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TAWARA_RTM: A complete platform for a real time monitoring of contamination events of drinking water

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The security of drinking water is increasingly being recognized as a major challenge for municipalities and water utilities. In the event of a contamination, water spreads rapidly before the problem is detected. Consumption of contaminated water can induce major epidemics, disrupt economic life and create mass panic. Significant drinking water contamination events pose a serious threat to public and environmental health.
Today's laboratory-based contaminant testing systems coupled with the current practice of the use of contingency plans are impractical for daily monitoring usage. They operate too slowly for incident control and prevention since the full extent of the event can be rarely determined timely for efficient mitigation measures.
A complete platform to control the quality of the tap water with respect to the radioactivity content will be presented. The platform is developed within the EU-funded project TAp WAter RAdioactivity Real Time Monitor (TAWARA_RTM).The TAWARA_RTM platform will provide a real time measurement of the activity in the water (measuring the gross alpha and beta activity) to verify whether the distributed water is far from the limits set by the EU legislation reaching thresholds that require rapid actions.
The TAWARA_RTM platform will offer a system for real time on-site monitoring and it will be a three-device inspection system:
•early warning device to monitor a significant change of the radioactive content of the water;
•fast alarm device for crossing thresholds that require rapid actions on the tap water distribution system;
•spectroscopic investigation to determine the type of contamination and decide the appropriate and effective countermeasures (The determination of the contaminants is needed to establish the effects on the population and produce a full information report to the Civil Security Authorities).
The early warning is achieved by the Early Alarm Detector which is built using a large volume NaI:Tl. In case a substantial amount of gamma-ray emitters appear in the water, the EAD generates an alarm signal to shut off the water flux to further stages of the water treatment facility.
The fast alarm device is the Real Time Monitor (RTM), a detection system for gross alpha and beta radioactivity, which is continuously monitoring the water quality. The water flows through the RTM device where a potential alpha or beta emitter will induce scintillation light in the detector foils.
If the RTM or the EAD detector count rate exceeds the background threshold level, an alarm flag is set and the spectroscopy investigation step, the SPEC, will start, with the aim at identifying the radioisotopes using gamma-ray spectroscopy. The SPEC detector comprises a high purity CeBr3 scintillator shielded by an active anti Compton shield. In order to reduce the measurement time, a concentrator based on selective ion-exchange resins is placed close to the detector front face.
Moreover, a dedicated ICT infrastructure has been foreseen to operate the system and manage the alarms that may occur during operation. The integrated system tests will be carried out in spring 2016, at Warsaw Waterworks.

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