Consequences of different meteorological scenarios in the environmental impact assessment of tritium release

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In order to measure the environmental impact of the tritium effluent emission in an ITER-like type reactor the knowledge of the real boundary conditions of the primary phase after the tritium discharge to the medium, is fundamental. That phase has been modeled by using the real meteorological data. We have developed an advance simulation tool that transfers the processes under the base of the high-resolution HIRLAM weather numerical forecast model and also with IFS ECMWF. These last data are coupled to the tritium discharge code in normal operational conditions and in the accidental cases, in particular: Tritium Plant, Vacuum Vessel Active Cooling System or DBA.

Real time meteorological data, including satellite derived products of MSG METEOSAT-9 as air mass products, regional and composite radar imagery for precipitation and some real wind observations have been used. To make this exercise and analyze consequences, we used our good access to extensive data bank for surroundings of Vandellós NPP (Spain). Those data are measured during one year, giving the changes in the wind direction towards the interior of the peninsula (e.g. due to Mediterranean cyclogenesis and south winds) or its discharge to the Mediterranean Sea (e.g. in case of other waves with north component winds). Backwards surface trajectories were analyzed with the Lagrangian particle dispersion model FLEXPART coupled to ECMWF model, and ejected for the forecast fields valid at 9, 12 and 24 hours, within a possible scope up to 72 hours. Then, we can have a precise idea of the order of magnitude of the dry and humid deposited tritium and Cs-137 in the zone and some indicators concerning the re-emitted tritium to the atmosphere in the oxidized form.

Results of the primary phase are strongly adjusted to the precision of the meteorological changes mainly, but not only, due to the events or accidents, but also in tritium concentration emitted to the atmosphere in normal operation conditions. This probabilistic modeling allows us to obtain results in the secondary phase which will be used for detecting doses to population by inhalation or ingestion within permitted limits.