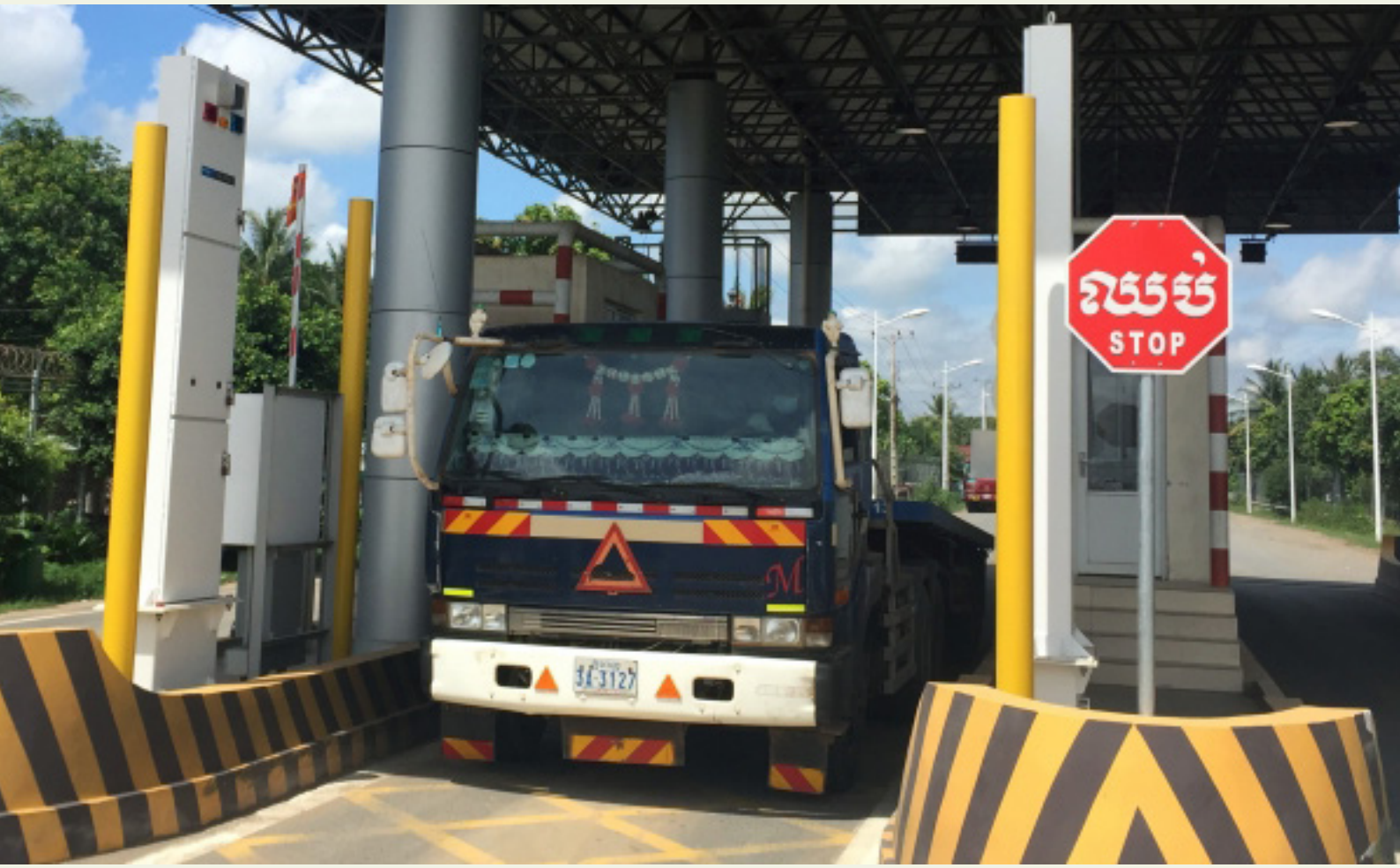
New app helps customs officers improve radiation detection for nuclear security



Every truck entering or leaving Cambodian ports passes through a radiation portal monitor – see the white panels with the red, orange and blue buttons. One third of shipments at the Phnom Penh port set off this alarm, even if they contain only harmless amounts of naturally occurring radiation. A new app developed by the IAEA will help customs officers zoom in on the shipments that may really contain smuggled radioactive material.

(M. Gaspar/IAEA)

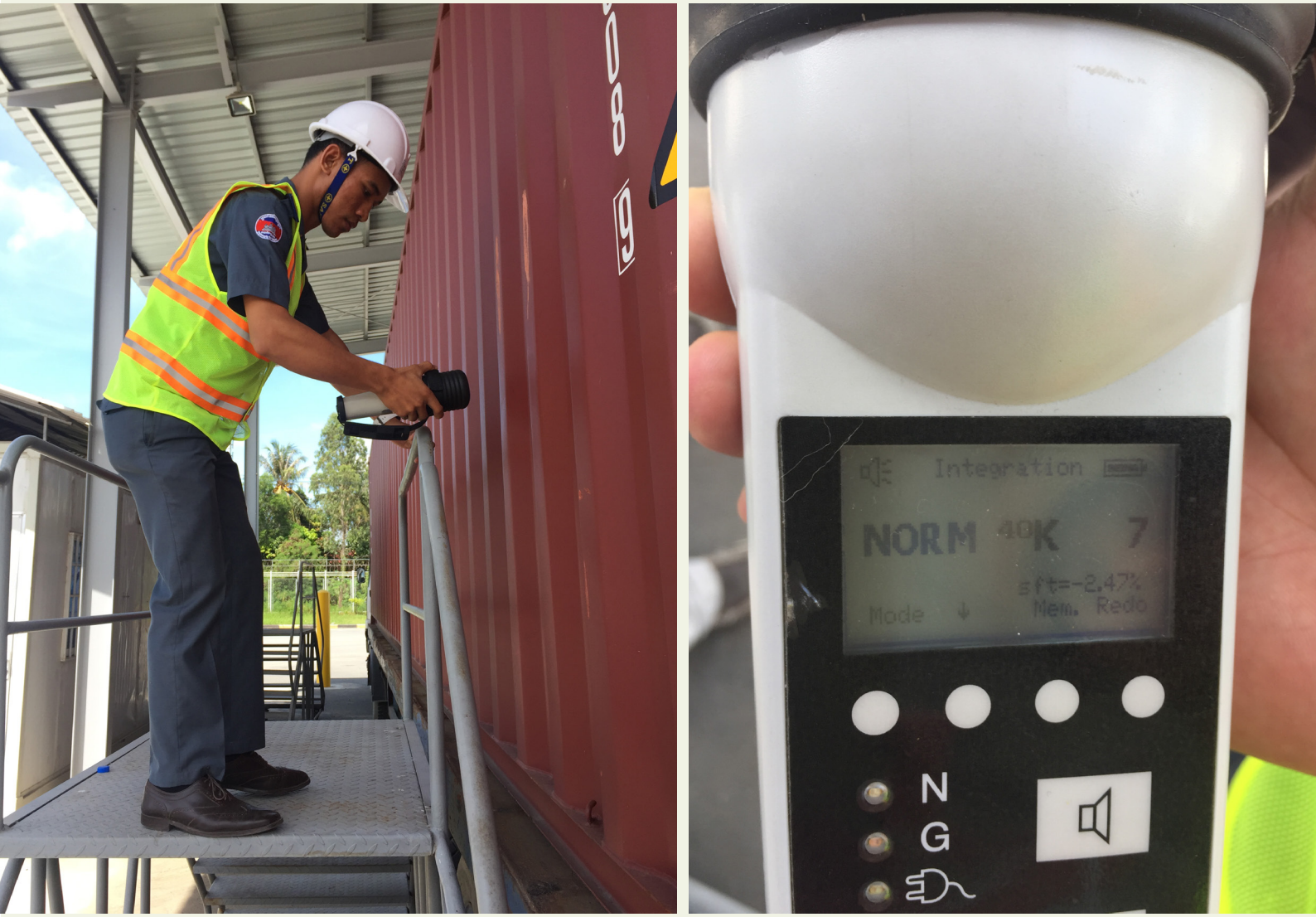
Customs officer Mengsrom Song and his colleagues are used to the sound of radiation alarms. One third of cargo container shipments passing through the Phnom Penh Autonomous Port set off alarms on the sensitive radiation portal monitors intended to catch smuggled radiation sources and nuclear material.

However, all the alerts since the device was installed in July 2016 have been caused by material such as tiles, fertilizers and construction materials, said Song, deputy chief of the customs office at the port, located on the Mekong River just outside the Cambodian capital, Phnom Penh. The port handles one quarter of the country's foreign trade.

"Evaluating radiation alarms represents a huge challenge for us, as they require us to perform secondary inspections on dozens of containers a day," Song said. "This takes time and resources, and detracts from our other work." Secondary inspections involve the time-consuming use of hand-held radionuclide identification devices, which measure the amount of radiation and identify its type and source, as well as analysis of the data from the radiation portal monitor to check the type and origin of the commodity.

A new smartphone application launched by the IAEA will help to distinguish between alarms caused by harmless amounts of naturally occurring radiation and alarms that might be a cause for concern from a security standpoint and warrant further investigation.

The app is the outcome of an IAEA-coordinated research project that aims to improve the assessment of initial alarms. Researchers from the IAEA and 20 countries have worked together to improve the alarm assessment process by developing tools and algorithms for the detection software, with the goal of enabling it to distinguish between



A customs officer performing a secondary inspection on a truck that set off the port's radiation alarm. The handheld device confirms that the alarm was triggered by harmless amounts of naturally occurring radiation from potassium-40 isotopes, rather than from smuggled radioactive sources or nuclear material.
(M. Gaspar/IAEA)

radiation from potentially smuggled man-made sources and naturally occurring radiation.

Download the app from iTunes and Google Play.

The key to the research is being able to distinguish between the radiation characteristics of these different substances, said Charles Massey, nuclear security officer at the IAEA, who coordinates the research. The distinction cannot be based on the quantity of radiation, because the detectors need to catch even small amounts of nuclear or other radioactive material that may be present. Instead, researchers are looking into ways to identify the make-up of radiation from the different isotopes that characterize each material. The software will need to identify and record these, so that it can screen out radiation from naturally occurring materials that match the same profiles. This would filter out most of the innocent alarms, allowing customs officers to concentrate on the remaining unclear cases.

Researchers are working on new algorithms for use in the software programs to be installed in the detection systems. In the meantime, the new app, called TRACE (Tool for Radiation Alarm and Commodity Evaluation) provides a detailed compendium of naturally occurring radioactive substances and their typical radiation characteristics. "This is a big step in the right direction, as using the app will reduce the time spent deciding whether a container setting off the alarm requires further investigation," said Sokkim Kreng, customs officer at Cambodia's largest seaport in Sihanoukville.

IAEA guidance recommends that countries use radiation detection equipment as part of their national nuclear security programmes to check exports and imports of commercial goods, as a way to intercept smuggled nuclear and radioactive material.

— By Miklos Gaspar