ORTEC®

AMETEK®

# FoodGuard-1

## NaI(Tl) Foodstuffs Monitor

"A simple-to-use answer to the screening of foodstuffs for radioactive contamination."




- A simple-to-use answer to the screening of foodstuffs for radioactive contamination, now further enhanced.
- Suitable for counting of a wide variety of sample types.
- Meets regulatory detection limit requirements:
- Clear results with calculations such as percentage of maximum permitted concentration (MPC).
- Immediate feedback with audible alarms to warn of sample activities that exceed a user-set percent of MPC limit.
- Ready for immediate use "out-of-the-box" including standard sample containers. Check sample included.
- Intuitive software for data collection, display, and storage.
- Transportable and easily deployed cart option.

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## NaI(Tl) Foodstuffs Monitor

### Hardware Features

- High efficiency counting and easy sample loading using 3" x 3" NaI detector in bench-top low background lead shield, optionally mounted on easy-to-maneuver wheeled cart .
- Simple setup with USB-connected ORTEC "digiBASE" all-in-one digital preamplifier and detector high voltage and powerful digital signal processing multichannel analyzer.
- Digitally stabilized against temperature variations.

The ORTEC FoodGuard-1 Foodstuffs Monitoring system can rapidly and accurately screen foodstuffs for the radionuclides expected from release events from nuclear power plants: for example $^{131}$I, $^{103}$Ru, $^{134}$Cs and $^{137}$Cs. Total Cesium (the sum of $^{134}$Cs and $^{137}$Cs activities) can also be reported. The system is battery operated, portable, and low power so it can be used where the foodstuffs are gathered, imported, sold or consumed. It is easily transportable and a cart mounted option allows the system to be used in places such as food markets where the system is easily brought to the product.

The FoodGuard-1 system hardware consists of a sodium iodide (NaI(Tl)) spectroscopic gamma-detector in a lead shield, an ORTEC digiBASE all-in-one spectrometer, a laptop PC and laser printer. The digiBASE supplies the multichannel analyzer function, the high voltage for the NaI detector, and all the signal processing electronics. Internal stabilization electronics and internal check source allow the system to be used over a wide range of environmental conditions.

### Principle of Operation

Sample material is placed in a Marinelli beaker (supplied). The beaker is then placed on the detector in the shield. The operator starts the process using the FoodGuard software and is guided through a series of questions. The software collects the data, analyzes the spectrum, checks the results against allowable limits, and prints the report.[1] The spectra and reports are also saved on the laptop hard disk. Samples that exceed defined limits are clearly marked on the report for quick results reporting that can easily be shared.

The spectrum analysis uses an "interference ROI matrix" method, approved by the US FDA for the monitoring of foodstuffs.[2]

The matrix operations are based on Numerical Recipes.[3]



**1 Liter Marinelli Beakers.**

### Calibration

The system is delivered pre-calibrated for gain and efficiency. The fixed efficiency calibration is pre-determined by the dimensions of the detector crystal and the sample containers used. Gain calibration is adjustable and once set is stabilized against temperature drift. Standard 1-liter Marinelli beaker containers are included with the system, and the factory calibration ensures accurate results if these containers are used. The naturally occurring isotope, $^{40}$K, is also reported and can be used to monitor system performance as well as providing the reference peak for gain stabilization.

### Lower MDC and Increased Customization with FoodGuard-2 HPGe System

FoodGuard-1 is designed for rapid analysis of the most common radionuclides expected from nuclear power plant events. For lower MDC, more advanced reports, and customizable nuclide libraries, ORTEC has developed the FoodGuard-2 High Resolution Germanium system. More information on FoodGuard-2 can be found at www.ortec-online. com or contact your local sales representative.

**Table 1. Minimum Detectable Concentration**

| Time (min) | MDC (Bq/l) | | | | |
|---|---|---|---|---|---|
| | $^{131}$I | $^{103}$Ru | $^{137}$Cs | $^{134}$Cs | $^{40}$K |
| **10** | 14.8 | 13.6 | 14.9 | 21.7 | 224.4 |
| **20** | 10.5 | 9.6 | 10.3 | 15.2 | 143.6 |
| **30** | 8.6 | 7.8 | 8.5 | 12.4 | 123.4 |
| **60** | 6.1 | 5.5 | 6.0 | 8.8 | 87.1 |

*More information on MDC calculation available on request.

[1] The allowable limits, which vary from country to country and from incident to incident may be edited in a supervisor function.

[2] Baratte, Edmond J., Associate Chapter Editor, AOAC Officially Methods of Analysis (18th Edition).

[3] Press, W. H., Flannery, B. P., Teukolsky, S. A., and Vetterling, W. T., Numerical Recipes, Cambridge Press (1986),

## Specifications

### Hardware

**Detector** 3" x 3" NaI detector with ORTEC digiBASE: 14-Pin PMT base with integrated bias supply, preamplifier, and MCA (with digital signal processing). Typical resolution 8% for $^{137}$Cs 662 keV gamma ray.

**Spectrum Stabilizer** The digiBASE features built-in gain stabilization circuitry. Stabilization is performed by "locking onto" a reference peak in the spectrum, supplied by the $^{40}$K gamma ray from a small potassium chloride sample inside the shield.

**Interface to PC** Full-speed (12 Mbps) USB 2.0 Interface. The ultra-low power digiBASE is powered from the USB cable.

**Lead Shield** Bench-top, low-background lead shield which can accommodate a one liter Marinelli beaker (individual lead shield designs may differ).

**1 liter Marinelli Beakers** Commonly available beakers, model GA-MA 133N-E including lid. Six included with system.[4]

**Calibration Check Source** A calibration check source, comprising ~2 kg of KCl (contains $^{40}$K) is provided.

**Transport Cart** The transport cart makes the system easy to use in areas such as vegetable markets, food packing plants and production facilties. It is easily maneuvered and has locking wheels. Cart dimensions: 24 in. x 24 in. base x 36 in. height




**Transport Cart**

### Software

**FG-1-BW** FoodGuard-1 version 2.0 Food Monitoring Package provides easy-to-use routines for system calibration and operation, including peak overlap correction, MPC calculations and audible alarm facility. $^{131}$I, $^{103}$Ru, $^{134}$Cs, and $^{137}$Cs are the monitored nuclides. The naturally-occurring isotope $^{40}$K is also reported and can be used to monitor system performance. Available in four languages: English, Russian, Chinese and Japanese.

**MAESTRO MCA Software** is used for spectrum display and system adjustment and calibration prior to sample measurements. It is a highly versatile "smart" MCA program which allows the FoodGuard-1 system hardware to be used for a number of other radiation measurement tasks such as radon filter monitoring and materials monitoring.

**FoodGuard Computer Requirements** PC capable of operating Microsoft® Windows® 7 through 10 and a CD-ROM drive (software is supplied on CD). A printer is required for hard copy output.

# FoodGuard-1

## NaI(Tl) Foodstuffs Monitor

## Ordering Information

**FOODGUARD-1-PC-CART**

**Complete NaI-based food monitoring system with computer and transport cart.** Includes:

ORTEC 905-4 3" x 3" integral NaI detector and photomultiplier
ORTEC G5-FOODGUARD-1 low-background lead shield (30 mm thick)
ORTEC digiBASE all-in-one high performance digital electronics, MCA and high voltage supply
FG-1-BW FoodGuard-1 V2.0 food monitoring software
6 each GA-MA 133N-E 1L marinelli beakers with lids
$^{40}$K (KCl) ring source for stabilization
Marinelli beaker calibration check source: ~2 kg of KCl
ORTEC PC-L-FG standard laptop
ORTEC PC-PRT-1 LaserJet printer
FGCART transport cart

**FOODGUARD-1-CART**

**Complete NaI-based food monitoring system with transport cart.** Includes:

ORTEC 905-4 3" x 3" integral NaI detector and photomultiplier
ORTEC G5-FOODGUARD-1 low-background lead shield (30 mm thick)
ORTEC digiBASE all-in-one high performance digital electronics, MCA and high voltage supply
FG-1-BW FoodGuard-1 V2.0 food monitoring software
6 each GA-MA 133N-E 1L marinelli beakers with lids
$^{40}$K (KCl) ring source for stabilization
Marinelli beaker calibration check source: ~2 kg of KCl
FGCART transport cart

**FOODGUARD-1-PC**

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6 each GA-MA 133N-E 1L marinelli beakers with lids
$^{40}$K (KCl) ring source for stabilization
Marinelli beaker calibration check source: ~2 kg of KCl

## Options

**FGCART**

Transport Cart. Securely carries the shielded detector, and provides a convenient shelf mount for the system laptop computer.
Cart dimensions: 24 in. x 24 in. base x 36 in. height.

**FG-1-MARINELLI-CASE**

Full case (33) of additional GA-MA 133N-E 1L Marinelli beakers with lids.

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Specifications subject to change
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