



Rapid response

Equipment to be deployed by the French nuclear operator in case of an emergency includes new radiation detection probes.

Shortly after the accident at the Fukushima Daiichi nuclear plant in March 2011, a need for additional safety measures became obvious. On the recommendation of the French nuclear safety regulator (ASN), EDF proposed a 'Nuclear rapid action force' (FARN).

Created in 2012, the FARN teams are located at four nuclear power plants: Civaux, Bugey, Paluel and Dampierre. These locations are within easy reach of the entire French nuclear fleet. Teams can mobilise within one hour and arrive at a site within 12 hours: they must be fully operational within 24 hours in an accident. FARN takes action to assure a power plant's three vital functions: supply of air, water and electricity.

The FARN teams come from an EDF staff of almost 300 volunteers, who are available 24/7. They have special training in operational crisis management or logistics, but otherwise follow their regular day jobs. The FARN teams are experts with specific skills in plant operations, maintenance, radiation protection, environment, nuclear logistics, etc. The headquarters at the Paris EDF Crisis Management Centre co-ordinates their movements and provides the regional bases with special equipment.

The FARN programme for emergency response includes equipment that can be sent to the scene of an accident, for example mobile pumps, generators, vehicles, helicopters, personal protection and communications equipment. It also serves as a fast deployment for events like earthquakes or flooding, when the environmental radiation-monitoring network installed in the vicinity of a nuclear

plant could suffer damage.

Decision-making about evacuation of the surrounding population depends on the fast availability of deployable sensors for short-term and medium-term use, reliable data transmission operating in potentially difficult terrains and dangerous environments. It must also be possible to access and interpret measurement data transmitted securely from authorised personnel at the crisis centre or any other authority.

With this in mind, in 2014 EDF organised a tender to survey the latest developments, in which Saphymo participated. (Based in France, Germany and Italy, Saphymo is part of Bertin Technologies/CNIM group.)

Back in the late 1990s Genitron Instruments (now Saphymo, Frankfurt), demonstrated to EDF that it was possible to drop autonomously operating radio probes for gamma monitoring in emergency via a remotely operated helicopter. However it was not until the previously unimaginable Fukushima disaster that the concept formed the basis for a new technical solution for emergency response. In 2011-2012, the German armed forces (Bundeswehr) considered using remotely deployable probes for the protection of personnel involved in securing contaminated terrain. Thus the new GammaTRACER Spider probe concept was born before EDF thoroughly tested probes and took the decision to equip all its French plants with 164 of the monitors.

The Spider probes are self-erecting, based on Geiger Muller tubes, with GPS for simple unmanned deployment. Although EDF decided on a type that can be arranged manually, it is

possible to throw the probes out of a vehicle, push them through an outlet or send to contaminated or inaccessible terrain by drone, chute, helicopter or quadcopter, minimising exposure of the first responders.

The compact Spider probes transmit data via Iridium satellite. This is the only secure way operable in all terrains and in case regional power breakdowns. The Iridium satellite transmission system operates on a basis of 66 satellites, such that every 11 minutes a new satellite appears. The transmission delay is 1-2 minutes. Data transmission through Iridium to the central server can use email or direct IP. The probes are also equipped with weatherproof housing and built-in rechargeable batteries allowing up to five years operation.

The Spider probes for the FARN project are accredited to IEC 60846-1:2009 standard. Nineteen EDF plants are equipped with four probes each in a transportable suitcase, a portable operating system for local use of the probes, batteries and charger. Batteries can be exchanged within few minutes and the probes can be enabled or disabled by magnet.

The batteries have an operational life of one year for a ten-minute measuring cycle and hourly transmission via satellite. The lifetime is two months in a ten-minute data transmission cycle. An IR reader and software can also be used for onsite readout or configuration of probes.

The central server is equipped with DataEXPERT data management software for remote configuration and secure web access (internet/intranet) via WebVIEW, a web based visualization and analysis tool. Data is presented on maps, charts and tables, also usable on mobile devices.

In addition to the probes at the plants, each regional FARN site has received suitcases with 21 probes, integrated tripods and rechargeable batteries. Deliveries began in November and FAT was carried out in January 2016. ■