provides map information on the medium-term consequences of generic accidents. The data can be exported and overlaid with local information layers via any geographic information system. These data will enable the different Local Liaison Committees to create maps with which they can illustrate the challenges of radiological post-accidental management in their own territories.

KEY WORDS: POST-ACCIDENT, LOCAL STAKEHOLDERS, TRAINING, WEB-MAPPING

I. Introduction

As part of their partnership agreement signed in 2003, the Institute for Radiological Protection and Nuclear Safety (IRSN) and ANCCLI (National Association of Local Liaison Committees) decided in late 2009 to launch an action to help local actors to prepare themselves for post-accidental situations. This shared commitment has resulted in the establishment of a working group involving representatives of the IRSN and the Standing Group "Territory and Nuclear Post-Accidental phase" of ANCCLI. The project is planned for a period of three years (2010-2012).

The purpose of this group is twofold:

- To develop an education tool for the training of local people about post-accidental consequences of an accident affecting a French nuclear facility but also to prepare them for an accidental situation by identifying post-accidental issues of their territory;
- To improve the IRSN knowledge of local issues linked to post-accident consequences, and to compile local information that characterizes environment close to nuclear site, depending on data availability.

II. OPAL - an awareness tool to post-accidental issues for local actors

Between 2010 and 2011, the purpose of the working group was to define the architecture of OPAL (awareness tool to post-accidental issues for local actors).

a. Scope

From this collaboration, OPAL was developed to provide map information on the medium-term consequences of generic accidents in terms of environment and food contamination and people exposure. This map information is obtained via several calculation tools addressing release of radionuclides, atmospheric dispersion, deposition, environment and food transfer and population exposure. The result is provided in the form of operational zoning where specific actions (population protection or environment rehabilitation) are required.

The data can be exported and overlaid with local information layers via any geographic information system (Figure 1). They will enable Local Liaison Committees to create maps allowing an illustration of the challenges of post-accidental management on their own territories.

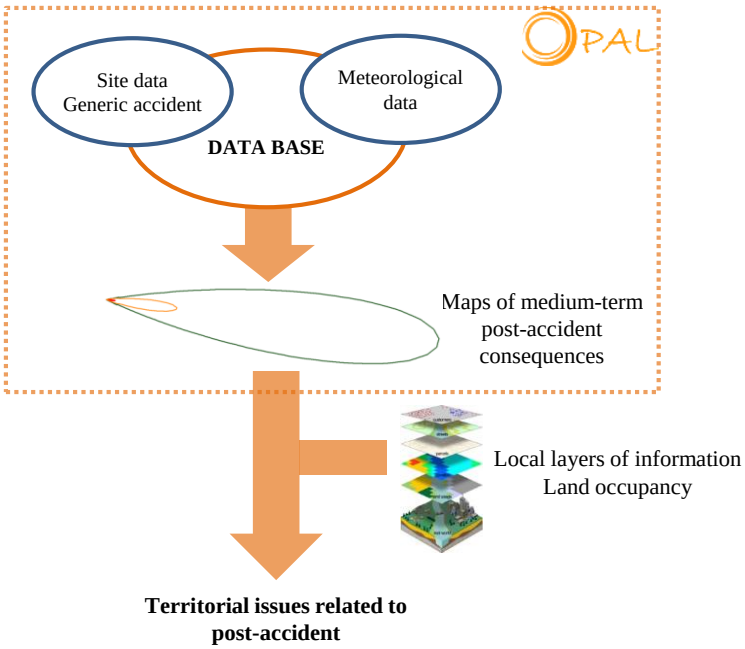

Figure 1 : simplified scheme of OPAL

It is important to note that the scope of OPAL is limited to post-accidental phase, which is considered to begin after the end of atmospheric releases and deposition of radioactive particles in the environment. Moreover, this tool was only developed for a training purpose and isn't relevant for expertise or crisis management purposes.
Finally, this tool is primarily designed to take into account only the middle-severity accidents scenarios. Nevertheless, OPAL was thought as a scalable tool which will be improved by experience feedback of future users.

b. Inputs

Several inputs parameters have been selected including types of nuclear sites, accident scenarios, season, wind speed and direction and atmospheric stability.

- Types of nuclear sites included in the tool are exclusively fixed civil installation, thus nuclear power plants, laboratories and nuclear fuel cycle installations. The defense related sites and radioactive materials transportation were not investigated at the development stage of tool. For each site, several scenarios are available with several levels of middle-severity.

- Two seasons are proposed (summer or winter) in order to cover periods when agricultural practices like grazing differs.

- Five weather conditions which cover the various types of climates in France could be chosen in terms of atmospheric stability, wind speed and rainfall. Wind direction could be adjusted between 0 and 360°. A wind rose was also wished to help user's choice for the wind speed and the direction.

c. Outputs

The outputs are based on the ones of the Steering Committee on Post-Accident Phase Management in the Event of a Nuclear Accident or Radiological Emergency Situation (CODIRPA) recommendations. OPAL provides a delimitation of three contaminated territories management zones [CODIRPA, 2010]:

- Relocation zone (PE): public exposure is too high, due to external irradiation from deposits or, possibly, unintentional ingestion of radionuclides or inhalation of contaminated particles, it would then become necessary to relocate part of the population.
- Public Protection Zone (ZPP): perimeter within which measures designed to reduce resident exposure is required. It is an area delineated to achieve a public radiation protection target with respect to those residing in the most contaminated territories. In a post-accident situation, the main source of public exposure will be via ingestion of contaminated foodstuff from local

origin. It is for this reason that the consumption or sale of foodstuff produced in the ZPP would be prohibited, regardless of their level of contamination.

- Territorial reinforced Surveillance Zone (ZST): zone encompassing all of the areas within which, as regards a specific agricultural yield, the European Community's Maximum Permissible Levels (MPL) – the regulatory acceptable levels regarding maximum contamination – may be exceeded. It is initially recommended to prohibit immediately all forms of sale and consumption of farm products within the respective areas where there is a risk that the MPL being exceeded, based on the most restrictive radionuclide and the most radioactive deposition sensitive foodstuff. Subsequently, as soon as the testing systems and an approved sampling strategy for each segment of farm production have been instituted, the commercialization of those products meeting the MPL values may be authorized.

These outputs, called "post-accident layers", are available in a GIS-ready format and are defined for several products (leafy vegetables, meats, milk…) and periods (24 hours/7 days/1 month/1 year) after the end of the release. They were calculated with existing tools used in IRSN Technical Crisis Center and stored in a data base.

For each scenario (one site, one accident, one season and one weather condition), at most 38 post-accident layers are available; depending on the gravity of the accident and the kind of radionuclides released. The database contains about 30.000 post-accident layers by considering the whole of generic accidents, seasons and weather conditions.

d. Architecture of the tool

OPAL is a web-mapping tool which provides an easy access to post-accident consequences of a generic accident. In order to access to the OPAL interface, an ID and a password are needed.

The work interface is divided into three modules (Figure 2):

1. OPAL-selection: selection of generic accident scenario and meteorological data,
2. OPAL-mapping: visualization of a part of information layers of post-accident consequences. This mapping will illustrate the effects of rain, wind speed and atmospheric stability on post-accidental consequence thanks to the access of five meteorological conditions and check the wind direction.
3. OPAL-export: zip-file export of all information layers provided by OPAL for the chosen scenario.

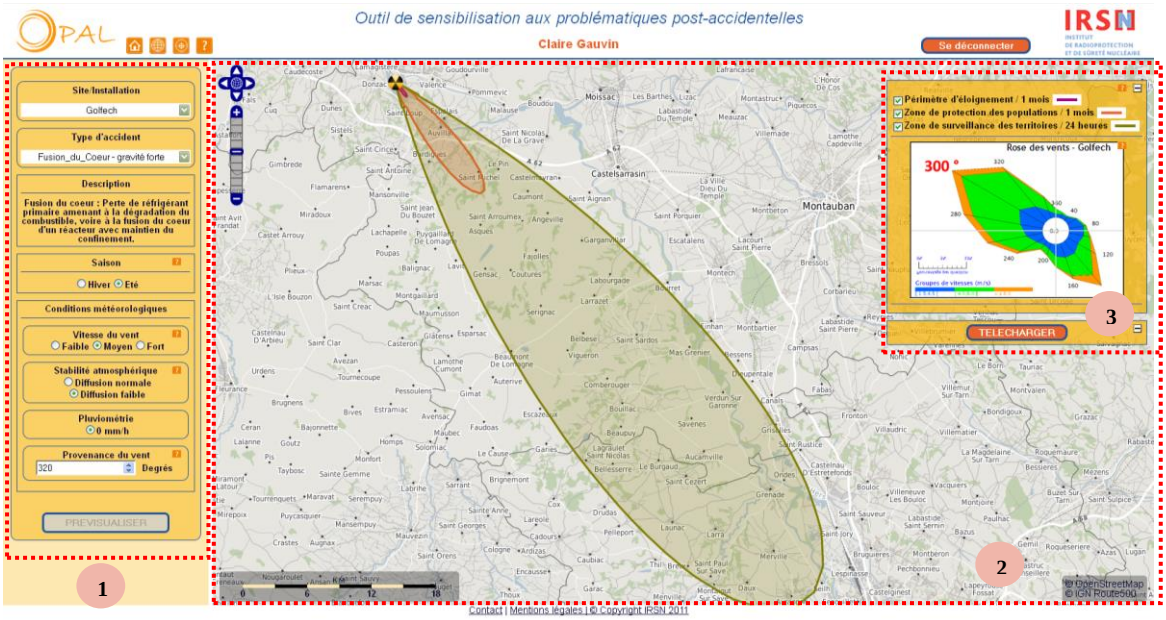

Figure 2 : Interface

III. Conclusion and Perspectives – implementation on pilot areas around nuclear facilities

The development of OPAL was the first stage in the awareness-raising process of local actors. The second phase consists now in implementing OPAL on pilot areas around nuclear facilities before a gradual extension in 2013 to all the sites identified by the working group.

The purpose of this implementation is twofold. First of all, local actors will be able to test OPAL with the support of experts of IRSN. Then, the overlaid of post-accident layers with local information layers via any geographic information system (Figure 3) will enable ANCLII to create maps which allowing them to identify and illustrate the challenges of post-accidental management in territories.

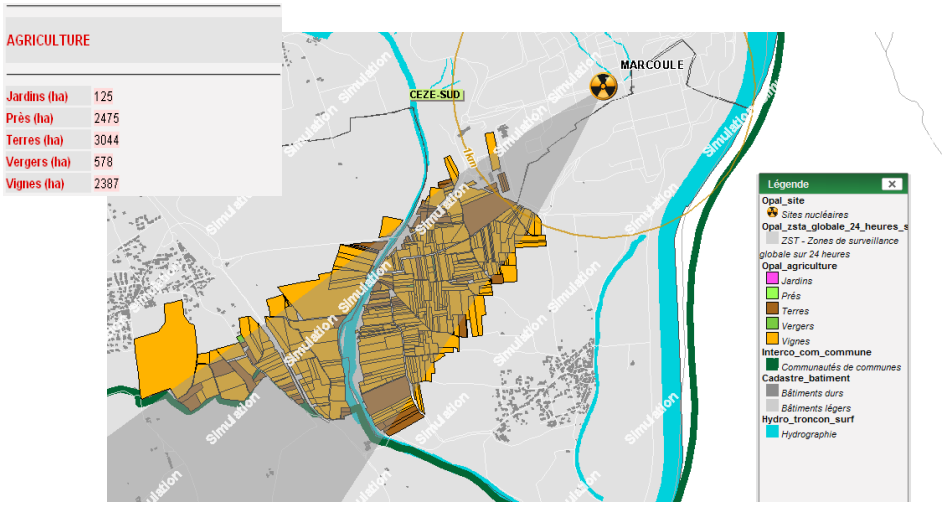

Figure 3 : overlaid of post-accident layer and land occupancy layer [SIIG Bagnols-sur-Cèze]

Finally, the experience feedback of end-users will improve OPAL in terms of the usability and the intuitive user interface and the kind of data available in OPAL (help, zone…).

References

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