Leading in Environmental Radiation Protection

SAUNA QUBE – RADIOXENON MONITORING SYSTEM

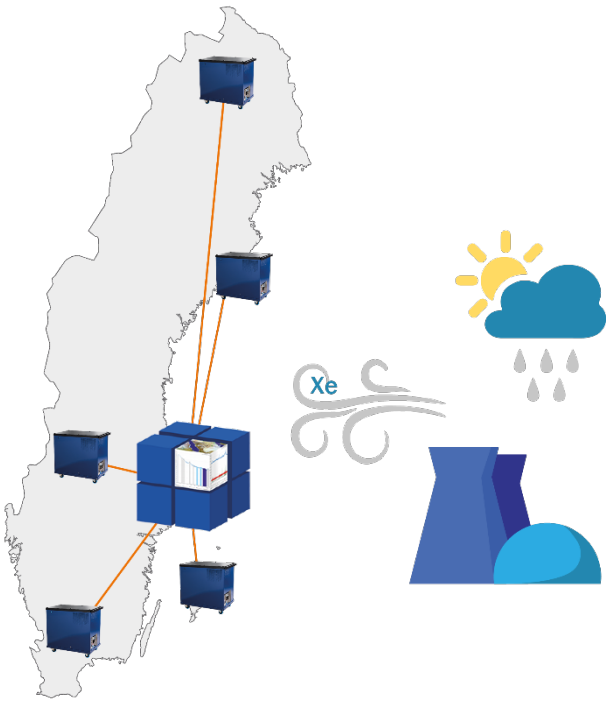
The QUBE is the latest generation, fully automated system to measure the activity concentration of radioactive xenon in air. SAUNA QUBE uses a series of adsorption stages to extract xenon gas from the air. The volume of the xenon sample is measured and then transferred to a detector to measure the activity of the four relevant xenon isotopes using beta-gamma coincidence spectroscopy.

The QUBE is highly scalable, operating as a single unit as well as in an array of QUBE units spread over a larger geographic region. The array concept improves source localization and characterization. It also improves robustness compared to a single system since the array keeps functioning if a single unit is down, and exchanging an individual unit is easy because of its transportability and plug-and-play design.

The system is manufactured and calibrated at our facility in Uppsala, Sweden, whereafter a factory acceptance test is carried out on the finished system to make sure it performs according to specification. After installation, a site acceptance test is carried out to validate the performance of the system. Relevant training for operators is also available.

ARRAY CONCEPT

The array concept improves geographic coverage compared to a single unit. It also improves source localization since individual detections are spread out in both time and space, especially when combined with atmospheric data and diffusion models.



Of course, the QUBE can also operate as a single unit, potentially turning it into an array later.

QUBE

Operation of the QUBE is as simple as possible:

1. Connect power, nitrogen, and internet
2. Press start button



FUNCTIONS

- Detection and identification of four radioxenon isotopes with highest confidence
- Powerful array concept:
  - Scalable from one to multiple units
  - Robustness
- Highly accurate source localization and characterization
- State-of-health monitoring for all relevant components

MINIMUM DETECTABLE CONCENTRATIONS*

Isotope	Typ. value
Xe-133	0.4 mBq/m³
Xe-133m	0.3 mBq/m³
Xe-131m	0.3 mBq/m³
Xe-135	1.0 mBq/m³

* Specified for a pure sample of the respective isotope in 12h sampling interval

TECHNICAL DATA

Parameter	Typ. value
Sample Interval	12h
Stable Xe per sample	1.2 ml at STP
Cross contamination	<1%
Radon removal	10^{-5}
Carrier gas	Nitrogen (N5)
Gas consumption	200 l/day uncompressed (less than 1 cylinder 50l/200bar per month)
Operating voltage	220 – 240 V
Mean power	900 W
Max power	1400 W
Weight	360 kg
Footprint	73 cm × 116 cm
Temperature range	20 – 25 °C
Max. T variation	± 1.5 °C
Humidity	<70%

FEATURES

- Low total cost of ownership: Low power and gas consumption, Nitrogen as carrier gas, low maintenance
- Small and compact, easily transportable – on wheels, can be moved by one person
- Modular design for easy maintenance
- Exchange unit philosophy – easy and quick replacement
- Built-in uninterruptible power supply with automatic shutdown
- Internal lead-shielded Cs-137 source (~1.5 kBq) for stabilization
- Calibrated at the factory
- Plug and play installation

INTERFACES

Part Number	Type
QB -400-4	LTE
QB -400-R	Radio

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