



*Sino-Italian Cooperation Project*

***Ionizing Radiation Protection Activities of Arpa  
Piemonte***

**G. d'Amore**

**Environmental Protection Agency of Piedmont Region  
(ARPA Piemonte)**



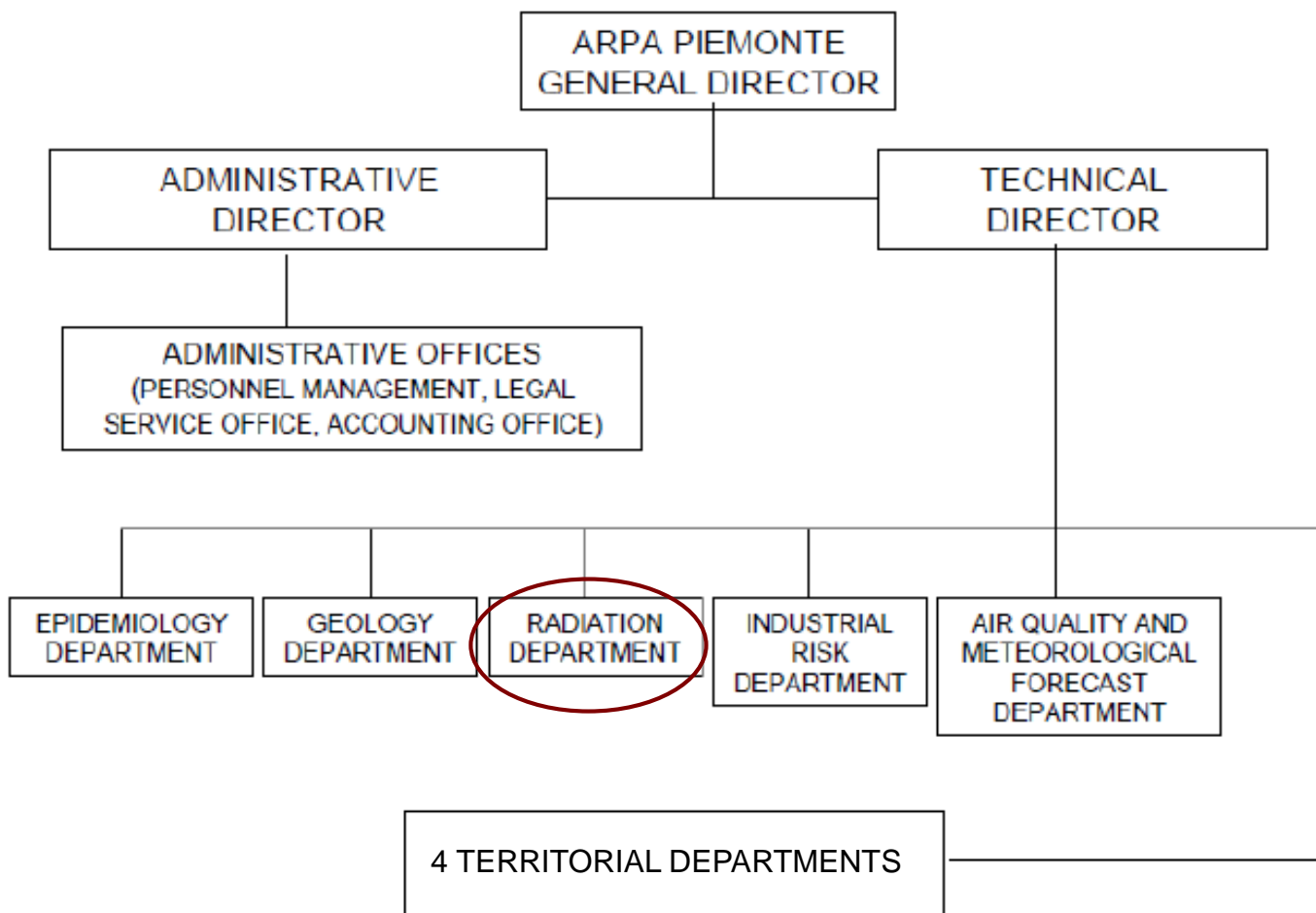
ARPA Piemonte (Agenzia Regionale per la Protezione Ambientale del Piemonte – Regional Environmental Protection Agency in Piemonte) is a public body with independent status for administrative, juridical, technical, asset and accounting management

Arpa Piemonte is a member of a network of 21 Regional Environmental Protection Agencies managed by Ispra (Istituto Superiore per la Ricerca e la Protezione Ambientale - Institute for Environmental Protection and Research)

National System for Environmental Protection (SNPA – Sistema Nazionale per la Protezione dell’Ambiente) established by Law 132/2016

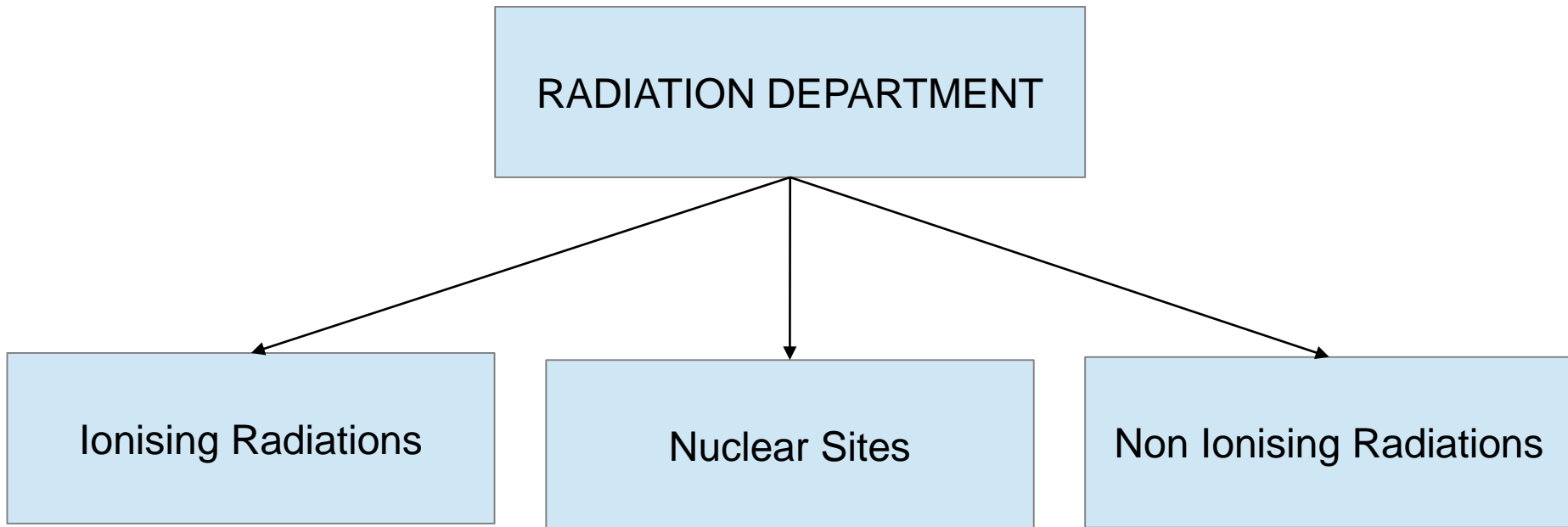
The main role is protection of people from the risk related to exposure to chemical, biological and physical agents.

# ORGANIZATIONAL CHART OF ARPA PIEMONTE



Regional Law n. 18/2016 → Organizational Changes

## *The Radiation Department of Arpa Piemonte*





## MAIN TASKS OF ARPA PIEMONTE RADIATION DEPARTMENT

Environmental radiation monitoring

Collection and periodic dissemination of data on the state of the environment

Formulation of proposals and opinions for regional local authorities concerning quality standards for radiation protection

Control over activities relating to the peaceful uses of nuclear energy and over the effects of ionising radiation on the environment

Technical advice on the use of radioactive materials and radiation-emitting devices

Technical support to local authority of National Health Service for protection of workers



## In Italy the radiation environment management is regulated by two framework laws:

Safety standard for the protection of the health of workers and general public against the dangers arising from **ionizing radiation** (Decree Law 230/1995)

Regarding radiation environment management

The national system of environmental radioactivity monitoring is based on a set of networks for surveillance, measurements and controls carried out by different structures distributed throughout the territory

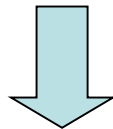
Decree entrusts national Institute for Environmental Protection and Research (ISPRA) with the technical coordination functions of national surveillance networks



## Environmental radioactivity monitoring

Arpa Piemonte contributes to the national network of environmental radioactivity monitoring (RESORAD). This network is basically a collection of a subset of data from the regional/provincial networks.

The aim of the network is the surveillance of the pattern of environmental and dietary contamination and the identification of anomalous variations of radioactivity as a result of a (nuclear) accident.



Assessment the radiation doses which the Italian population may receive and production of data for support to management and decisional processes in case of emergency



## Environmental radioactivity monitoring

RESORAD include the sampling and subsequent laboratory analysis of environmental and food matrices as shown below

<b>Matrix</b>	<b>Sampling frequency</b>	<b>Measurement frequency</b>
Air particulates	Daily	Monthly
Fallout	Monthly	Monthly
Aquatic Environment	Six-Monthly	Six-Monthly
Drinking water	Six-Monthly	Six-Monthly
Milk	Weekly	Monthly
Meat	Monthly	Three-Monthly
Cereal and by-product	Seasonal	Seasonal
Complete meal = mixed diet	Three-Monthly	Three-Monthly
Vegetable	Seasonal	Seasonal
Fruit	Seasonal	Seasonal





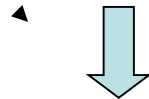
# Environmental radioactivity monitoring

Management of regional environmental radioactive network by Arpa Piemonte (sampling network based on laboratory analysis of sampled matrices and automatic network based on gama dose rate detectors)

Water sampling



Undisturbed soil sampling



Estimation of average annual radiation dose for population living on regional territory



# Environmental radioactivity monitoring

## Radioactivity surveillance networks implemented by Arpa Piemonte

- Regional network for radiation dose assessment to regional population
- Nuclear sites networks for radiation dose assessment to the surrounding population (critical group)

# Nuclear Installation in Piemonte Region



- **Bosco Marengo**, former nuclear fuel factory
- **Trino**, PWR power plant in decommissioning
- **Saluggia**, reprocessing plant in decommissioning and spent fuel repository still operating



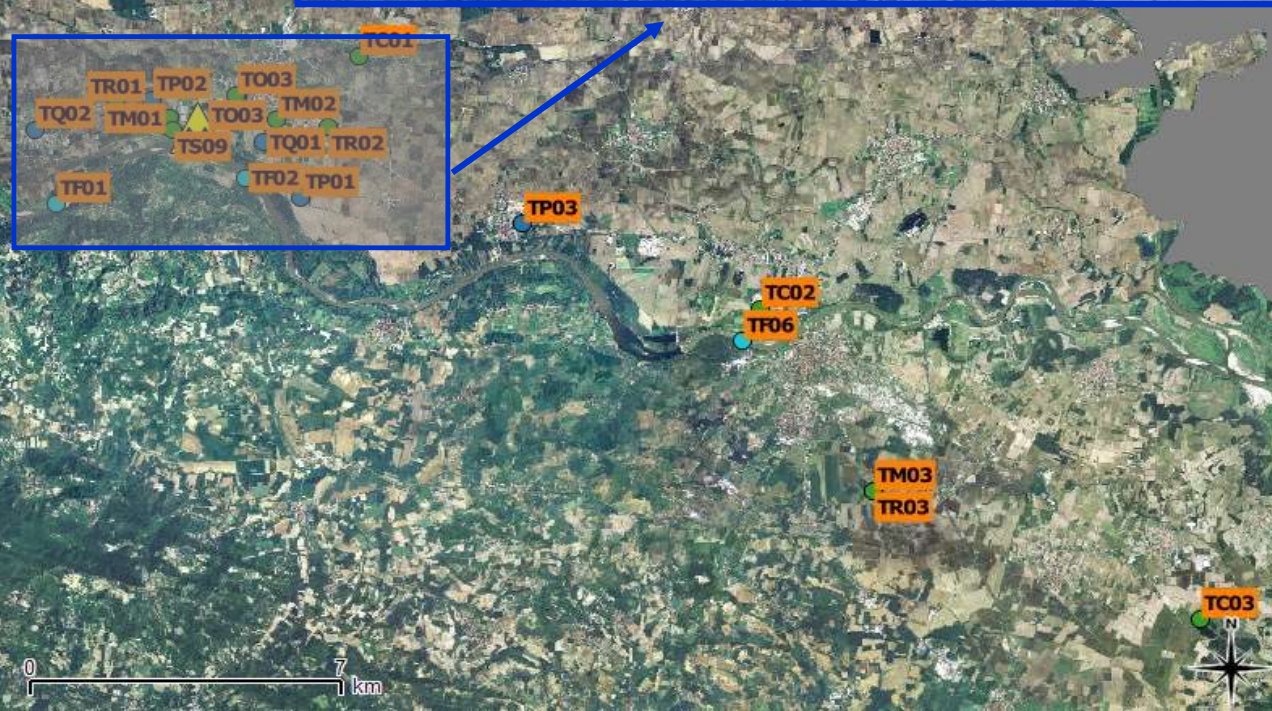
# Arpa Piemonte activities for nuclear sites

At nuclear sites operate three local radiological monitoring and control networks managed by Arpa Piemonte

**Monitoring** include analysis of radioactivity in environmental and food matrices samples around the sites, according to a scheduled programme

**Control** include, according to ISPRA, analysis of radioactivity in liquid effluents from nuclear facilities, the surveillance on extraordinary activities carried out by plants or in case of abnormal events and the verification of clearance levels.

# Radiological monitoring network at Trino site



## Matrices

Airborne particles

Drinkable water

Groundwater

River water

River sediments

Milk

Cereals

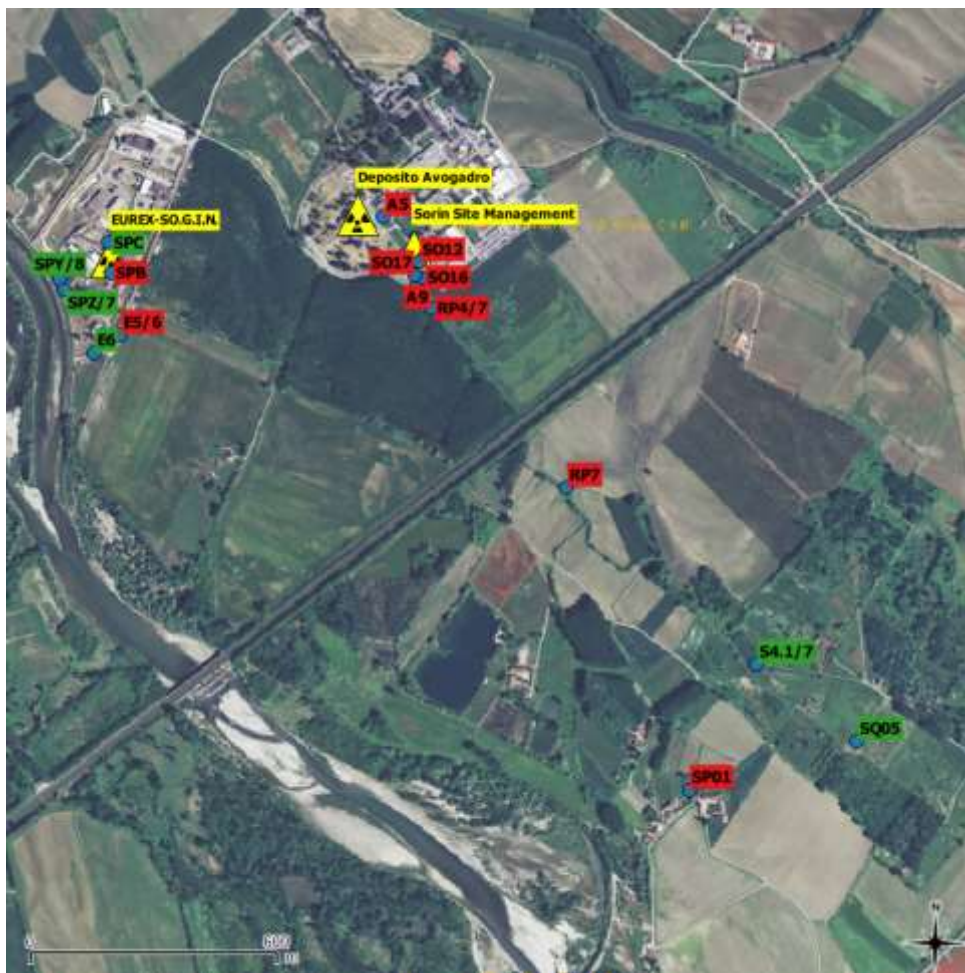
Vegetables

Grass

Soil

# Extraordinary radiological monitoring network of groundwater at Saluggia site

From 2007 analysis results showed the presence of contamination in the groundwater (**Sr-90, Co-60, Cs-137 e H-3**) due to the nuclear facilities of the site



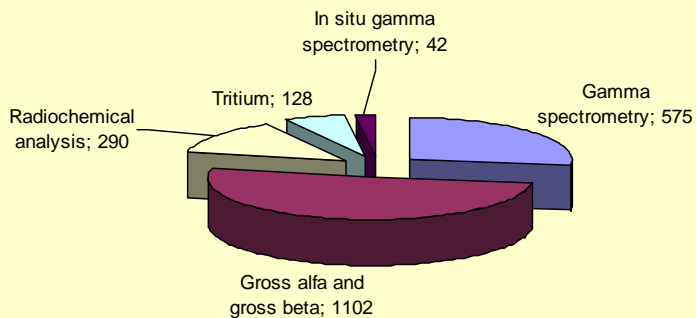
Contaminated well

Not contaminated well

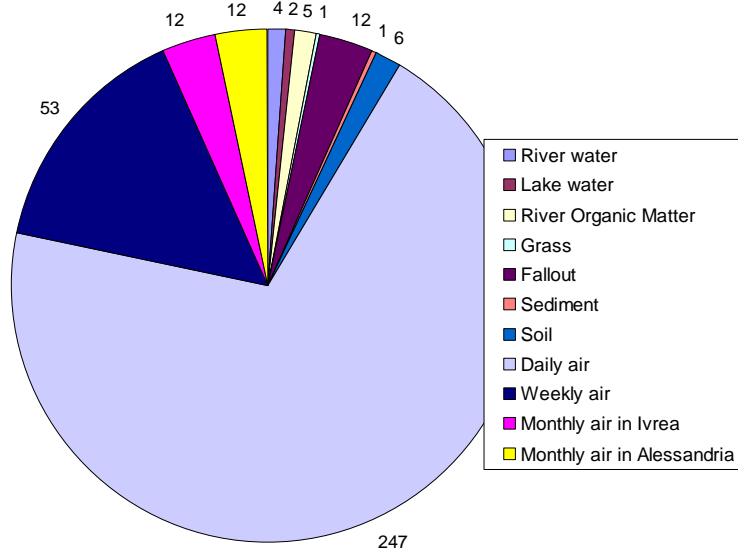
# Environmental radioactivity monitoring performed activities

About 4000 analysis on about 2000 samples

Year 2015 analysis



Number of radiometric analysis of environmental samples



**Arpa laboratory is Accredited  
UNI CEI EN ISO/IEC 17025:2005**



## *Monitoring radiation during nuclear transports*

The transfer of the spent fuel stored in the Italian nuclear facilities to the La Hague reprocessing plant (France) is supervised and monitored by Arpa Piemonte







# Radiation Protection

A regime for protection of general public and environment against the hazards of ionising radiation is established in Legislative Decree N. 230 of 17 March 1995 and N. 241 of 26 May 2000

Controlling all sources of ionising radiation to avoid any contamination of the public and of the general environment;

Possession and use of such sources has to be notified to Arpa Piemonte

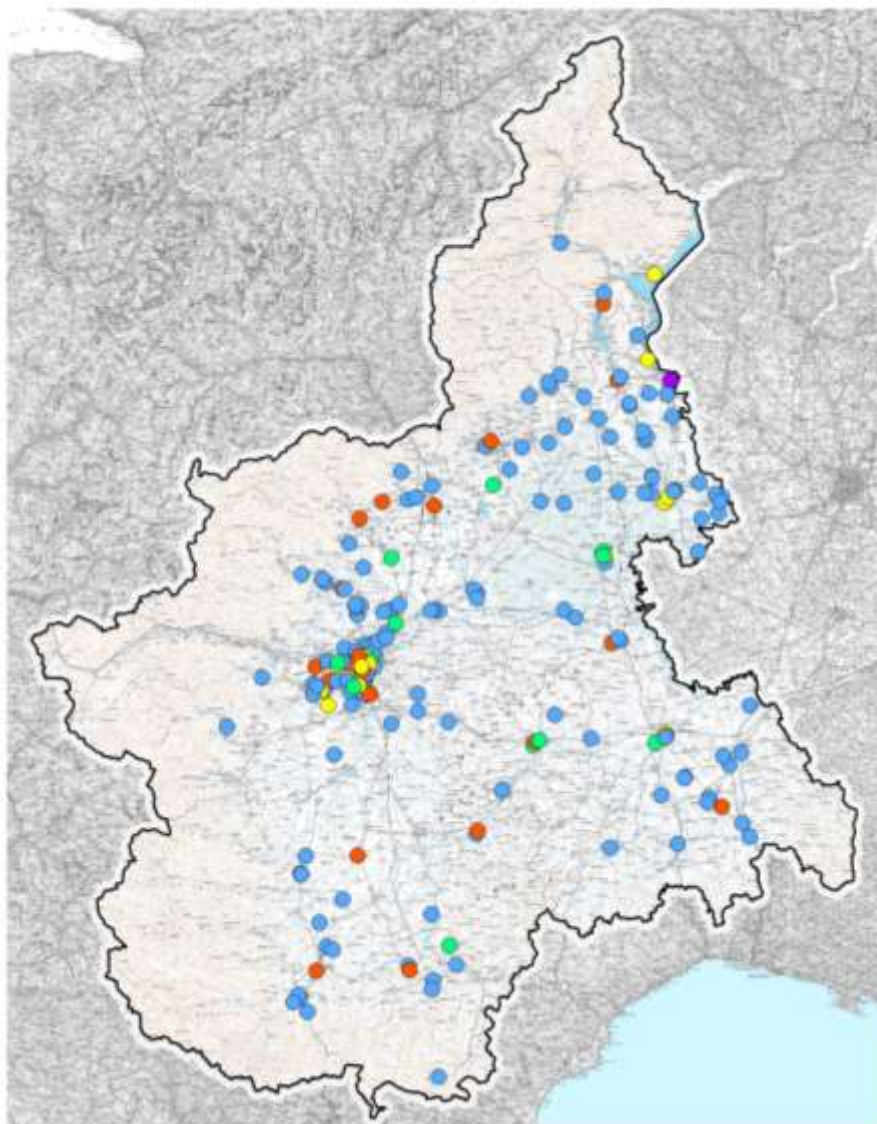
Realization and management of Digital Register of radioactive sources used on regional territory

Inspection activity to ensure protection against the risk of radioactive environmental contamination



# Radiation Protection

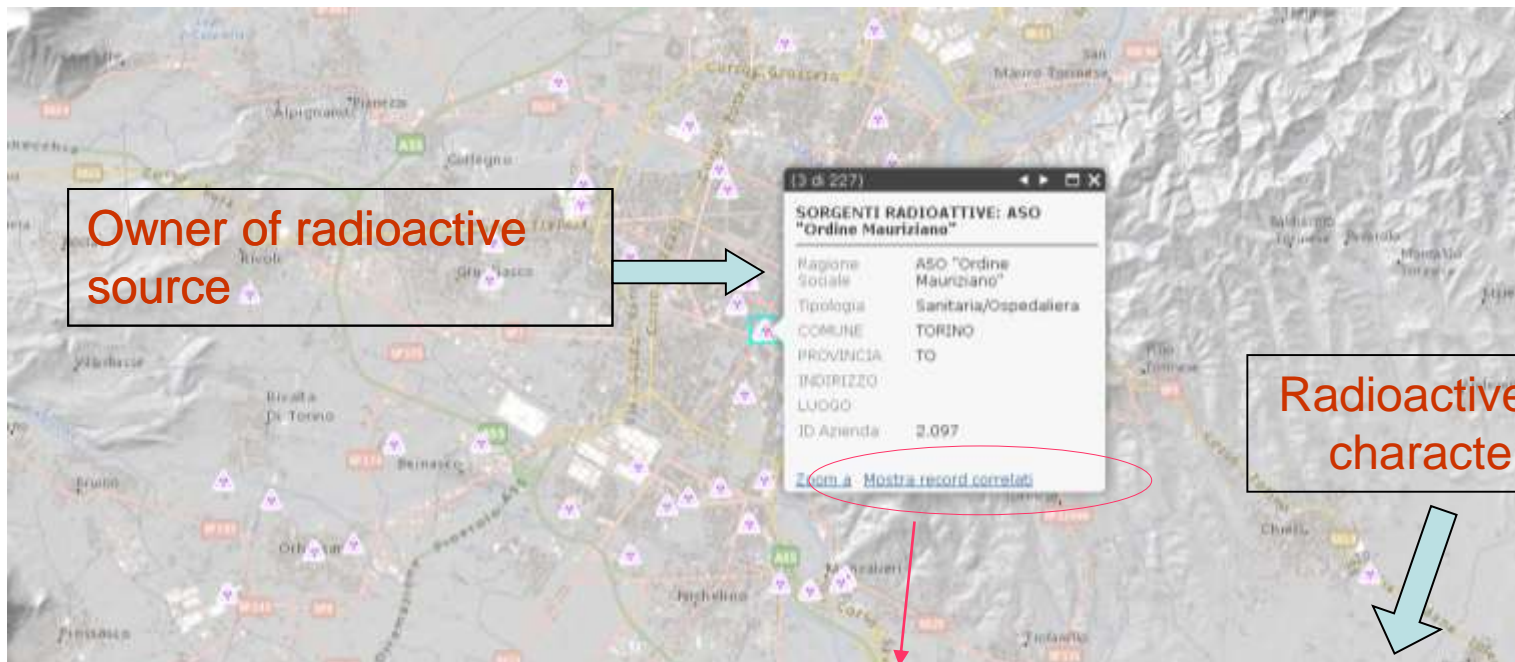
Digital Register of radioactive sources used on regional territory



- Public bodies
- Research use
- Industrial use
- Healthcare use
- Veterinary use
- Regional border

# Digital Register of radioactive sources used on regional territory

Data base was filled with data deriving from information to be included in licensing applications:



Owner of radioactive source

Radioactive source characteristics

OBJECTID	ID AZIENDA	RADIOISOTOPO	TOTALE SORGENTI	TIPO SORGENTE	ATTIVITA' TOTALE DETENUTA
63	2.092	H-3		Non sigillata	12
53	2.097	Sr-90		Non sigillata	9.000
54	2.097	Sr-90		Non sigillata	148
60	2.097	I-131		Non sigillata	90.713
55	2.097	In-111		Non sigillata	256
51	2.097	Y-90		Non sigillata	2.420
59	2.097	I-125		Non sigillata	36
64	2.097	Ba-133		Non sigillata	5
65	2.097	Ba-133	2	Sigillata	20
50	2.097	Tl-201		Non sigillata	30.131
61	2.097	Cs-137	1	Sigillata	172
66	2.097	Co-57	2	Sigillata	333
56	2.097	Pu-238 (pace-maker)	0	Sigillata	101.076



## Radioactive substances and equipment

The use of radioactive materials and radiation-emitting devices requires a licence from the Minister for Economic Development (Category A) and clearance certificates from the Prefect of the province (Category B) with the agreement of other competent authorities.

Use includes trade in materials as well as activities related to their use, such as handling, treatment and the eventual disposal of waste into the environment

Arpa Piemonte provides technical advice on the use of B category ionizing radiation sources (X Ray Equipment with voltage higher than 200 kV, Radionuclide with activity higher than given values)

A category includes X Ray Equipment and Linear Accelerator with voltage higher than 25 MV, Radionuclide with activity higher than given values



# Radioactive Contamination in Metal Scraps

Metal scrap, widely used in steel production, come from: rejects from industrial processes, industrial demolition, car bodies, metal shavings etc

Italy is the first importer of metal scraps in the European Union (no iron production from mines) with about 4 million tons imported each year.



Possible radioactive contamination of metal scraps consignements

Radiometric surveillance by Arpa Piemonte in smelting plants and scrap collecting factories





# Emergency Interventions

Applicable intervention levels in the event of an emergency and also the corresponding levels applicable to foodstuffs and beverages are established in legal enactments

“External emergency plans” to be put into action when an accident occurs in a nuclear installation and involves a risk for the local population are drawn up for each plant

Arpa Piemonte experts participate to technical unit foreseen in the plan for the first phase emergency operations; at the same time technical staff collaborates to radiological analysis execution with firefighters

In the second emergency phase a long period radiological monitoring network is managed by Arpa Piemonte



## Emergency Interventions

In the event of an accident during an operation which involves radioactive substances, if the environment is effected, the operator must intervene to prevent the risk of subsequent contamination or injury to persons. The Prefect of the Province and the local authorities of the National Health Service must be informed immediately

Availability Service for emergency interventions: Arpa technical experts can be called for a real time evaluation of radioactive contamination due to release of radioactive substances into the environment

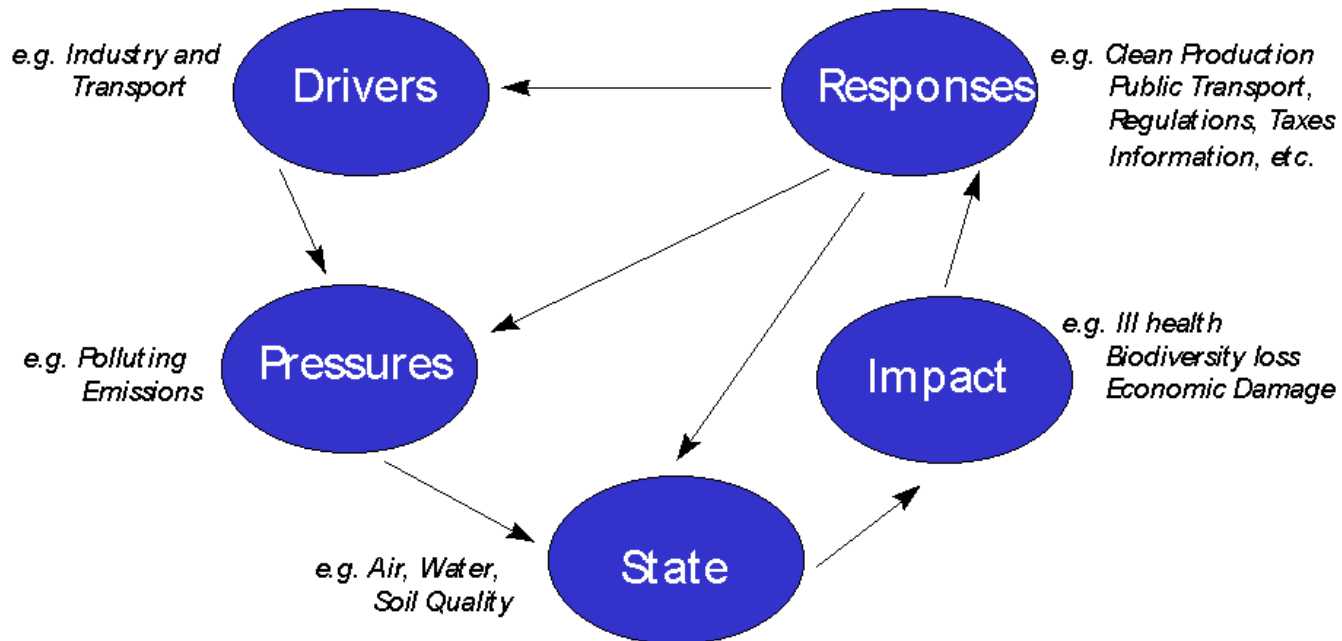
Collection and periodic dissemination of data on the state of the environment



Annual State of the Environment Report



Environmental indicators: DPSIR Framework







Collection and periodic dissemination of data on the state of the environment

## Environmental indicators: PSR Framework

### Ionizing Radiation

Total activity of radioactive wastes and spent fuel

Activity of liquid effluents released from nuclear plants and fuel-cycle facilities

Cs137 activity concentration in environmental and food samples

Activity concentration in the environmental and food samples

Annual individual effective dose for population

Number of radiometric analysis of environmental and food samples

PRESSURE

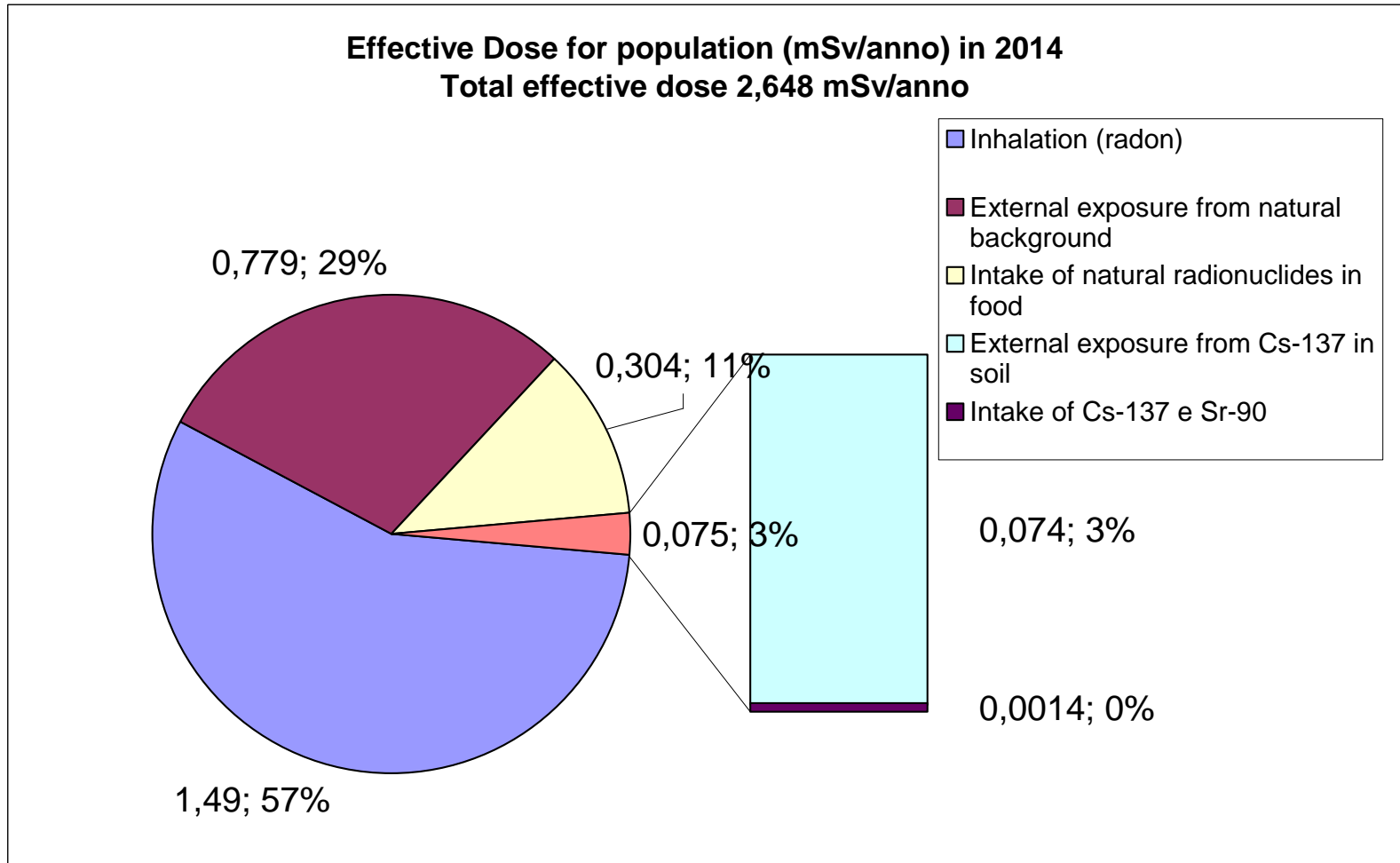
STATE

IMPACT

RESPONSE

# Annual State of the Environment Report

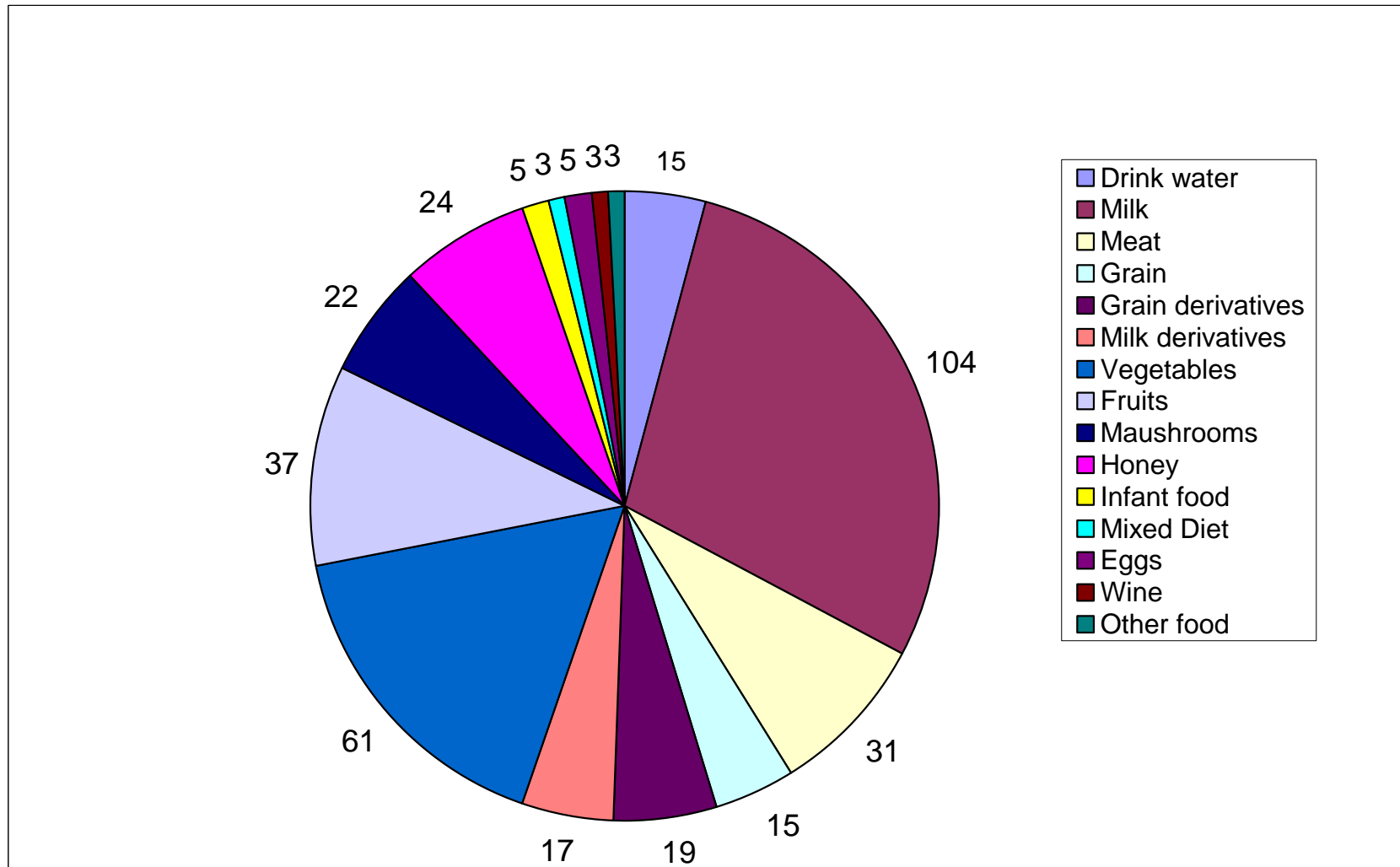
## Annual individual effective dose for population





# Annual State of the Environment Report

## Number of radiometric analysis of food samples





THANK YOU FOR YOUR ATTENTION