Citizen-based radiation measurement in Europe: Supporting informed decisions regarding radiation exposure for emergencies as well as in daily life.

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INTRODUCTION:

Lessons learned from the Fukushima Dai-ichi NPP crisis and its aftermath have confirmed that lack of knowledge and understanding during emergencies can result in panic as well as in the unorganized use of unsuitable equipment. While this can be directly affected and also be reassuring from a distance. For an individual, to understand the situation and to gain perspective transform them from bewildered to informed. The individual is the main reason why some radioprotection bodies such as IRSN and SÚRO have developed strategies to not only inform people by providing them with basic useful knowledge for coping with such situations, but also by trying to engage citizens by encouraging them to measure radionuclides themselves and to share their data. One of the challenges a nuclear accident presents is to prepare for the post-accident phase, and to be attentive and relevant to the needs of the public, for example, in the context of nuclear radiation exposure. The public is expected to be affected by nuclear radiation for many years after the event. Therefore, in order to follow the recommendations of authorities in order to limit their individual doses, it becomes quite important for them to trust decision-makers. Taking their own measurements helps citizens become knowledgeable active participants in the safety dialogue.

Other local citizens as well as consumers worldwide who might be considered less directly affected by radioactive contamination nevertheless have a valid make in accurate information. Lack of knowledge, mistrust of authorities, and receptivity to misinformation can lead many to erroneously consider a country which in truth has suffered a limited zone of hazardous contamination to be contaminated in its entirety. As has been seen after the Chernobyl disaster. This can lead to product boycotts and lengthy embargoes, particularly for foodstuffs, but also against travel and tourism. The nuclear accident in Japan showed that all of these can have a significant economic impact and can lead to an entire country being perceived as contaminated.

In the wake of the Fukushima-Dai-ichi NPP disaster, citizen-science based radiation data collection efforts have proven very important in filling information gaps for the public. The activity recognized by governmental institutions, first responders, and international bodies, many of whom have expressed interest in citizen efforts to disseminate response plans, as soon as the information is available. The goal of this paper is to give examples of such developments and their results in Europe.

About Safecast:

Safecast, is an international, volunteer-based organization devoted to citizen science efforts to provide accurate information on background radiation and other pollutants. It was initiated on March 12, 2011, one day following the onset of the Fukushima Dai-ichi NPP accident, in response to what several official reports on the disaster have called the climate of fear created by TEPCO, its agency, and inter-governmental communication. Since 2011, Safecast has implemented participatory, open-source citizen-science-based radiation mapping solutions developed through a process of collaborative open innovation, leveraging developing sensors and a variety of off-the-shelf hardware and software for visualizing environmental measurement data. The Safecast project has now taken on the role of providing real-time environmental and nuclear issues with tools they can use to build alternative, open-source means of measurement and communication which can be easily shared and built upon by others. Five years after the onset of the Fukushima disaster, Safecast volunteers have built and deployed hundreds of radiation sensors worldwide and have amassed the largest open data set of radiation measurement results to date. Many Safecast devices are in use in Europe and these data are shared on web-based and other Safecast maps. The map to the right shows data in Europe accumulated by Safecast devices as of May, 2016. Most of the measurement results were done by car using the Geiger Mares GPS-equipped device, with data logging capability.

The devices were positioned at approximately 1m height. Each data point represents a clipping total of the previous 60-second count, covering every 5 seconds. Location precision depends upon the quality of the GPS signal available. Global Geiger Mares devices have been used in Europe by logging approximately 9 million Europas (out of approximately 47 million in the entire Safecast database as of May, 2016). In addition, the Through this project, instrument education in Japan, Europe, and the US.

FRANCE:

As part of its program of public empowerment, IRSN experts regularly give interactive lectures for high schools supported by a traveling exhibition consisting of 90 fluorescent posters covering every anticipated question about radiation and nuclear risks. In addition, IRSN recommends that students learn to use a variety of tools for measuring radioactivity (Geiger-Couper “Geiger” Digital Electronic Dosimeter, a Radiation Monitor). This tool is used to measure background radiations and it is not designed for measurement of low doses. The results are limited with a resolution of 100 mCr/ h. In addition, a team of researchers from the University of Paris, not long ago the French government science minister, unfortunately forced to develop a working knowledge of previously unfamiliar units such as “Becquerel,” “Sievert,” and “Gray”). IRSN experts follow the activities published by students in this manner is considered the most effective and promising.

CZECH REPUBLIC:

In the Czech Republic, a program has been established which aims to improve public safety by introducing radiation monitoring systems at several levels, including institutions, schools, and citizens, in accordance with current international trends. Titled “Radiation Monitoring Network for Public Protection” (RMMN), the project is led by the Ministry of Interior within the framework of the research program MINTER. The approach is based on direct experience using appropriate devices and understanding of the measurement results. The project will run from 2011-2013, under the guidance of SÚRO in cooperation with the Institute of Technical and Experimental Physics of the Czech Technical University in Prague and the Czech Nuclear Energy Agency.

CONCLUSION:

Citizen monitoring networks can create a valuable contribution to radiological monitoring in emergency situations, as well as providing useful input into databases of normal background radiation. The educational potential of participation in citizen radiation monitoring efforts has also been recognized in Europe and other parts of the world. The achievements of Safecast and similar groups following the Fukushima Daiichi NPP disaster represents the maturation of citizen science in general and has intensified the debate about quality control, training, and reliability of the data they produce. The independence of citizen-based environmental monitoring organizations is an important source of their credibility in the eyes of the public, and for this reason needs to be carefully guarded. Nevertheless groups like Safecast which promote the principles of openness and transparency should welcome close scrutiny and evaluation of their systems by outside experts and official radiological monitoring bodies. From the point of view of the public, information about potential health risks and their associated probabilities and uncertainties in detection, positioning, and potential, performance of sensors, and the human body. The experience of SÚRO and IRSN has shown that appropriate technical evaluation and support within an educational context can help foster interest in citizen-based radiation measurement, and provide the basis for good communication regarding risks and emergency response between citizen networks and experts.