DESIGN BASED APPROACH TO OSI SAMPLING STRATEGY

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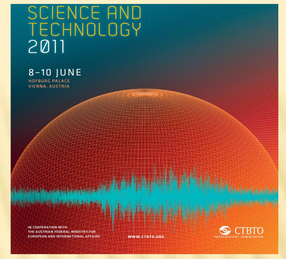
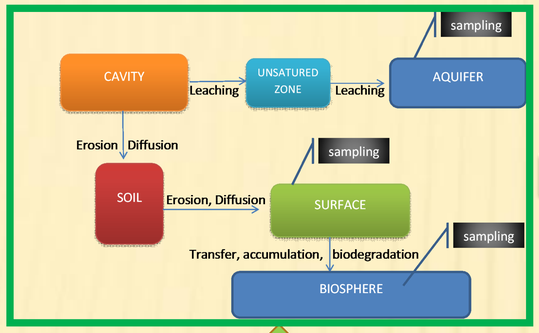
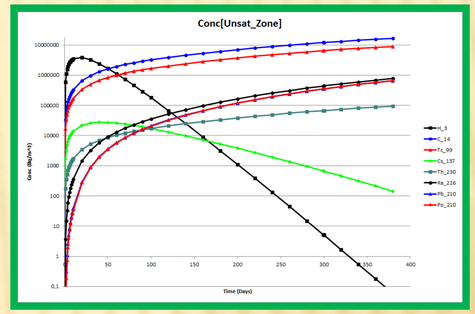


ABSTRACT

As an On Site Inspection has to be conducted in a relative short time it's important to dedicate a big effort to design an effective and reliable sampling/survey strategy in order to collect the right number of information for the OSI purpose. In this framework the grid base sampling strategy may be not as effective as in other environmental survey sampling because of the nature of the source event and the different physical features of the analyte.

The dispersion of radioactive products from an underground nuclear test will follow the migration paths of the geophysical environmental in which the test has been conducted. The identification of the transport mechanism through the geosphere and the biosphere can be combined with the modeling of the migration paths, in order to identify the accumulation points to be surveyed with much more details.

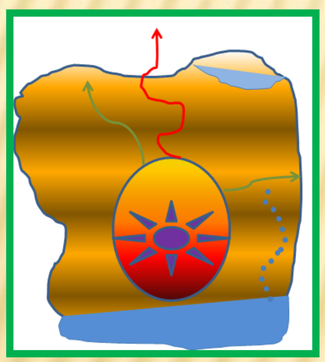


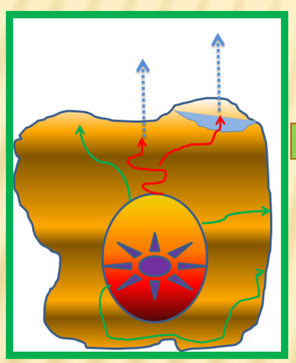


First results calculated using a standard inventory library.
The next step will consider a dedicated OSI radionuclides library

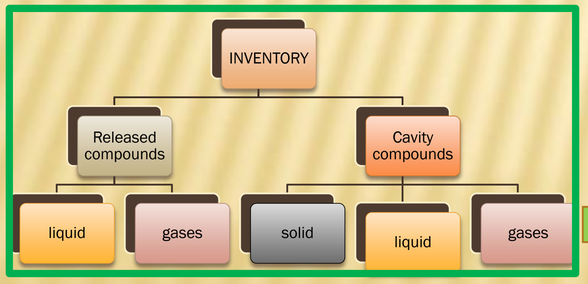
WHERE AND WHEN

The capability to follow the temporal evolution of the concentration of targeted radionuclides among the different selectedcompartments can support the choice of the sampling point and the timescale of the sampling plan.





Different pathways can cause the chemical speciation of the radionuclide compounds



AMBER COMPARTMENT MODEL

Mass balance of the contaminant ***n*** (***p*** is its decay product) in the compartment ***c.***

$$\frac{dA_c^n}{dt} = -\lambda^n A_c^n + \lambda^p A_c^p + \sum_b T_{bc}^n A_b^n - \sum_b T_{cb}^n A_c^n + S_c^n$$

Decay | In-growth | Transfers In | Transfers Out | External Sources

The ENEA group is now trying to apply a compartment model based software (AMBER) to depicts and gives numerical quantification of the migration paths of radioactive particles in soils, rocks and water tablet, for the design of OSI sampling strategy. This software is commercially available by the Quintessa ltd and it was originally designed for the performance assessment of a near surface radioactive waste disposal.

The aim of the actual work is to:

- To identify possible compartments to investigate for the migration of radionuclides from the explosion site
- To make a database of transfer parameters involved in the migration process
- to test the performance of the software for a different application and to verify its possible customization for the OSI purpose.

WHERE AND WHAT

Some factors that can affect the radionuclides migration :

- ❑ Inventory
- ❑ Isotopic composition of the products
- ❑ Chemical speciation
- ❑ Release kinetic
- ❑ Decomposition efficiency

The concept of design of the sampling strategy

This work is carried out within the activities of the ENEA-CTBT team supporting the Italian National Authority for the Radionuclide NDC.

ENEA-CTBT Support Group:

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