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

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**Abstract:**
As part of their partnership agreement signed in 2003, the Institut de Radioprotection et de Sûreté Nucléaire (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 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 on 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-ACCIDENTAL, LOCAL STAKEHOLDERS, TRAINING, WEB-MAPPING

## I. Introduction

As part of their partnership agreement signed in 2003, the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) and ANCCLI (National Association of Local Liaison Committees) decided in late 2009 to launch an action to help local stakeholders 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 educational tool for local people to train on post-accidental consequences of an accident affecting a French nuclear facility but also to get prepared to an accidental situation by identifying post-accidental issues on their territory;
- To improve IRSN knowledge of local issues linked to post-accidental consequences, and to compile local information that characterizes environment close to nuclear sites, depending on data availability.

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

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

### II.1. 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.
A generic basic data base has been created upstream by IRSN via several calculation tools addressing release of radionuclides, atmospheric dispersion, deposition, environment and food transfer and population exposure. Specific basic map information are obtained by OPAL users selecting one or more accidental scenarios from the data base. The result is provided in the form of operational zoning around the accident site 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 t post-accidental management challenges on their own territories.

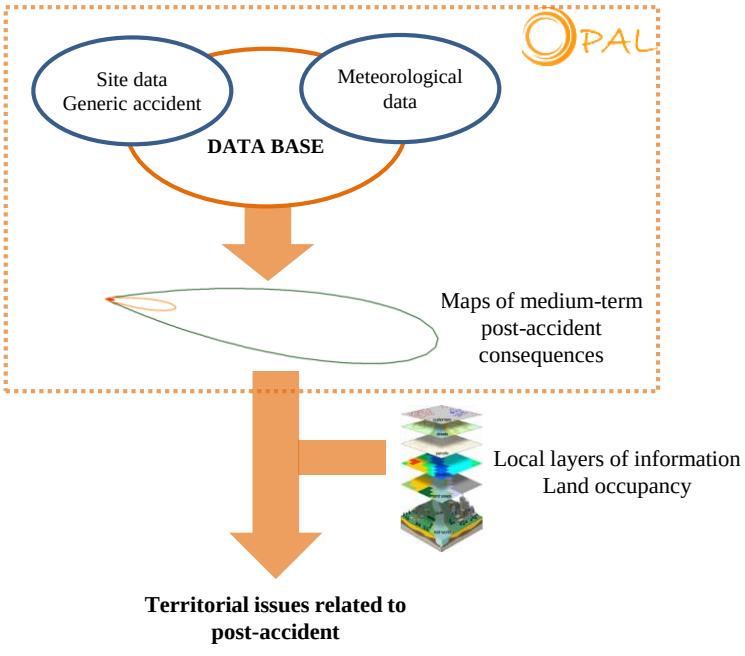


**Figure 1:** simplified scheme of OPAL

It is important to note that the scope of OPAL is limited to the 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. Nevertheless, OPAL was thought as a scalable tool which will be improved by experience feedback of future users.

### II.2. Inputs

Several input parameters are proposed to OPAL users to select an accident from the data base and obtain map information: nuclear site affected, accident scenario, season, meteorological conditions (wind speed, wind direction, rainfall and atmospheric stability).

- Types of nuclear sites included in the tool data base are exclusively fixed civil installation such as nuclear power plants, laboratories and nuclear fuel cycle installations. The defense related sites and radioactive materials transportation accidents were not investigated at the development stage of tool.

- For each site, several accident scenarios are available with various levels of middle-severity.

- Two seasons are proposed for the date of the accident (summer or winter) in order to cover periods when agricultural practices like grazing differ.

- Five weather conditions which cover the various types of France climates can be selected in terms of atmospheric stability, wind speed and rainfall. Wind direction can be adjusted between 0 and 360°. A wind rose adapted to the chosen nuclear site local is also provided to help user choice for the wind speed and direction.

### II.3. Outputs

The outputs are provided in the form of operational zoning around the accident site.
They are based on the Steering Committee for Post Accident Management (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 is necessary to relocate 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 highly contaminated territories. In a post-accidental situation, the main source of public exposure is via ingestion of contaminated foodstuff from local origin. It is for this reason that the consumption or sale of foodstuff produced in the ZPP is prohibited, regardless of their contamination level of.
- Territorial reinforced Surveillance Zone (ZST): zone encompassing all the territories within which, as regards agricultural production, the European Community's Maximum Permissible Levels (MPL) – the regulatory acceptable levels regarding maximum contamination – may be exceeded. In a first time in the Zone, all forms of sale is initially prohibited and it is recommended to not consume farm products. However, as soon as testing systems and approved sampling strategies 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-accidental layers”, are available in a GIS-ready format. 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), 38 post-accidental layers maximum are available, depending on the gravity of the accident and the kind of radionuclides released. The database contains about 30.000 post-accidental layers by considering the whole of generic accidents, accident seasons and weather conditions.

### II.4. Architecture of the tool

OPAL is a web-mapping tool which provides an easy access to post-accidental 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 some of the layers of post-accidental consequences. This mapping will illustrate the effects of rain, wind speed and atmospheric stability on post-accidental consequence thanks to the access to five meteorological conditions and will enable to check the chosen wind direction.
3. OPAL-export: zip-file export of all information layers provided by OPAL for the chosen scenario in a GIS-ready format.

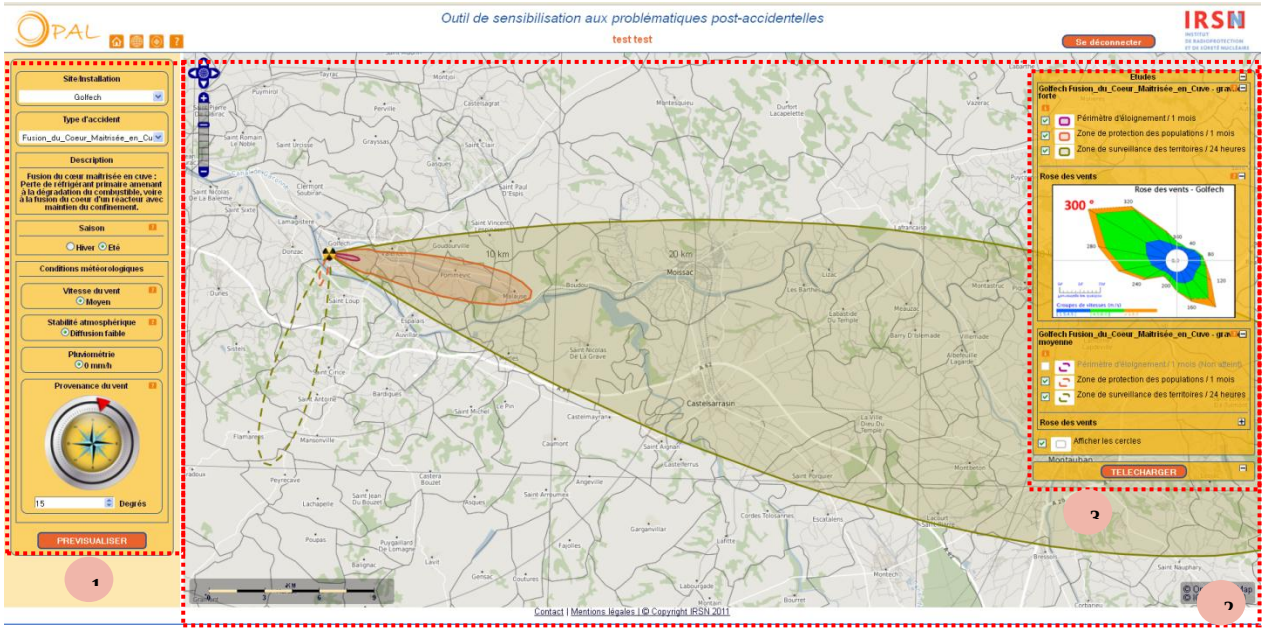


**Figure 2:** Interface

## 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 stakeholders. The second phase consists now in implementing OPAL on pilot areas around nuclear facilities before a gradual extension at the end of 2013 to all the sites identified by the working group.
The purpose of this implementation is twofold. First of all, local stakeholders will be able to test OPAL with the support of experts from IRSN. Then, the overlaid of post-accidental layers obtained via OPAL with local information layers using any Geographic Information System

(Figure 3 and Figure 4) will enable ANCLII to create maps allowing them to identify and illustrate the challenges of post-accidental management in their territories.

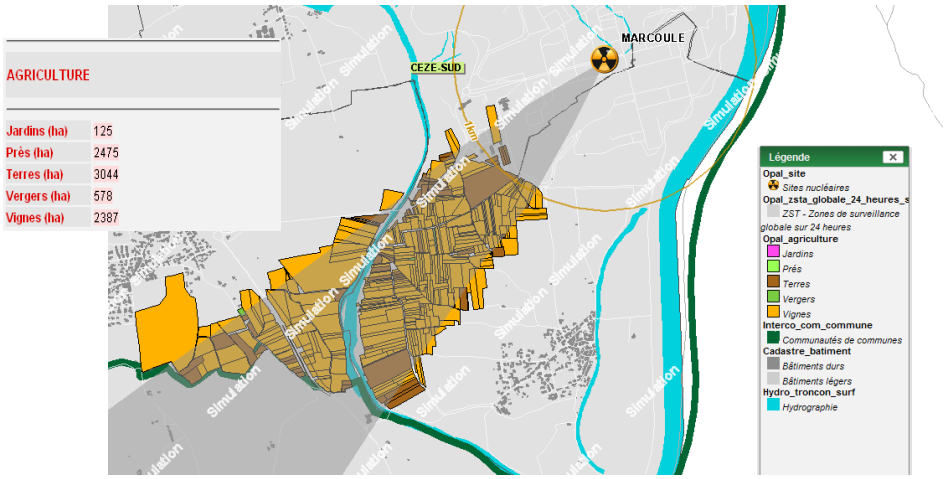


**Figure 3:** overlaid of post-accidental layer and land occupancy layer available to the SIIG Bagnols-sur-Cèze

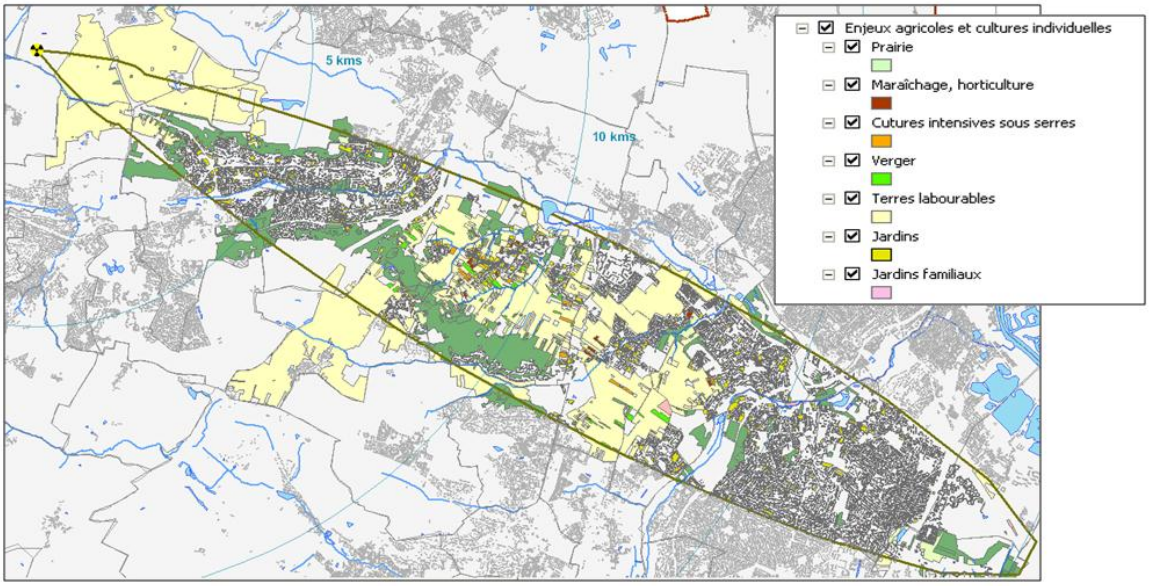


**Figure 4:** overlaid of post-accidental layer and land occupancy layer available to the General Council of the Essonne

Finally, the experience feedback of end-users will improve OPAL in terms of usability and user interface intuitivity and variety of data available in OPAL.

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