Sino-Italian Cooperation Project

Role and tasks of Arpa Piemonte in controlling and monitoring of ionizing and non ionizing radiation

G. d'Amore

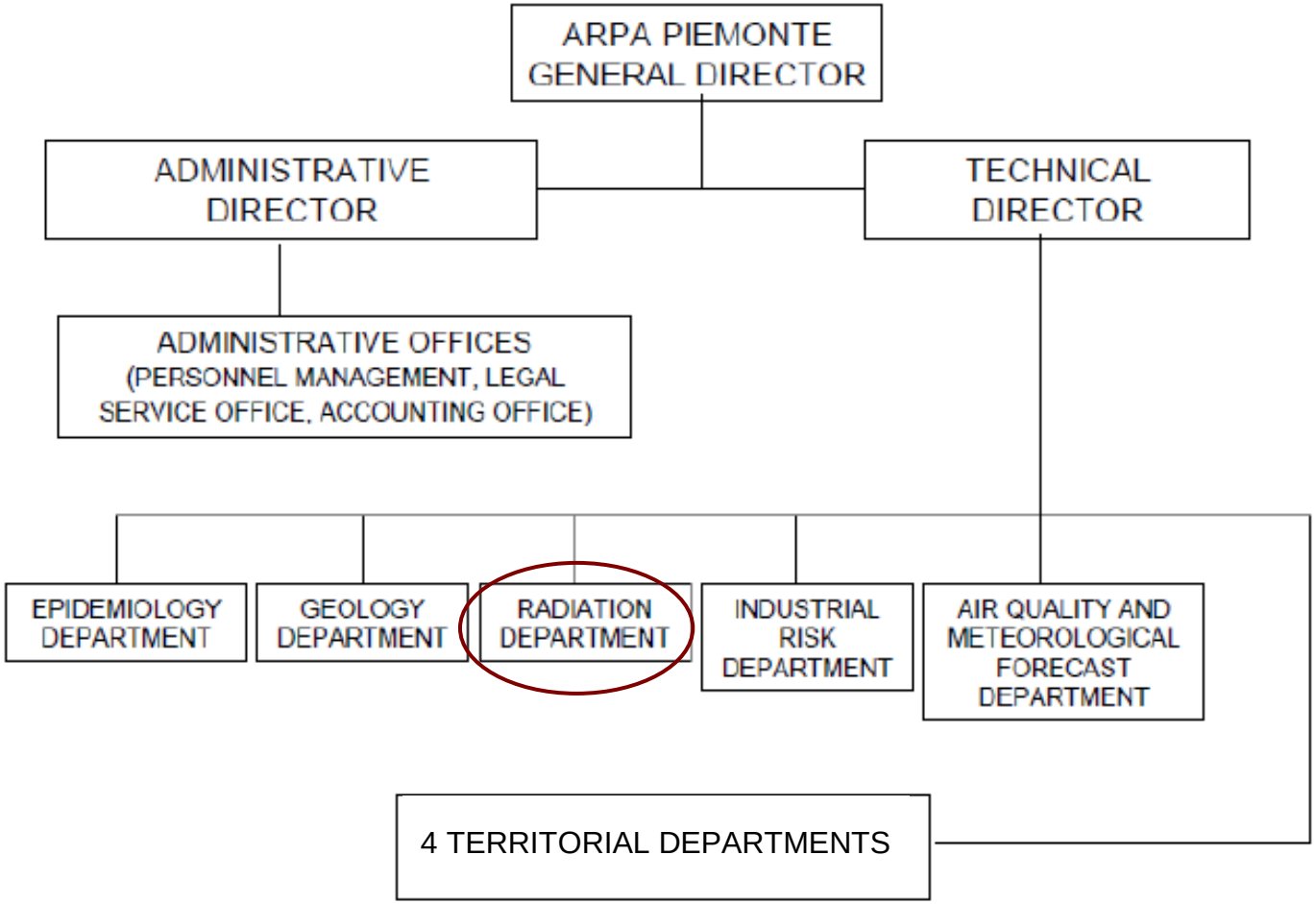
Environmental Protection Agency of Piedmont Region (ARPA Piemonte)

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

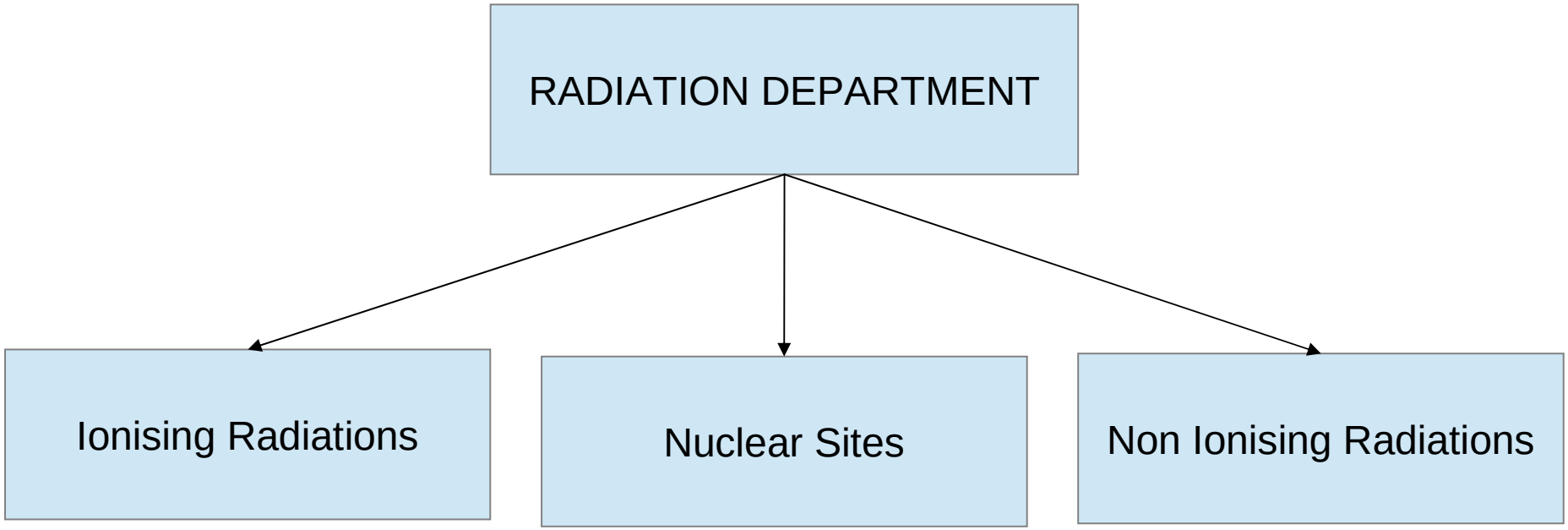
Arpa Piemonte is a member of a network of 21 Regional Environmental Protection Agencies managed by Ispra (Istituto Superiore per la Ricerca e la Protezione Ambientale - Institute for Environmental Protection and Research) in Rome.

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

ORGANIZATIONAL CHART OF ARPA PIEMONTE



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

Measurements of electromagnetic fields for compliance with standard limits

Technical advice on the compliance with limits of the emissions from the new broadcast installations and radio base stations for mobile phone

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

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RADIATION PROTECTION TASKS AND REGULATORY FRAMEWORK FOR NUCLEAR ACTIVITIES IN ITALY

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

Radioactive substances and equipment

Radiation Protection

Radioactive Waste Management

Nuclear Installations

Radioactive substances and equipment

The use of radioactive materials and radiation-emitting devices is divided into two categories (A and B) requiring 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.

B CATEGORY
- X Ray Equipment with voltage higher than 200 kV
- Radionuclide with activity higher than given values

A CATEGORY
- X Ray Equipment and Linear Accelerator with voltage higher than 25 MV
- Radionuclide with activity higher than given values

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

Radioactive substances and equipment

The information to be included in licensing applications:

- information relating to the applicant;
- the intended use of the radioisotopes (industrial,agricultural, medical or scientific),
- the location of the premises involved;
- the professional qualifications of personnel;
- etc…….

Authorities responsible for medical uses of radioactive materials and radiation emitting devices shall be set up under regional legislation.

Radioactive substances and equipment

Arpa Piemonte representatives participate to technical committee, established by Piemonte regional law, that gives advice on the medical use of such materials and devices

Committee composition
- Local Authority of National Health Service (Chair Committe)
- Arpa Piemonte
- Fire Fighters (Technical Unit for Radiological Emergencies)

Arpa Piemonte provides advice for Prefect requirements on the use of B category ionizing radiation sources

Nuclear Installation

Commercial utilisation of nuclear power in Italy started in 1963 and by 1981 four nuclear power plants had been commissioned

In the same period one nuclear fuel production plant and two pilot nuclear fuel reprocessing plants went into operation

These plants continued to be operated until 1987, when they were definitely shut down based on a governmental decision which interpreted the results of a national referendum, called upon after the Chernobyl accident, as the will to abandon the nuclear option.

The spent fuel and the largest part of the radioactive waste to be managed in Italy derive from the operation of nuclear installations. A large amount is expected from nuclear plants decomissioning.

Control and regulatory inspections of nuclear installations in matters of nuclear safety and radiation protection is under responsibility of Ispra

Nuclear Installation

In Piemonte Region are located three shutdown nuclear plants and one spent fuel repository, still operating

- one nuclear power plant
- one nuclear fuel fabbrication plant
- one pilot nuclear fuel reprocessing plant
- one spent fuel repository

Nuclear Installation

Nuclear Facilities in Piemonte Region

- Bosco Marengo, former nuclear fuel factory;
- Trino, PWR power plant
- Saluggia, reprocessing plant and spent fuel repository

Nuclear Installation

At these sites operate three local radiological monitoring and controlling networks managed by Arpa Piemonte

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

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

Monitoring radiation during nuclear transports

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

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Agenzia Regionale per la Protezione Ambientale

Nuclear Installation

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

Radioactive Waste Management

For nuclear plants and other facilities related to detection, handling of radioactive materials and radioactive waste storage and disposal, the operating licence is issued by the Ministry for Economic Development (with the concerted agreement of the Ministries of the Environment Land and Sea, Interior, and Labour Health and social Affairs), taking the technical advice of ISPRA (Institute for Environmental Protection and Research) into account

Any licence incorporate the corresponding technical prescriptions and legally binding requirements formulated by ISPRA

Specific Clearance Levels

Effluent release Levels

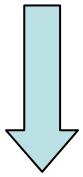
Waste storage and disposal

Arpa Piemonte verifies that the environmental radioactive contamination due to the release of radioactive gaseous and liquid effluents is within regulatory limits

Radioactive Waste Management

Radioactive waste are classified on the basis of the radioisotopes characteristics and concentrations, and considering the possible options for final disposal as main guiding criterion

Category 1	Waste which decay in a few months to radioactivity level below safety concerns (mainly hospital and research waste with T1/2<1 year).
Category 2	Waste which decay to radioactivity level of few hundreds of Bq/g within few centuries. Activity of several radionuclides shall not exceed given values
Category 3	Long lived waste not included in category I and II; high level waste from reprocessing of spent fuel and alpha bearing waste from the fuel cycle and R&D activities



New Classification

5 Classes

Radioactive Waste Management

Radioactive waste are classified into five Classes on the basis of the radioisotopes characteristics and concentrations, and considering the possible options for final disposal as main guiding criterion (Ministry of the Environment Land and Sea Decree of 7 August 2015)

Class	Conditions/Concentations levels	Final disposal
Very short lived waste Mainly hospital and research waste	T1/2<100 days	Storage for decay over a limited period of up to a few years and subsequently cleared from regulatory control according to arrangements approved by the regulatory body
Very low level waste Typically nuclear plants decommissioning waste, soil and rubble	≤ 100 Bq/g, alpha emitters ≤10 Bq/g max	Near surface landfill type facilities with limited regulatory control or National Repository (engineered near surface facilities)
Low level waste Tipically nuclear plants, hospital and industrial waste	- Short lived radionuclides ≤5 MBq/g - Ni59-Ni63 ≤40kBq/g - Long lived radionuclides ≤400 Bq/g	National Repository (engineered near surface facilities)
Intermediate level waste Typically nuclear plants decommissioning waste	- Short lived radionuclides >5 MBq/g - Ni59-Ni63 >40kBq/g - Long lived radionuclides >400 Bq/g - No heat dissipation during its storage and disposal	National Repository (engineered near surface facilities)
High level waste Tipically waste from fuel reprocessing plants and spent fuel if not reprocessed	- levels of activity concentration high enough to generate significant quantities of heat by the radioactive decay process - waste with large amounts of long lived radionuclides	Temporary storage in National Repository (engineered near surface facilities) and then disposal in deep, stable geological formations

Radiation Protection

A regime for protection of general public and environment against the hazards of ionising radiaton 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;

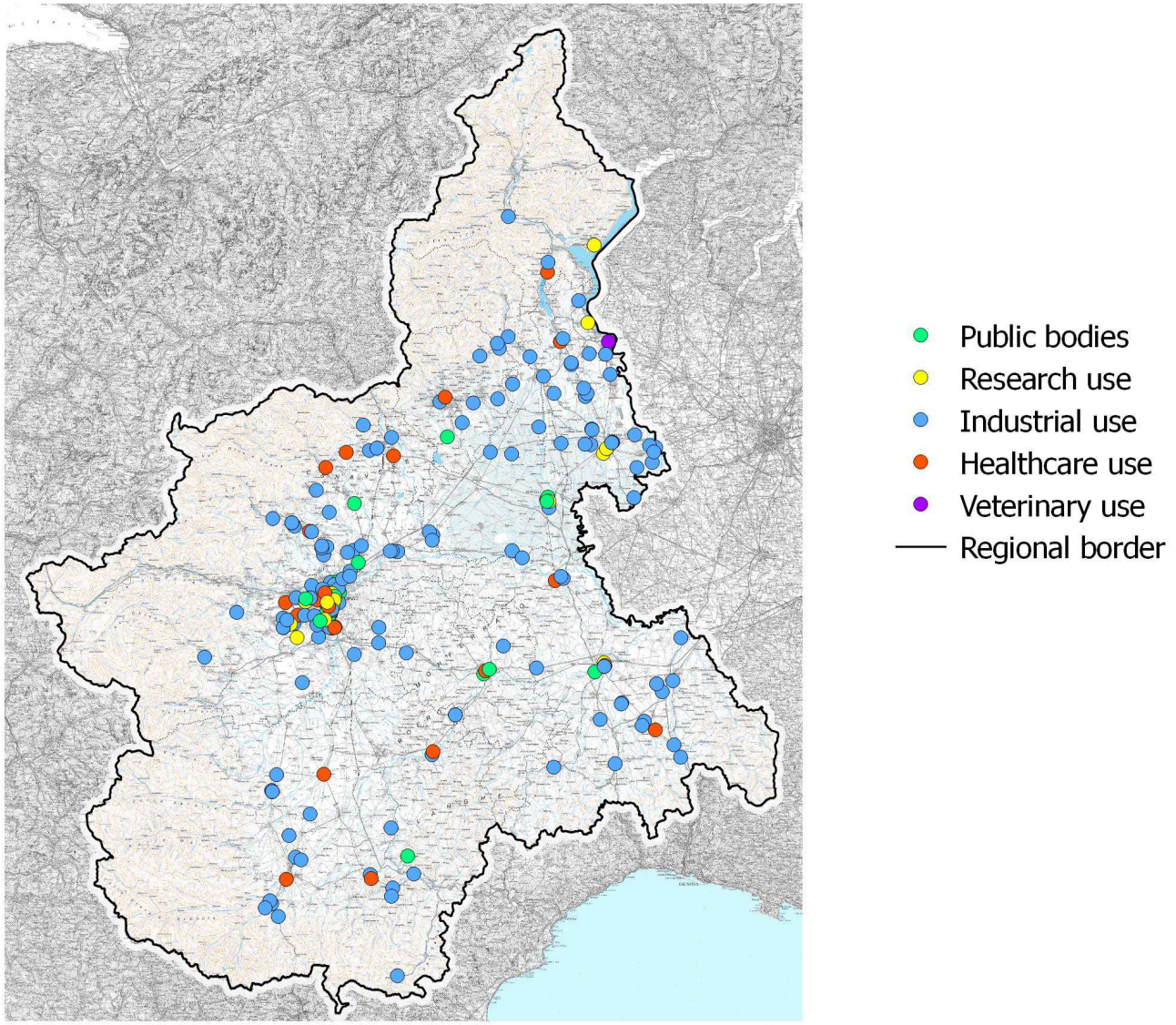
Possession and use of such sources has to be notified to Arpa Piemonte

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



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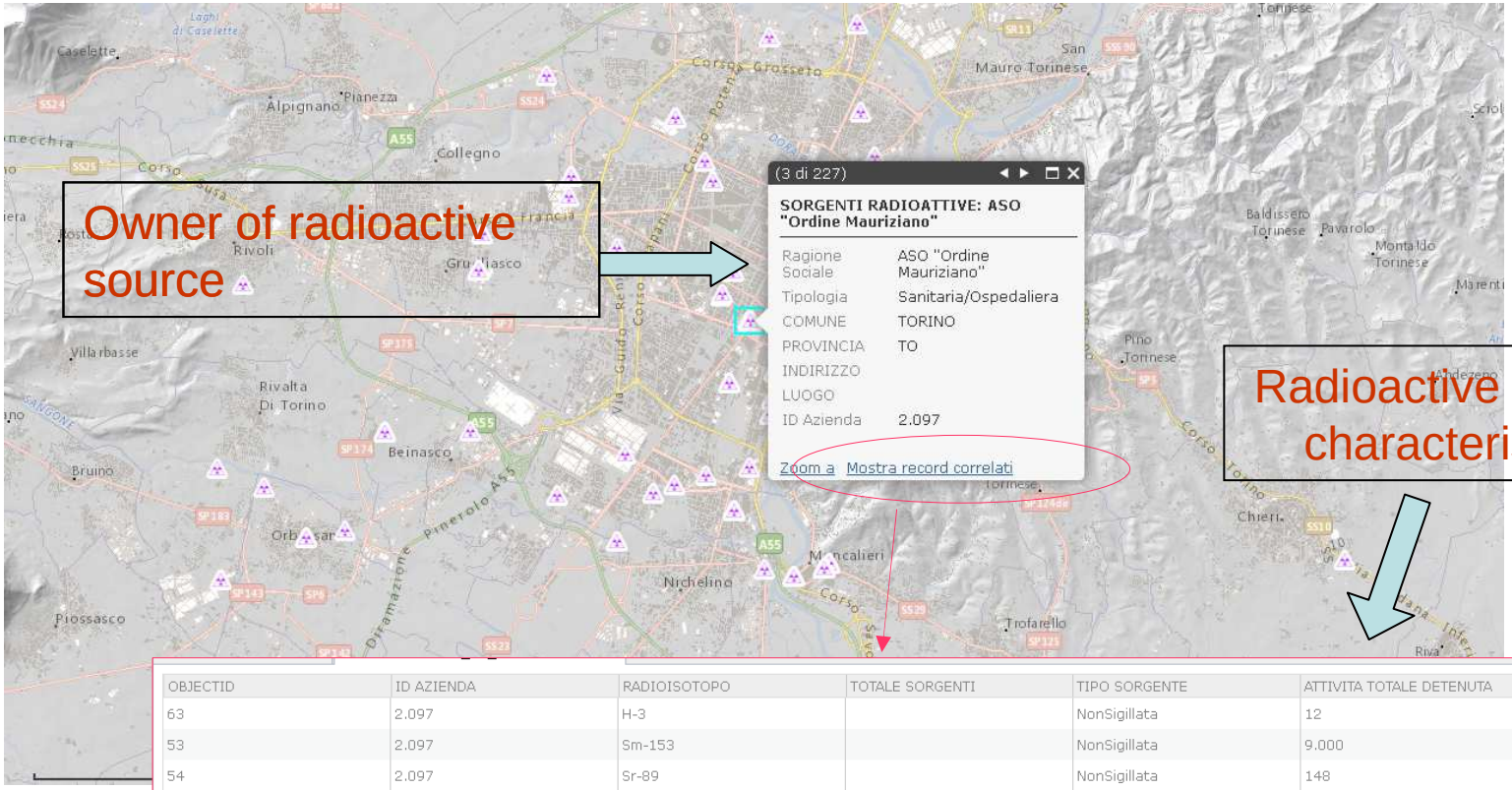
Digital Register of radioactive sources used on regional territory



OBJECTID	ID AZIENDA	RADIOISOTOPO	TOTALE SORGENTI	TIPO SORGENTE	ATTIVITA TOTALE DETENUTA
63	2.097	H-3		NonSigillata	12
53	2.097	Sm-153		NonSigillata	9.000
54	2.097	Sr-89		NonSigillata	148
60	2.097	I-131		NonSigillata	98.713
55	2.097	In-111		NonSigillata	256
51	2.097	Y-90		NonSigillata	2.420
59	2.097	I-125		NonSigillata	36
64	2.097	Ba-133		NonSigillata	5
65	2.097	Ba-133	2	Sigillata	26
50	2.097	Tc-99m		NonSigillata	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

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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

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Radiation Protection

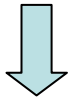
Legislative Decrees N. 230 of 17 march 1995 and N. 241 of 26 May 2000

Dose limits and maximum permissible concentrations for the public are established in compliance with applicable European Community Directives;

An optimum level of environmental protection has to be maintained thereby ensuring that the exposure limits set out in the Euratom Basic Standards are observed.

Monitoring of ambient radioactivity and of foodstuffs and beverages radioactive contamination is carried out by national and regional networks

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



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

Radiation Protection

Legislative Decrees N. 230 of 17 march 1995 and N. 241 of 26 May 2000

Management of regional enviromental 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

PIEMONTE Arpa Agenzia Regionale per la Protezione Ambientale

Radiation Protection

Legislative Decrees N. 230 of 17 march 1995 and N. 241 of 26 May 2000

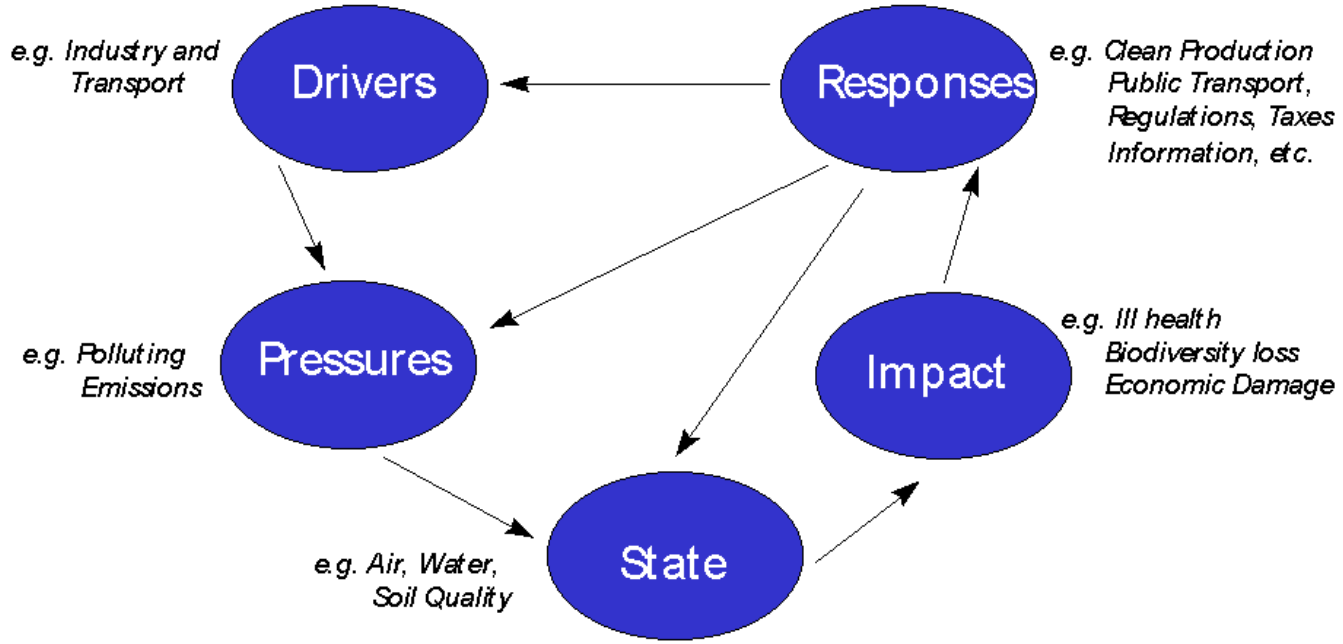
In the event of an accident during an operation which involves radioactive substances, if the environment is effected, the operator must intervene to prevent the risk of subsequent contamination or injury to persons. The Prefect of the Province and the local authorities of the National Health Service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

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

Annual State of the Environment Report

Environmental indicators: DPSIR Framework



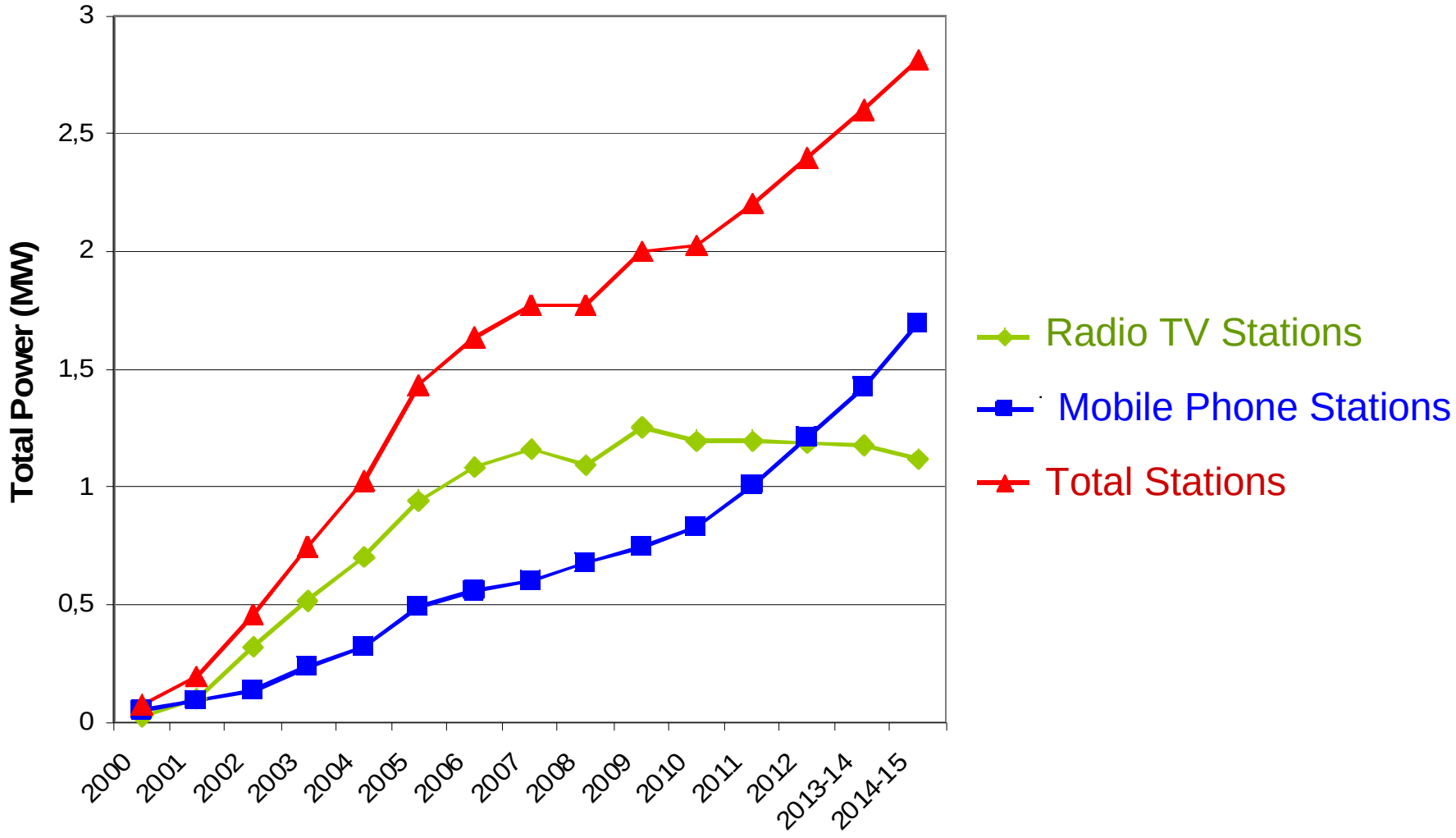
Collection and periodic dissemination of data on the state of the environment

Environmental indicators: PSR Framework

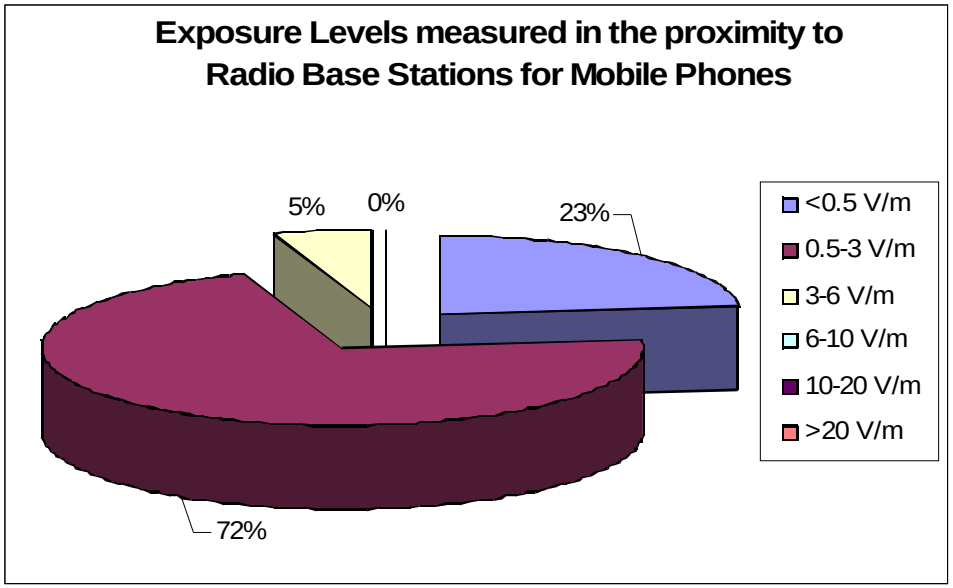
Non Ionizing Radiation

Total length of power transmission lines	DRIVER
Density of telecommunication installations	
Total RF power of telecommunication transmitters	PRESSION
Number of measured levels higher than exposure limits	STATE
Number of measurements	RESPONSE
Number of technical advices on new telecommunication installations	

Total RF power of telecommunication transmitters

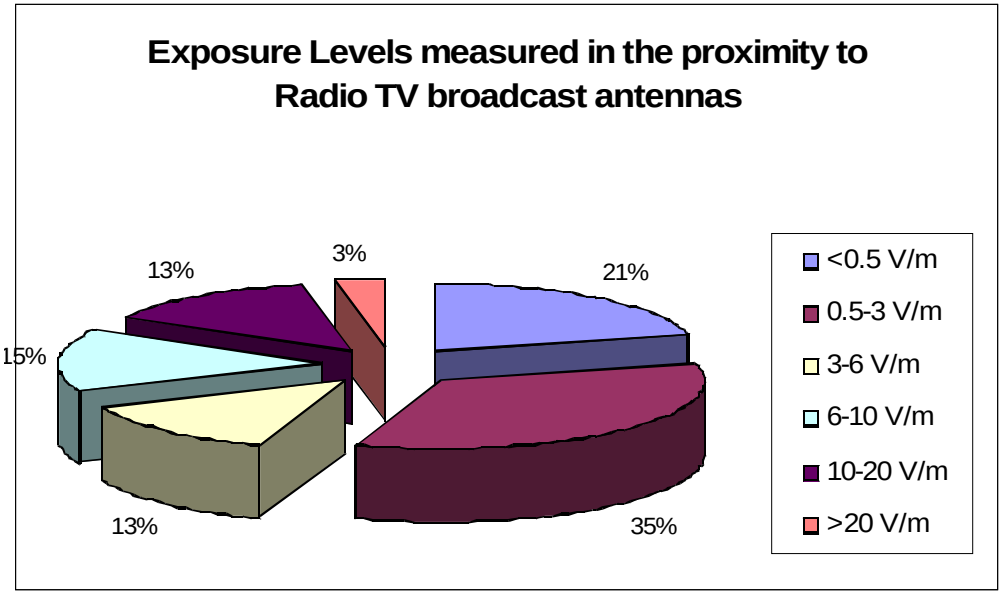


Number of measured levels higher than exposure limits

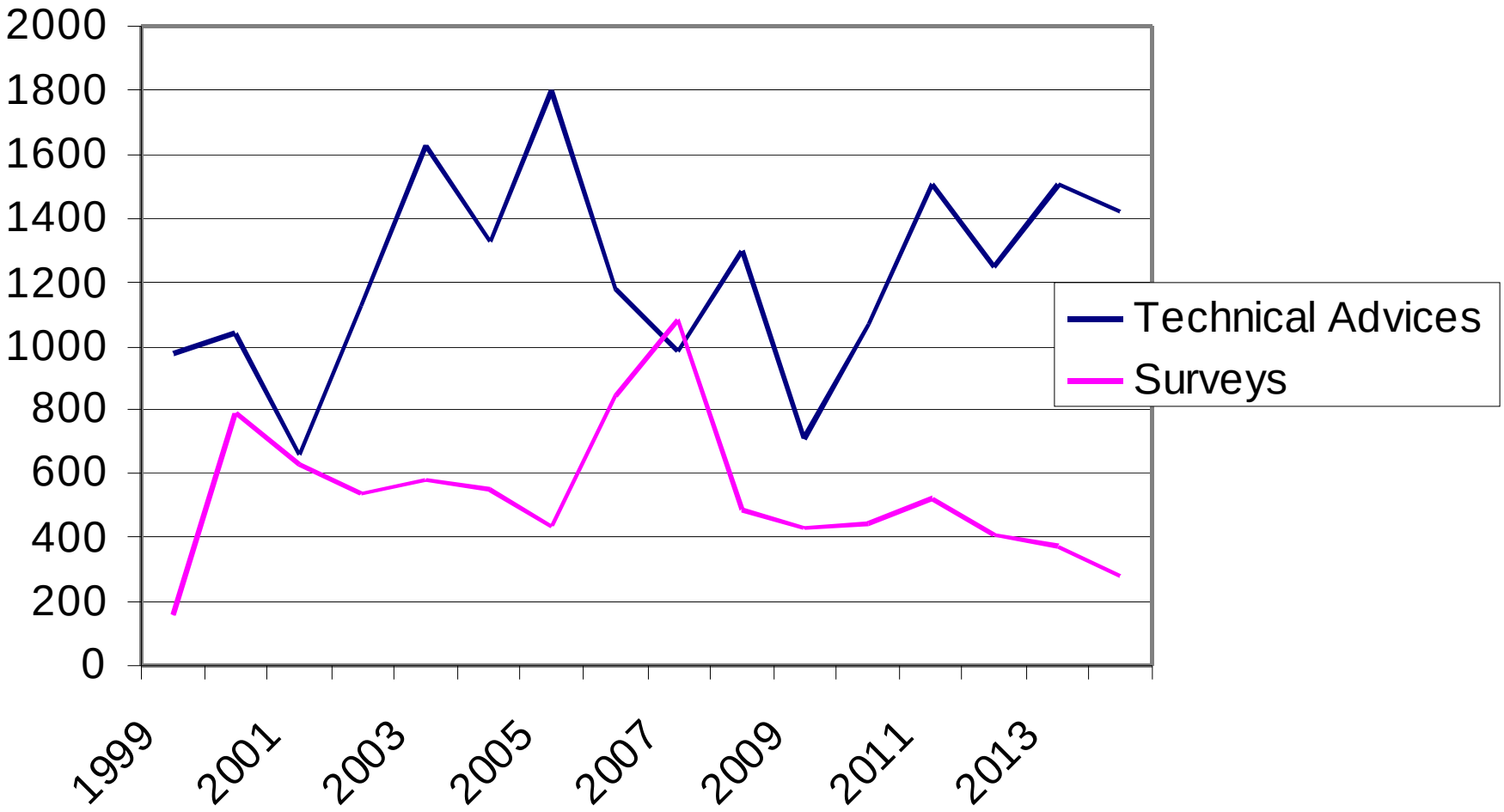


870 measurements in the period 2008-2014

760 measurements in the period 2008-2014



Number of technical advices on new telecommunication installations and surveys



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

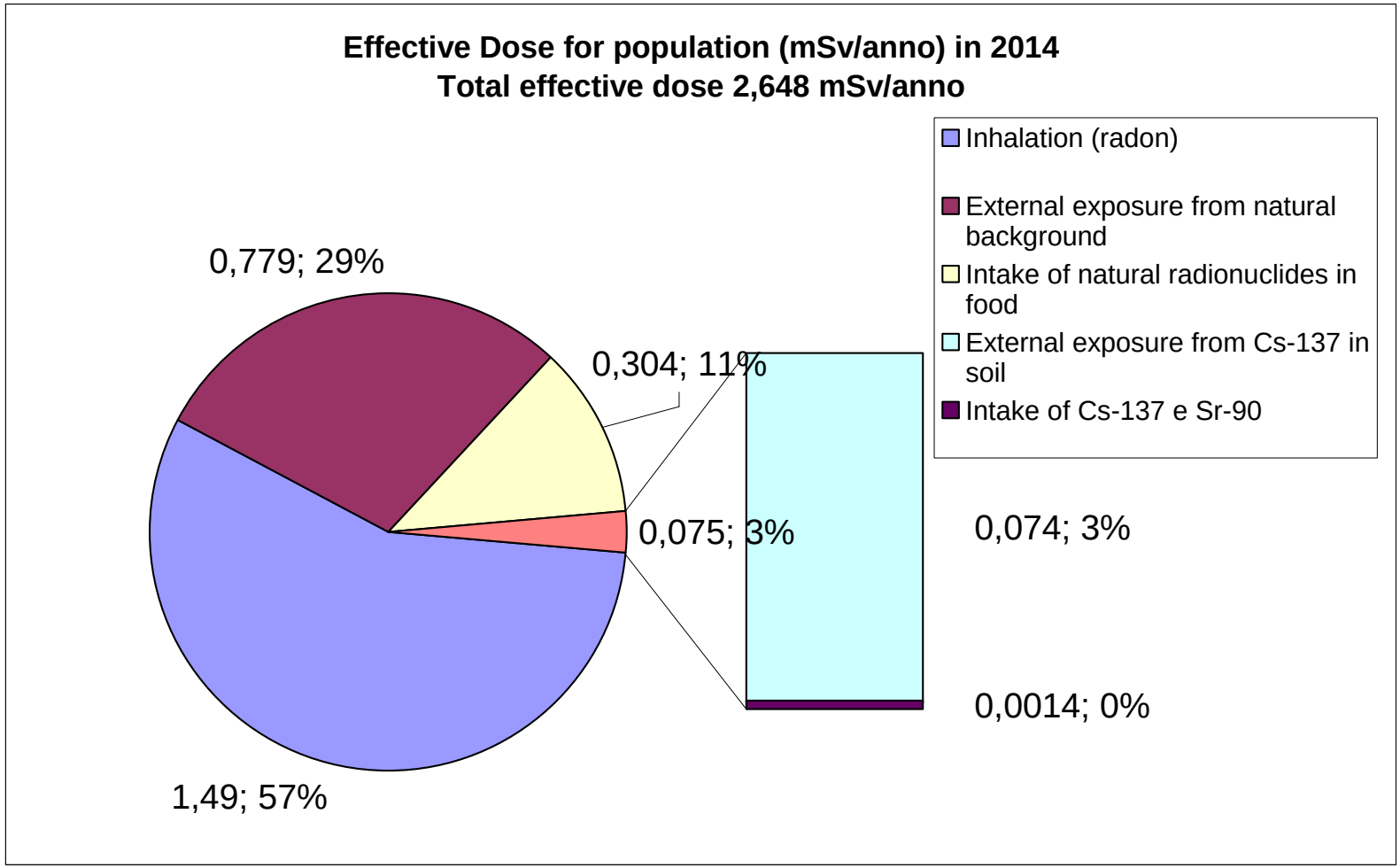
Environmental indicators: PSR Framework

Ionizing Radiation

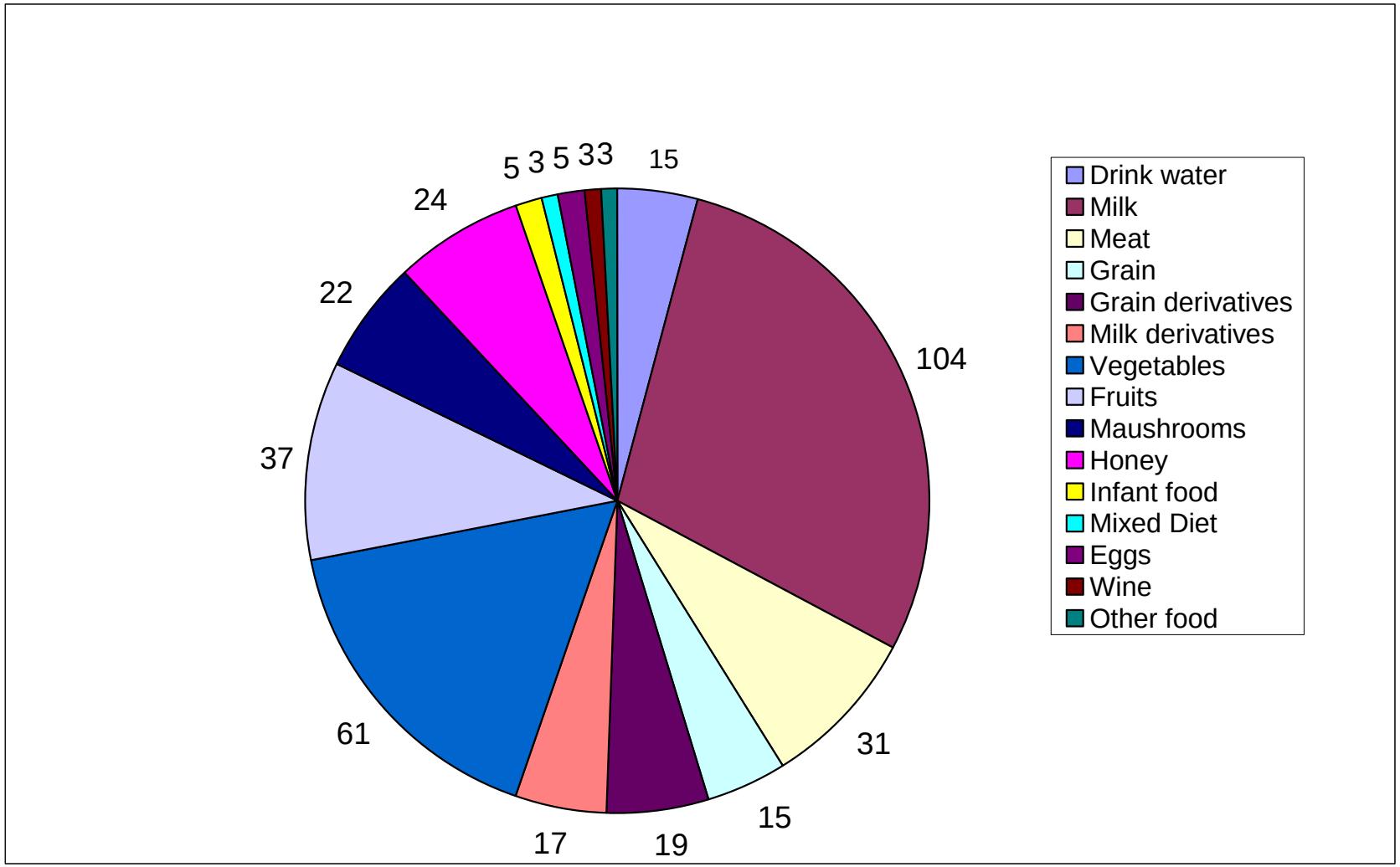
Total activity of radioactive wastes and spent fuel	PRESSURE
Activity of liquid effluents released from nuclear plants and fuel-cycle facilities	
Cs137 activity concentration in environmental and food samples	STATE
Activity concentration in the environmental and food samples	
Annual individual effective dose for population	IMPACT
Number of radiometric analysis of environmental and food samples	RESPONSE

Annual State of the Environment Report

Annual individual effective dose for population



Number of radiometric analysis of food samples



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