



Italian National Agency for New Technologies,  
Energy and Sustainable Economic Development

# MONITORING OF IONISING RADIATION BY NON-GOVERNMENTAL NETWORKS IN THE FRAMEWORK OF THE EMPIR - 16ENV04 "PREPAREDNESS" PROJECT

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PREPAREDNESS

Metrology for mobile detection of ionising radiation  
following a nuclear or radiological incident.

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## MONITORING OF IONISING RADIATION BY NON-GOVERNMENTAL NETWORKS IN THE FRAMEWORK OF THE EMPIR - 16ENV04

### "PREPAREDNESS" PROJECT

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**INTRODUCTION:** The analysis of possible nuclear or radiological consequences arising from relevant incidents or accidental situations is crucial for the protection of the public against dangers arising from ionising radiation. In these kinds of scenarios, the levels of ambient dose equivalent rate and activity concentrations provide essential information about the consequences of the progression of the radioactive cloud. This information will allow appropriate countermeasures by decision makers and reduce the risk of exaggerated actions and preventable follow-up costs. The Work Package 3: "Monitoring of ionising radiation by non-governmental networks" of EMPIR-16ENV04 "PREPAREDNESS" Project - "Metrology for mobile detection of ionising radiation following a nuclear or radiological incident" aims to establish a metrological basis to support this work.

**OBJECTIVES OF WP3 OF EMPIR-16ENV04 "PREPAREDNESS" PROJECT:** The non-governmental networks are operated by private companies or by persons who run measuring instruments for collecting and disseminating counts rates or dose rate data. The high availability of the measured data may have a strong political impact in case of an emergency; therefore the objective of WP3 is to investigate the metrological relevance of these data from such networks and the feasibility to include such data into that reported by governmental networks. Three tasks have been identified: the evaluation of existing measuring instruments used in non-governmental monitoring networks; a feasibility study on the use of non-official dosimetry data for preparedness purposes and the development of new instruments for non-governmental and state-owned monitoring networks.

**OVERVIEW OF MEASURING INSTRUMENTS USED IN NON-GOVERNMENTAL NETWORKS (MINN):** In order to investigate the status of the measurement of ionising radiation in non-governmental networks, JRC with support of NPL and PTB performed a web based study by including information from manufacturers, developers, etc., to ensure consistency and completeness of the review. Currently the study focused on MINN and installed stations in Europe.

Network	Category	Link information/URL/Contact	Additional Information
IMMAGINE (Italy mobile phone)	Non-profit company	Automatic/ manual/ CPM	48.8 µSv/h (live values) 0.4-2.0 µSv/h (live values) 32 µSv/h (live values)
SMC map (with fixed stations)	Private company	Automatic/ manual/ CPM and CPM	Colour of the stations is variable depending on time
Radiation Networks (with fixed stations)	Private company	Automatic/ manual/ CPM	Warning level 100 CPM Alert level 100 CPM
Radiation Networks (with fixed stations)	Private company	Automatic/ manual/ CPM	Alert level 3 contamination level of 100 CPM or 2.3 times a Station's baseline
RadiationMap (with fixed stations)	Non-profit company	Automatic/ manual/ CPM	0-3.0 µSv/h (live values) 0.3-3.0 µSv/h (live values) 10-20 µSv/h (live values)
RadioMonitor (with fixed stations)	Private company	Automatic/ manual/ CPM	0-1.2 µSv/h (live values) 0.1-1.2 µSv/h (live values) 0-2.0 µSv/h (live values)

**PLANNED PERFORMANCE INVESTIGATION IN LABORATORIES:** PTB will determine the inherent background imparted dose rate in case of no external ionising radiation) of typical MINN by performing measurements in the underground laboratory UDO II. PTB, ENEA, NPL and VINCA will determine the energy dependence and linearity of typical MINN in own X-ray and gamma-ray irradiation facility.

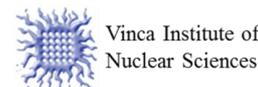
**OUTLOOK:** For several decades, radiological information is provided by national monitoring networks. Since a couple of years, non-governmental monitoring networks disseminate crowd sourced data on radiation levels. Metrological non-reliable data of simple and private electronic devices provided by non-officials to the general public and to the media is likely to result in unnecessary concern and may raise questions about the validity of the regular monitoring networks. Although the active involvement of the public should be encouraged, one should be aware of a situation in which measured results of citizens may be in disagreement with the official measured national dose rate values. Hence, non-governmental monitoring requires a first and detailed investigation on its metrological relevance. Therefore, the congruity of dose rate data provided by non-governmental networks and the feasibility of using such data for European Data Exchange Platform (EURDEP) will be investigated for the first time. One of the important achievements of the Work Package 3 of EMPIR-16ENV04 "PREPAREDNESS" project will be the dissemination of the results to the stakeholders to judge the information provided by non-governmental networks, to avoid misunderstandings with potentially severe psychological and harmful side-effects as a consequence of questionable measurements by lay persons.

# WP3 of EMPIR-16ENV04 PREPAREDNESS” Project

In a relevant incident/accident with radiological risk the levels of **ambient dose equivalent rate** provide essential information about the consequences of the progression of the radioactive cloud.

This information will allow **appropriate countermeasures** by decision makers and reduce the risk of exaggerated actions and preventable follow-up costs.

The Work Package 3 of the project: **“Monitoring of ionising radiation by non-governmental networks”** aims to establish a metrological basis to support this work.



# Tasks of WP3 of EMPIR-16ENV04 "PREPAREDNESS" Project

- Evaluation of existing radiation measuring instruments and practices used in non-governmental monitoring networks.
- Feasibility study on the use of non-official dosimetry data for preparedness purposes.
- Development of prototypes for instruments to be used in both non-governmental and state-owned monitoring networks.



JRC, with support of NPL and PTB, performed a web based study to ensure consistency and completeness of the review of measuring instruments used in non governmental networks (MINN) in Europe.

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# Overview on non-governmental networks in Europe

Network	Category	Data submission	Raw/ displayed data	Additional Information
<b>Safecast</b> with mobile devices	No- profit project	Automatic (inJapan) and manual	CPM / $\mu\text{Sv/h}$	<0,4 $\mu\text{Sv/h}$ ; 0,4-2 $\mu\text{Sv/h}$ ; >2 $\mu\text{Sv/h}$ (blue – red- yellow)
<b>GMC map</b> with fixed stations	Private company	Automatic and manual	CPM or ACPM /CPM or $\mu\text{Sv/h}$	Colours of the stations is related to data updating time
<b>Radmon</b> with fixed stations	Private company	Automatic and manual	CPM / CPM or $\mu\text{Sv/h}$	Warning level: 50 CPM Alert level 100 CPM
<b>Radiation Network</b> with fixed stations	Private company	Automatic	CPM/ CPM	Alert level: 3 consecutive minutes of lesser of 100 CPM or 2.5 times a Station's baseline
<b>Radioactive@Home</b> with fixed stations	No- profit project	Automatic	CPM / $\mu\text{Sv/h}$	<0,3 $\mu\text{Sv/h}$ ; 0,3-0,8 $\mu\text{Sv/h}$ ; >0,8 $\mu\text{Sv/h}$ (green; yellow; red)
<b>uRad Monitor</b> with fixed stations	Private company	Automatic	CPM / $\mu\text{Sv/h}$	<0,12 $\mu\text{Sv/h}$ ; 0,12-0,21 $\mu\text{Sv/h}$ ; >0,21 $\mu\text{Sv/h}$ (green; yellow; red)

# Outlook

Since a couple of years non-governmental monitoring networks disseminate **crowd-sourced data on radiation levels** along with official radiological information provided by national monitoring networks.

The **congruity of dose rate data** provided by non-governmental networks is extremely important to avoid misunderstandings with potentially severe psychological and harmful side-effects as a consequence of questionable measurements by lay-persons.

The WP3 of EMPIR-16EN04 “PREPAREDNESS” project will achieve the following:

- Instruments used by some non-governmental networks undergo a **first and detailed investigation on its metrological relevance**.
- **Results of this investigation are disseminated to the project stakeholders** i.e. decision makers.



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