



## Emergency management

### NUCLEAR AND RADIOLOGICAL EMERGENCIES

A radiation emergency is an event that can lead to exposure of workers, of individuals or of the population as a whole to high levels of ionizing radiation, to prevent which immediate action is required.

Events classified as radiation emergencies range over a broad spectrum. Accidents involving nuclear installations are historically very rare; their potential impact, as demonstrated by the Chernobyl incidents of 1986 and Fukushima in 2011, could concern large areas, even in areas far from their national borders. Accidents involving radioactive sources, for example in use in the medical or industrial fields, which can occur at the place of use, or during their transport. For these, historically more frequent, while not excluding the possibility of producing serious health effects, the potential consequences would remain limited in circumscribed areas, involving limited groups of the population.

ISIN works closely with the Civil Protection Authorities and with operators of nuclear installations or authorized activities for the use of radiation sources as well as with community and international organizations, to guarantee a rapid and effective response to a possible situation nuclear or radiological emergency.

In the field of nuclear and radiological emergency management, the current legislation entrusts the Inspectorate with the primary task of providing the necessary technical support to the Civil Protection Authorities, both as regards the phase of preparation for emergencies (preparation and management of emergency systems, planning activities), which collaborates in response activities to incidental events.

In particular, ISIN:

- carries out the assessments of the incidental analyzes that the operators of nuclear installations are required to perform, providing the Civil Protection Authorities (the Prefect for local emergencies and the Presidency of the Council of Ministers - Department of Civil Protection, for those of national character) the technical bases for the preparation of emergency plans;
- participates in the activities of planning committees in the preparation of emergency plans;
- contributes to the national alert system through the management of automatic environmental radioactivity monitoring systems which, on a national scale, operate for the purpose of alerting;
- is the national contact point and national authority competent in the field of community systems and international conventions for prompt notification in the event of a nuclear accident or radiological emergency;
- provides, in the early phases of an emergency, based on the information held for nuclear safety aspects, the status of the damaged installation and its foreseeable evolution, as well as the forecast of the radiological impact on the national territory following the dispersion of the radionuclides accidentally released into the atmosphere;
- hosts, by coordinating its activities, the CEVaD Data Processing and Evaluation Center, which is entrusted with the task of providing estimates of the time and space trends of exposure levels, for the purpose of identifying and adopting the necessary measures to protect public health, as well as to support the authorities responsible for disseminating information to the population;
- coordinates the National Surveillance Network of Environmental Radioactivity, RESORAD Network.

### NUCLEAR EMERGENCY CENTER



The Nuclear Emergency Center (CEN) constitutes the ISIN operational structure in response to a nuclear or radiological emergency. The services and systems that compose it operate in support of the activities that the Inspectorate is called to perform in the management of such emergencies.

In case of an accident at a nuclear installation, e.g. in one of the installations near the Italian borders (reference to those within 200 km from the borders), in the initial phase of the emergency (first hours following the accident), the Inspectorate has the task of alerting the Authorities on the basis of information received from the international notification systems, of which it is a national contact point, or through its own early warning networks. It must therefore carry out the first evaluations of the event and estimate, through the systems for the prediction of atmospheric dispersion of radioactivity, the potential interest of the national territory. Furthermore, as required by the legislation in force, it must host and coordinate the activities of the Data Processing and Evaluation Center (CEVaD), which makes use of support systems to manage emergencies operating in the Nuclear Emergency Center of the Inspectorate.

### **Prompt notification and information exchange**

The Inspectorate is the national point of contact in the international systems of prompt notification and rapid exchange of informations; it has the task of receiving and evaluating informations readily exchanged on these circuits in the event of a nuclear emergency.

These systems were introduced after the Chernobyl tragedy, following the agreements that sanctioned, in the event of a nuclear or radiological accident, the obligation for the country where the incident occurred to promptly notify international organizations and affected countries or potentially affected by the effects of the emergency.

The implementation of these agreements led to the realization of two systems for prompt notification of nuclear accidents:

- the ECURIE system (European Commission Urgent Radiological Information Exchange) which establishes the obligation for EU countries to notify the European Commission and all other member countries of any nuclear or radiological accident in their own country;
- the USIE System (Unified System for Information Exchange in Incidents and Emergencies) adopted by the International Atomic Energy Agency (IAEA), which extends the notification requirement also to non-EU countries, whose regulatory bases are represented by the International Convention of September 1986, on the prompt notification of a nuclear accident.

To these systems, we must add the channels for the rapid exchange of information carried out within the framework of bilateral agreements with neighboring countries, directly by the Inspectorate with the Slovenian Nuclear Safety Authority (SNSA), Swiss (ENSI) and French (ASN), in addition to the government level agreement between Italy and Switzerland. These agreements provide for the sending of alarm communications to the CEN of the Inspectorate.

### **Availability system for ISIN experts**

Availability for nuclear and radiological emergencies is structured to deal with the first phase of an emergency and, in any case, until the entire structure of the Inspectorate is fully activated. This, both in the case of incidents deriving from the use or transport of radioisotopes, for which it is possible to foresee a relatively inadequate activation of the system, both in the event of emergencies against nuclear facilities across the border, which may involve the need for complex and prolonged management over time, for which the full activation of the Center is required.

The organization of Availability provides for the ready availability of different competence profiles, whose coordination is entrusted to a specific figure, in fact, the Emergency Coordinator in turn. On call availability, active



24/7, consists of experts in the field of nuclear plant safety, radiation protection, use of radioactive sources and their transport, environmental radiometric measurements and management support systems of emergencies operating at the CEN.

### Automatic alarm monitoring networks

After the nuclear accident at the Chernobyl power plant, it emerged the importance of adopting specific emergency organizations and specific infrastructures aimed at facing possible nuclear accidents, even outside the own national territory. In many countries, alert alarm monitoring networks were therefore set up, able to report abnormal levels of radioactivity continuously and with adequate territorial coverage.

ISIN manages two automatic monitoring networks, with a national coverage, complementary to each other: the REMRAD and GAMMA networks, which contribute to the national alert system in the event of the arrival of a radioactive cloud on the Italian territory, resulting, for example, in an accident in one of the nuclear plants operating across the border.

The REMRAD Network currently consists of 4 stations located in strategic points of the national territory in which, in relation to the predominant winds, a radioactive cloud from a foreign plant, would make its appearance on the Italian territory. The stations are located at the teleposts of the Italian Air Force of Bric della Croce (TO), Monte Cimone (MO) and Capo Caccia (SS), as well as at the National Institute of Oceanography and Experimental Geophysics, OGS, of Trieste. The station equipment is able to measure even relatively low levels of radioactivity present in atmospheric particulate, also providing valuable information on the type of radionuclides that may be present.

The GAMMA network, which has a more widespread distribution on the national territory with its 61 monitoring stations, provides the measure of the rate of equivalent of ambient dose, adding the component possibly present in the air with that deposited on the ground. It is therefore an effective tool for monitoring radioactive fallout following the passage of airborne contamination.

Representing Italy, the GAMMA network participates in the EURDEP platform (European Radiological Data Exchange Platform) which is the tool the European Community has adopted to respond to the requirements of the Council Decision 87/600/EURATOM regarding exchange rapid release of data produced by national monitoring systems during a nuclear emergency. Therefore, the system allows to follow in real time the evolution of a radioactive cloud throughout the European territory.

Internationally, the GAMMA Network participates in the IRMIS system, the system developed by the United Nations Atomic Energy Agency (IAEA) as part of initiatives to implement international conventions and to support the role that, in terms of management to nuclear emergencies, the IAEA itself has taken on towards the international community.

The flow of data made available has recently been increased thanks to the cooperation with the ARPAs of the regions operating similar networks (Agencies in Valle d'Aosta, Piemonte, Emilia-Romagna, Lombardia, Puglia and Molise), as well as that with the Monitoring Network of the Ministry of Interior Affairs, managed by the National Fire Corps. This, following the integration of the data produced by the regional monitoring stations and the VVF network, into the systems of the Nuclear Emergency Center of the Inspectorate.

### Forecast of the evolution of the radioactive cloud and estimate of doses and soil contamination

These systems have the task of quickly estimating, using meteorological data and their forecasts, the expected evolution of the radioactive cloud and the consequent radiological impact in terms of doses and environmental contamination. Especially in events with the release of large quantities of radioactivity in the environment, such as



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in the case of a serious accident at a nuclear power plant, the transport and dispersion of the contaminated air masses and the associated time play a fundamental role in the decisions to be made at protection of the population. The first assessments of the expected impact can be made in the initial phases of a radiological emergency, before the arrival of the contamination and the availability of the results of the environmental monitoring measures, allowing a more rapid adoption of the necessary provisions.

Among the CEN, the ARIES system operates: it's a platform in which, for different geographical scales, models for calculating the dispersion in the air and the deposition on the ground of radioactivity, models of calculation of the dose of the population that take into account the possible routes of exposure and for the different radionuclides present in the released contamination are integrated. Models are constantly updated, in real time, with meteorological data acquired by the Air Force Meteorological Operations Center (COMet). The forecasts (maps) of the concentrations of radioactivity in the air and of the soil contamination deposited, as well as of the relative doses to the population, play a fundamental role in the context of what is foreseen by the national planning as regards the definition of the different operational phases of the emergency, consequently, the implementation of the relative protective measures to protect public health.

### Data Processing and Evaluation Center - CEVaD

The ISIN Data Processing and Evaluation Center (CEVaD) ensures a common technical reference point in the management of nuclear and radiological emergencies. The Center is a technical structure supporting the Civil Protection Authorities, for assessing the levels of radioactivity in the environment in an emergency situation and the resulting levels of exposure. The assessments of the CEVaD are made available to the Authorities responsible for emergency management for the identification of the necessary measures as well as to those responsible for the dissemination of the information, together with the relative radiometric elements.

All survey centers and networks must, in fact, send CEVaD the results of the measurements taken during the emergency. Furthermore, based on the current situation, CEVaD may indicate particular operating methods to which all the subjects that operate measures on the national territory must comply with.

The CEVaD is activated by the ISIN at the request of the Civil Protection Department, or the Prefect in the case of local emergencies. The Inspectorate coordinates CEVaD activities and provides the necessary technical and logistical support through its Nuclear Emergency Center.

The CEVaD is composed of radioprotection experts and in the field of radiometric measurements, designated by the ISIN, with coordination tasks, by the Istituto Superiore di Sanità, by the Ministry of the Interior Affairs - National VVF Corps and by INAIL, as well as by experts of the Regional Environmental Protection Agencies designated by the State-Region Conference, as well as by experts of the Meteorological Service of the Air Force.

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