

HIGH DOSE RATE SPECTROSCOPY WITH SARA

HD-Spec is Scienta Envinet's patented* technology for gamma spectroscopy up to dose rates of 100 mSv/h. While most solutions rely on a Geiger-Müller counter for dose rates above some 100 μ Sv/h, HD-Spec and SARA allow you to perform an online, real-time nuclide analysis accurately, even under extreme conditions.

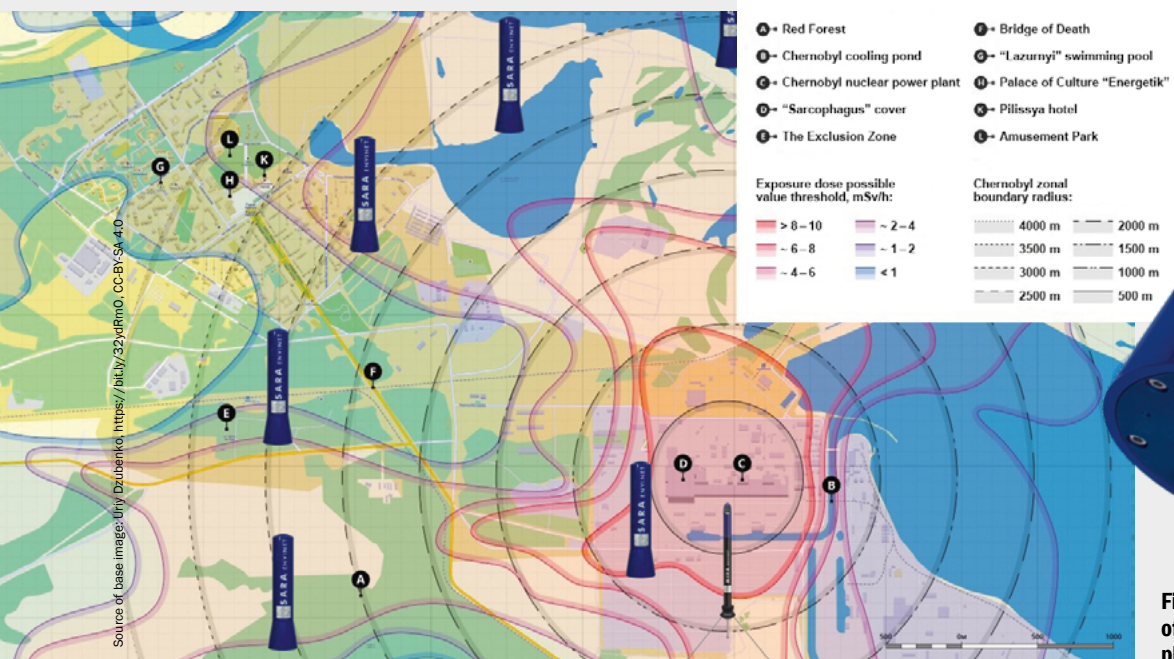


Figure 1: Dose rates in the vicinity of the Chernobyl nuclear power plant, one month after the accident

Environmental dose rates are typically found between several tens and a few hundred nSv/h. However, when artificial radiation is present, dose rates may surpass the count rate limit of standard spectroscopic environmental monitoring equipment, extending up into the two-digit mSv/h range. Such dose rates are found in the wake of nuclear reactor excursions, weapons tests or terroristic activities and are usually linked to severe environmental consequences. Yet the impact strongly depends on the type of nuclide and its activity. Nuclide-specific information is therefore a key component in assessing short-term needs for action. In addition, the nuclide vector of released isotopes contains important information on the progression of nuclear accidents.

EXAMPLE OF USAGE: NUCLEAR ACCIDENTS

During the Chernobyl nuclear accident in April 1986, more than 12,000 PBq of radioisotopes were deposited in the environment. The nuclide vector contained numerous isotopes, where the main activity was contributed by Te-132/I-132, I-131, Ba-140/La-130, Zr-95/Nb-95, Cs-134 and Cs-137. The activity vector was subject to

strong variations during and after the accident. As a consequence, dose rates of up to 100 mSv/h were found in the vicinity of the plant and up to several Sv/h directly adjacent to the reactor.

Figure 1 shows the dose rate levels one month after the accident in the surrounding area of the reactor, as well as the speculative location of probes in a typical ring monitoring network. Even 30 days ►

FUNCTIONAL AND RELIABLE

- Each detector is individually calibrated
- Dose rate accuracy of $\pm 10\%$ (HD: $\pm 15\%$)
- Integrated accuracy test to ensure detector performance regarding calibration, FWHM, dose rate etc.
- Automatic switching between low and high-dose regime with sufficient overlap

*Patent No. 10 2016 117 356

Fukushima-Daiichi dose rates and events

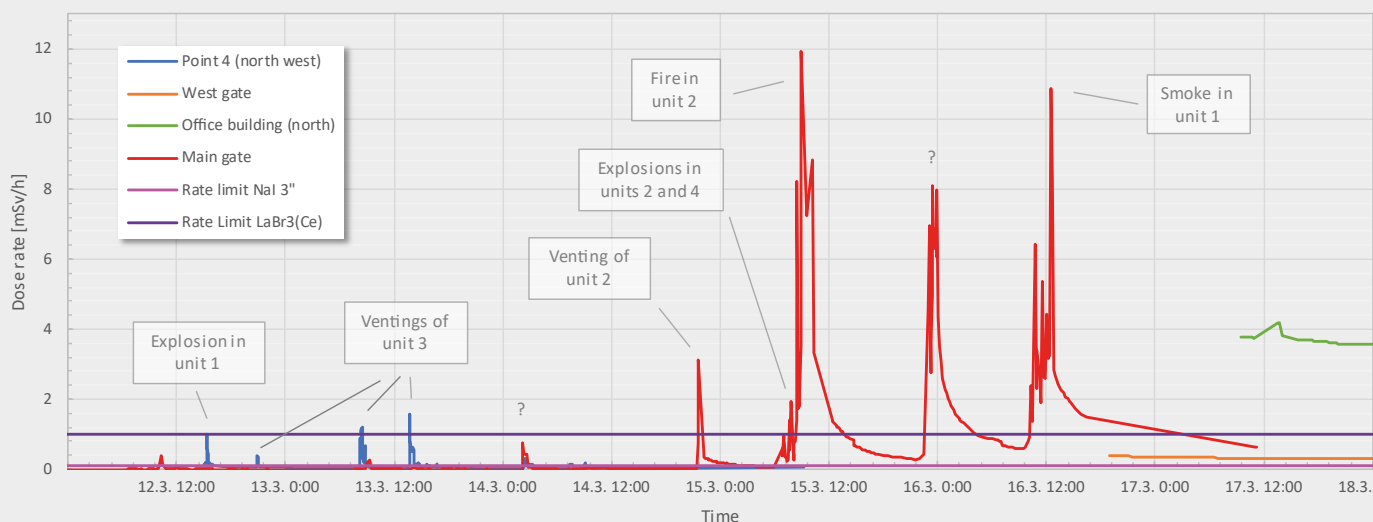


Figure 2: Dose measurements in the vicinity of Fukushima Daiichi

after the actual accident, dose rates at almost all measurement locations would have surpassed the capability of standard environmental gamma spectroscopy equipment. Such zones extended to more than 20 km beyond the actual plant. Scientia Environet's SARA with HD-Spec still provides reliable, autonomous spectroscopic information for rescue operations and decision makers.

Even for modern reactors, dose rates in the vicinity of damaged plants easily surpass the limits of standard spectroscopic solutions. Figure 2 shows dose rate measurements in the vicinity of the Fukushima Daiichi NPP. Since the progression of the release of radioisotopes deviated significantly from the Chernobyl accident, the nuclide vector was considerably different. Again, Scientia Environet's SARA with HD-Spec would have provided autonomous and reliable spectroscopic information where standard equipment would have given up for several days.

OUR SERVICE

In 2016/2017, Scientia Environet's successful SARA series received a major hardware and software upgrade with focus on reliability and flexibility. As such, the measurement range of the spectroscopic detector can be extended spectroscopically up to 100 mSv/h using the HD-Spec option. The CeBr_3 HD-Spec detector allows for rapid identification of the contributing radioisotopes, even in the case of nuclear accidents with complex nuclide vectors: autonomously, directly on the device, without the need for human radiation exposure and time-consuming post-processing operations.

HD-Spec can be combined with any SARA base detector. It can even be combined with an additional Geiger-Müller-Tube to extend the measurement range up to 10 Sv/h.

Key Features

Detector	CeBr_3
Range	0.05 – 100 mSv/h
Accuracy	$\pm 15\%$
Resolution*	Typ. 7%
Energy range	30 keV ... 3 MeV
Total efficiency*	1650 cpm / $\mu\text{Sv/h}$
Photopeak efficiency*	125 cpm / $\mu\text{Sv/h}$
Operating temperature	$-40^\circ\text{C} - +60^\circ\text{C}$

Order number SARA-500-H; *Cs-137

Our probes pass a rigorous testing program before delivery to ensure that all functional requirements are met. Extreme situations require top-class equipment – thanks to HD-Spec and NMC, SARA provides you top-grade radiological information to efficiently focus on emergency coordination, disaster control and rescue operations.



Patented technology

ENVINET GmbH
Hans-Pinsel-Str. 4
85540 Haar, Germany
+49 89 456657-0
info@scientaenvinet.com

Scientia Sensor Systems AB
Danmarksgatan 22
753 23 Uppsala, Sweden
+46 18 4805800
info@scientaenvinet.com

Scientia Omicron, Inc.
3222 E. 1st Ave, #521
Denver, CO 80206, United States
+1 901 538-1258
sales.us@scientaenvinet.com

Scientia Omicron (Beijing) Analytical Instrument Co., Ltd.
Beijing 100044, China
+86 010 58301883
sales.china@scientaenvinet.com