



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR ENERGY
DIRECTORATE D - Nuclear Safety and Fuel Cycle
Radiation Protection

TECHNICAL REPORT

VERIFICATIONS UNDER THE TERMS OF ARTICLE 35 OF THE EURATOM TREATY

Southern Italy

Sicily, Calabria, Basilicata, Campania and Puglia

3 to 7 May 2010



Reference: IT-10/02

**VERIFICATIONS UNDER THE TERMS OF ARTICLE 35
OF THE EURATOM TREATY**

FACILITIES: Installations for monitoring and surveillance of environmental radioactivity in southern Italy (Sicilia, Calabria, Basilicata, Campania and Puglia).

SITE: Sicilia, Calabria, Basilicata, Campania and Puglia.

DATE: 03 to 07 May 2010

REFERENCE: IT-10/02

VERIFICATION TEAM: Mr C. Gitzinger (Head of team)
Mr E. Henrich

DATE OF REPORT: 2010-11-16

SIGNATURES:

[signed]

C. Gitzinger

[signed]

E. Henrich

TABLE OF CONTENTS

1	INTRODUCTION.....	7
2	PREPARATION AND CONDUCT OF THE VERIFICATION.....	7
2.1	Preamble	7
2.2	Programme of the visit in Southern Italy	8
2.3	Documentation	8
2.4	Representatives of the competent authority and of all five regions of southern Italy. ..	8
3	COMPETENT AUTHORITIES AND NUCLEAR LEGISLATION	10
3.1	Legal basis	10
3.2	Competent Ministries	11
3.2.1	Ministry of the Environmental and Protection of the Territory and of the Sea (MATTM).....	11
3.2.2	Ministry of Health (MH).....	11
3.3	ISPRA (<i>Istituto Superiore per la Protezione e la Ricerca Ambientale</i>; Institute for Environmental Protection and Research)	12
3.3.1	Introduction.....	12
3.3.2	Main statutory responsibilities.....	12
4	ENVIRONMENTAL RADIOACTIVITY MONITORING IN ITALY	13
4.1	Introduction.....	13
4.2	National networks for environmental radioactivity monitoring	14
4.2.1	RESORAD network.....	14
4.2.2	National telemetric networks	15
4.2.2.1	GAMMA network	15
4.2.2.2	REMRAD network	16
4.3	National Actions to Implement Radioactivity Monitoring in the Environment and in Foodstuff.....	17
4.4	Regional environmental radioactivity monitoring in Italy (ARPA/APPa)	17
4.4.1	Regional actions to implement radioactivity monitoring in the environment and in foodstuffs in southern Italy	17
5	NATIONAL SYSTEM FOR ENVIRONMENTAL RADIOACTIVITY MONITORING IN SOUTHERN ITALY – VERIFICATION.....	18
5.1	Sicily	18
5.2	Calabria	18
5.3	Basilicata.....	19
5.4	Campania.....	19
5.5	Puglia.....	19
6	REGIONAL/PROVINCIAL ENVIRONMENTAL RADIOACTIVITY MONITORING IN SOUTHERN ITALY (DESCRIPTION OF THE SITUATION AND VERIFICATION)	19
6.1	Sicily (ARPA Sicilia network).....	19
6.1.1	Regional legislative acts regulating environmental radioactivity monitoring and funding.....	19
6.1.2	Analytical laboratories for Sicily	20
6.1.3	Samples analysed in 2008 for radioactivity monitoring and sampling locations.....	20

6.1.4	Planned regional programme for radioactivity monitoring in Sicily	21
6.1.5	ARPA Sicily laboratory Palermo.....	23
6.1.6	General Recommendations by the Verification Team for the Region.....	26
6.2	Calabria (ARPACAL network)	26
6.2.1	Regional legislative acts regulating environmental radioactivity monitoring and funding.....	26
6.2.2	Analytical laboratories involved in the monitoring of environmental radioactivity in Calabria.....	27
6.2.3	Samples analysed in 2008 for radioactivity monitoring and sampling locations.....	28
6.2.4	Planned Regional programme for radioactivity monitoring	29
6.2.5	ARPACAL laboratory, Reggio Calabria	29
6.2.6	General Recommendations by the Verification Team for the Region.....	32
6.3	Basilicata (ARPAB network)	32
6.3.1	Regional legislative acts regulating environmental radioactivity monitoring and funding.....	32
6.3.2	Analytical laboratory for Basilicata.....	32
6.3.3	Samples analysed in 2008 for radioactivity monitoring and sampling locations.....	33
6.3.4	Planned Regional programme for radioactivity monitoring	35
6.3.5	ARPAB laboratory, Matera	37
6.3.6	General Recommendations by the Verification Team for the Region.....	39
6.4	Campania (ARPAC network).....	39
6.4.1	Regional legislative acts regulating environmental radioactivity monitoring and founding.....	39
6.4.2	Analytical laboratories for Campania.....	39
6.4.3	Samples analysed in 2008 for radioactivity monitoring and sampling locations.....	40
6.4.4	Planned Regional programme for radioactivity monitoring	43
6.4.5	General Recommendations by the Verification Team for the Region.....	45
6.5	Puglia (ARPA Puglia network).....	45
6.5.1	Regional legislative acts regulating environmental radioactivity monitoring and funding.....	45
6.5.2	Analytical laboratory for Puglia	46
6.5.3	Samples analysed in 2008 for radioactivity monitoring and sampling locations.....	46
6.5.4	Planned Regional programme for radioactivity monitoring	49
6.5.5	Bari – ARPA Puglia, Radiological Laboratory.....	49
6.5.6	General Recommendations by the Verification Team for the Region.....	51
7	CONCLUSIONS	52

Appendix 1	Documentation received and consulted
Appendix 2	Verification Programme
Appendix 3	Provincial and Regional Environmental Protection Agencies – APPA/ARPA Network

TECHNICAL REPORT

ABBREVIATIONS AND ACRONYMS

ADSL	Asymmetrical Digital Subscriber Line (telecommunication)
AGIRE - POR	<i>Attivazione Gemellaggi Internalizzazione Regionale Esperienze di successo - Programma Operativo Regionale</i>
ANPA	(Former) <i>Agenzia Nazionale per la Protezione dell'Ambiente</i> (National Environmental Protection Agency)
APAT	(Former) <i>Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici</i> (Agency for Environmental Protection and Technical Services)
APPA	<i>Agenzia Provinciale Per la Protezione dell'Ambiente</i> (Autonomous Province Agency for Environmental Protection)
ARPA	<i>Agenzia Regionale per la Protezione dell'Ambiente</i> (Regional Agency for Environmental Protection)
ASL	<i>Azienda Sanitaria Locale</i> (Local Health Unit)
DG	Directorate-General
EC	European Commission
CRR	<i>Centro di Riferimento Regionale</i> (Regional Reference Centre)
CD-ROM	Compact Disk Read Only Memory
ECURIE	European Community Urgent Radiological Information Exchange
ENER	Energy
EURDEP	EUropean Radiological Data Exchange Platform
ENEA	<i>Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile</i> , (National Agency for New Technology, Energy and Sustainable Economic Development)
GAMMA	The national on-line gamma dose rate monitoring network (part of the national early warning system)
HEPA	High Efficiency Particulate Air (filter)
HPGe	High Purity Germanium (gamma detector)
IAEA	International Atomic Energy Agency
ICP-MS	Inductively Coupled Plasma - Mass Spectrometry
INMRI	<i>Istituto Nazionale di Metrologia delle Radiazioni Ionizzanti</i> (National Institute of Ionizing Radiation Metrology of ENEA)
IR	Ionising Radiation
ISDN	Integrated Services Digital Network (telecommunication)
ISO	International Organization for Standardization
ISPRA	<i>Istituto Superiore per la Protezione e la Ricerca Ambientale</i> (Institute for Environmental Protection and Research)
ISPESL	<i>Istituto Superiore per la Prevenzione e la Sicurezza del Lavoro</i> (National Institute for Occupational Prevention and Safety)
IT	Information Technology
ITREC	<i>Impianto di Trattamento e Rifabbricazione Elementi di Combustibile</i> (Fuel Element Processing and Refabrication Plant)
LN ₂	Liquid Nitrogen
MATTM	<i>Ministero dell'Ambiente e della Tutela del Territorio e del Mare</i> (Ministry of the Environmental and Protection of the Territory and the Sea)
MDA	Minimum Detectable Activity
MH	<i>Ministero della Salute</i> (Ministry of Health)
NIM	Nuclear Instrumentation Module
NIR	Non-Ionising Radiation
NPP	Nuclear Power Plant
NORM	Naturally Occurring Radioactive Material
OJ	Official Journal
PC	Personal Computer
POD	<i>Piano Operativo di Dettaglio</i> (Operative Details Plan)

POR	<i>Programma Operativo Regionale</i> , (Regional Operative Programme)
PVC	PolyVinyl Chloride
QA / QC / QM	Quality Assurance / Quality Control / Quality Management
REMRAD	<i>Rete di MONitoraggio automatic della RADioattività ambientale</i> , (Automated national network for the on-line monitoring of airborne radioactivity; part of the national early warning system)
RESORAD	<i>REte nazionale di SORveglianza della RADioattività ambientale</i> (National Environmental Radioactivity Surveillance Network)
SMOD	Sedimentable Mineral Organic Detritus
SOGIN	<i>Società Gestione Impianti Nucleari</i> (Nuclear Plant Management Co.)
TENORM	Technologically Enhanced Naturally Occurring Radioactive Material
TL	Thermo Luminescence
TLD	Thermo Luminescent Dosimeter/Dosimetry (radiation detector)
TREN	Transport and Energy
UHT	Ultra High Temperature
UKAS	United Kingdom Accreditation Service
UPS	Uninterruptible Power Supply
UOS	Unità Operativa Semplice
ZnS	Zinc sulphide (radiation detector)

1 INTRODUCTION

Article 35 of the Euratom Treaty requires that each Member State shall establish facilities necessary to carry out continuous monitoring of the levels of radioactivity in air, water and soil and to ensure compliance with the basic safety standards ⁽¹⁾.

Article 35 also gives the European Commission (EC) the right of access to such facilities in order that it may verify their operation and efficiency.

For the EC, the Directorate-General for Energy (DG ENER; formerly Directorate-General for Energy and Transport - DG TREN) and in particular its Radiation Protection Unit (at the time of the visit: TREN.H.4, now ENER.D.3) is responsible for undertaking these verifications.

The main purpose of verifications performed under Article 35 of the Euratom Treaty is to provide an independent assessment of the adequacy of monitoring facilities for:

- Liquid and airborne discharges of radioactivity into the environment by a site (and control thereof).
- Levels of environmental radioactivity at the site perimeter and in the marine, terrestrial and aquatic environment around the site, for all relevant pathways.
- Levels of environmental radioactivity on the territory of the Member State.

Taking into account previous bilateral protocols, a Commission Communication has been published in the Official Journal on 4 July 2006 with a view to define some practical arrangements for the conduct of Article 35 verification visits in Member States.

A verification team from DG TREN.H.4 (now DG ENER.D.3) visited from 3 to 7 May 2010 southern Italy (Sicily, Calabria, Basilicata, Campania and Puglia) in order to verify the monitoring of environmental radioactivity in these regions.

The visit also included meetings with representatives of the national authority having competence in the field of radiation protection. An opening meeting was held in Palermo in the premises of the Sicilian *Agenzia Regionale di Protezione Ambientale* (ARPA - Regional Agency for Environmental Protection), ARPA Sicilia, and a closing meeting, with all parties involved during the visit, at the premises of ARPA Puglia in Bari.

The present report contains the results of the verification team's review of relevant aspects of the radiological environmental surveillance in all above named regions of southern Italy.

The present report is also based on information collected from documents received and from discussions with various persons during the visit.

2 PREPARATION AND CONDUCT OF THE VERIFICATION

2.1 PREAMBLE

The Commission's request to conduct an Article 35 verification was notified to the Italian Permanent Representation to the European Union by letter TREN/H.1/VE/cm D(2010)50833 dated 1 February 2010.

It was decided that the verification activities would be carried out by a team of two inspectors from the European Commission.

Subsequently, practical arrangements for the implementation of the verification were made with the Italian competent authority *Istituto Superiore per la Protezione e la Ricerca Ambientale* (ISPRA).

¹ Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation. (OJ L-159 of 29/06/1996 page 1).

Mr. Giuseppe Menna	Physicist, Radioprotection Department, responsible for the Monitoring Network Sector
II. Regional level	
Region of Sicily	
Francesco Lipari (director officer)	Territory and environment Assessorate – Protection Service from noise - air - industrial risk pollution
Giovanni Di Leo (director officer)	Territory and environment Assessorate – Protection Service from noise - air - industrial risk pollution
Region of Calabria	
Orsola Reillo (director)	Department of environmental politics
Region of Basilicata	
Salvatore Lambiase (director)	Environmental department
Filomena Pesce (responsible)	Environmental department
Region of Campania	
Marzaia Arpaia	Environmental department
Michele Palmieri	Environmental department
Region of Puglia	
Paolo Garofoli	Environmental department
Lorenzo Nicastro	Environmental department
Antonello Antonicelli	Environmental department
Maria Trimmigiozzi	Environmental department
ARPA - Sicilia	
Luigi Librici (director of the provincial department of Palermo)	Provincial department of Palermo
Antonio Sansone Santamaria (director physicist)	Provincial department of Palermo – physics laboratory
Filippo Pinio (quality responsible for the provincial department of Palermo)	Provincial department of Palermo – physics laboratory
Maria Cristina Reitano (director physicist)	Provincial department of Palermo – physics laboratory
Salvatore Casabianca (director physicist)	Provincial department of Palermo – physics laboratory
Giantonio Lisciandrello (director)	General directorate
Antonio Conti (director physicist)	General directorate
ARPA - Reggio Calabria	
Elio Fatta (director)	Provincial department of Reggio Calabria – physics laboratory
Angelo Sartiano (physicist)	Provincial department of Reggio Calabria –

	physics laboratory
Daniela Morelli (physicist)	Provincial department of Reggio Calabria – physics laboratory
Santina Marguccio (physicist)	Provincial department of Reggio Calabria – physics laboratory
Andrea Vescio (physicist)	Provincial department of Reggio Calabria – physics laboratory
Raffaella Trozzo	Provincial department of Cosenza – physics laboratory
ARPA - Basilicata	
Vicenzo Sigillito (director)	Directorate ARPA-Basilicata
Nicola Vignola (coordinator)	Provincial department of Matera
Alfonso Gerardo Celeste (physicist)	Provincial department of Matera – radioactivity reference centre (CRR)
Duilio Fossanova (technician)	Provincial department of Matera – radioactivity reference centre (CRR)
ARPA - Campania	
Franco Scarponi (technical director)	Directorate ARPA Campania
Nicola Adamo (responsible)	Environmental sustainability service
ARPA - Puglia	
Luigi Vitucci (responsible director)	U.O.S. Ionising radiation specialisation centre
Paolo Bovio (director)	Territorial Service - provincial department of Bari
Maddalena Schirone (responsible director)	U.O.S. physics agent
Tiziana Cassano (physicist)	U.O.S. physics agent
Giorgio Assennato (general director)	General Director ARPA PUGLIA
Gianpaolo Bottinelli	Provincial department of Bari Director

3 COMPETENT AUTHORITIES AND NUCLEAR LEGISLATION

3.1 LEGAL BASIS

The main legislative act, establishing the responsibilities of the various actors in environmental radioactivity monitoring, in the radiological surveillance of foodstuffs and in emergency preparedness is Legislative Government Decree Nr. 230 of 17 March 1995 (amended by Legislative Decrees 187/2000, 241/2000, 257/2001 and 151/2001; the latter implementing European Directives 89/618/Euratom, 90/641/Euratom, 92/3/Euratom and 96/29/Euratom).

Decree Nr. 230, in Article 54 specifies that:

- Operators of authorised nuclear installations shall supply and operate the equipment necessary for permanent surveillance of the level of radioactivity of the atmosphere, waters, soil and foodstuffs, both within the site perimeter and within the surveillance area around the site.

Decree Nr. 230, in Article 104 specifies that:

- The responsibility for monitoring environmental radioactivity in Italy is with the Ministry of Environment and Protection of the Territory and the Sea (hereafter MATTM).
- The responsibility for the radiological surveillance of foodstuffs and feedstuffs is with the Ministry of Health (hereafter MH).
- Both Ministries shall exchange radiological information gathered during the exercise of their respective responsibilities.
- Radiological surveillance shall be established through national and regional monitoring networks.
- The implementation and operation of regional networks is under full responsibility of the regional governments; the latter shall abide by directives issued at national level by both the MATTM and the MH. National directives shall aim at reaching harmonisation over the regions where it concerns the standardisation and comparability of methods and techniques for sampling and sample analysis.
- The national monitoring networks shall be operated by bodies, entities or organisations having the necessary competence in the field of radiological protection.
- An independent national radiological emergency network is under the responsibility of the Ministry of Home Affairs.

Council Decision n° 87/600/Euratom³:

- ISPRA (*Istituto Superiore per la Protezione e la Ricerca Ambientale*) is the Italian Nuclear Safety Authority and has, at national level, the responsibility for the European Community Urgent Radiological Information Exchange (ECURIE) system and thus for two associated networks. The first is the RESORAD network that includes all Regional/Provincial agencies for environmental protection and some other qualified institutions. The second is a national telemetric radiological warning network of alarm consisting of a system for measuring ambient gamma dose (GAMMA network) and automatic stations for air particulate measurements (REM RAD network).

3.2 COMPETENT MINISTRIES

3.2.1 Ministry of the Environmental and Protection of the Territory and of the Sea (MATTM)

The Ministry for the Environment and the Protection of Land and Sea (*Ministero dell'Ambiente e della Tutela del Territorio e del Mare* - MATTM) is responsible for the radiological surveillance of the environment (art. 104 – Legislative Decree 230/95). It has been established under the Law n.349 of 8 July 1986 and further modifications and integrations. It is organised in six directorates-general.

ISPRA is the Italian Nuclear Safety Authority.

3.2.2 Ministry of Health (MH)

The Ministry of Health (MH, *Ministero della Salute*) is responsible for the radiological surveillance of foodstuffs (art. 104 – Legislative Decree 230/95). It is the top level body of the national health system which also comprises bodies at regional level and involves the *Istituto Superiore di Sanità*, the leading scientific and technical institution in Italy in this field, as well. MH, in accordance with Law n. 317 of 2001, was created by separation from the Ministry of Welfare. It has been attributed 'the functions of human and veterinary health protection, the coordination of the national sanitary system, as well as the hygiene and surveillance of foodstuffs'.

In order to fulfil its responsibilities and the requirements of protection and promotion of health of the citizens and of veterinary health, MH is organised in directorates-general and departments. The

³ 87/600/EURATOM Council Decision of 14 December 1987 on Community arrangements for the early exchange of information in the event of a radiological emergency (OJ L-371 of 30 December 1987, page 76)

Directorate-General of Sanitary Prevention is – among other tasks – responsible for the radiological surveillance of foodstuffs.

3.3 ISPPRA (*ISTITUTO SUPERIORE PER LA PROTEZIONE E LA RICERCA AMBIENTALE*; INSTITUTE FOR ENVIRONMENTAL PROTECTION AND RESEARCH)

3.3.1 Introduction

The Institute for Environmental Protection and Research (*Istituto Superiore per la Protezione e la Ricerca Ambientale* - ISPPRA), has been established by Decree no. 112 of 25 June 2008, converted into Law no. 133 (with amendments) on 21 August 2008. ISPPRA performs, with the inherent financial resources, equipment and personnel, the duties of:

- ex-APAT, Italian Environment Protection and Technical Services Agency (article 38 of Legislative Decree no. 300, July 30, 1999, and subsequently amended)⁴;
- ex-INFS, National Institute for Wildlife (Law no. 157 of February 11, 1992, and subsequently amended);
- ex-ICRAM, *Istituto Centrale per la Ricerca scientifica e tecnologica applicata al Mare* - Central Institute for Scientific and Technological Research applied to the Sea (Decree no. 496, article 1-bis, December 4, 1993, converted into Law no. 61, Article 1, January 21, 1994, with amendments).

ISPPRA is the Italian Nuclear Safety Authority, technically, scientifically and financially autonomous, and reports directly to the Ministry of the Environment and the Protection of Land and Sea (MATTM). ISPPRA operates in three-year programmes which are annually updated. These programmes aim at the implementation of directives issued by MATTM, by setting objectives, defining priorities and allocating resources.

3.3.2 Main statutory responsibilities

The main duties and statutory responsibilities of ISPPRA as the Italian Nuclear Safety Authority, so as to fulfil the obligations laid down in Decree Nr. 230 (as amended) are:

- Controls and inspections on existing nuclear installations.
- Licensing of new nuclear installations.
- Controls and inspections on the possession, commerce, transport, use and release of radioactive materials.
- Controls and inspections on radioactive waste management.
- Radiation protection of workers, the public and the environment.
- Nuclear emergency preparedness.
- Fulfilment of international agreements on control and surveillance of nuclear materials.
- Promotion of international co-operation in the field of nuclear safety and radiation protection.
- Promotion of actions aimed at maintaining and improving the national know-how and the national safety culture in the field of nuclear safety and radiation protection.

⁴ APAT (*Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici* - Agency for Environmental Protection and Technical Services), one of the predecessors of ISPPRA, was created in 2002 by merging ANPA with the Department for National Technical Services of the Presidency of the Council of Ministers (provision of Presidential Decree Nr. 207 of 8 August 2002). ANPA (*Agenzia Nazionale della Protezione dell'Ambiente*), the former National Environmental Protection Agency, was established by Art. 38 of Legislative Decree Nr. 300 of 30 July 1999.

In addition to these duties, ISPRA has also to:

- Support the national administrations (environment, health, home affairs, industry) to issue decrees that implement primary nuclear legislation.
- Issue specific technical guidance.
- Realise a national database on all nuclear applications.
- Assess the safety analysis carried out by the operating organisation.
- Inspect equipment and materials during the design, construction and operational phases (systematic operational safety verification).
- Enforce actions to remedy any failure to meet the licensing conditions and/or operational safety criteria.

In order to guarantee homogeneity of survey criteria, and following the directives of both the Ministry of the Environmental and Protection of the Territory and of the Sea (MATTM), ISPRA

- Co-ordinates measurements carried out by the agencies and institutions belonging to the national network in order to assure uniform techniques and methodologies of sampling and analysis.
- Promotes the installation of sampling and measurement stations whenever this is necessary for the achievement of an appropriate network of survey on national scale.
- Transmits the collected data to the European Commission.
- Co-ordinates and supervises the implementation of the environmental radioactivity monitoring in the Italian regions by ARPAs (*Agenzia Regionale di Protezione Ambientale* - Regional Agency for Environmental Protection) and APPAs (*Agenzia Provinciale Per l'Ambiente* - Autonomous Province Agency for Environmental Protection).

4 ENVIRONMENTAL RADIOACTIVITY MONITORING IN ITALY

4.1 INTRODUCTION

In Italy, the Ministry for the Environment and the Protection of Land and Sea is responsible to control environmental radioactivity in accordance with article 104 of Legislative Decree no. 230/1995 and its subsequent amendments and integrations. 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. The abovementioned Legislative Decree entrusts ISPRA with the technical coordination functions of national surveillance networks. Italy has been divided, also on the basis of European Commission directives and recommendations, in three “macro-regional areas” and 21 autonomous regions/provinces. In compliance with the Italian legislation the surveillance of the environmental radioactivity in Italy is organised at three different levels:

At *national* level three networks are in place:

- National network of environmental radioactivity monitoring (RESORAD). This network is basically a collection of a subset of data from the regional/provincial networks.
- National telemetric alarm networks (REMRAD and GAMMA) managed by ISPRA;
- National network for the surveillance of gamma radiation under the responsibility of the Ministry of the Interior. Data collected from this network are considered confidential and are not publicly available. This network was not part of the verification.

At *regional* level, there are 21 regional/provincial environmental radioactivity surveillance networks, each of which is under the responsibility of the concerned region/autonomous province. Currently the

related programmes are implemented by the laboratories of the regional/provincial environmental protection agencies (ARPA/APPA).

At *local* or site related level, a radioactivity monitoring network at the site of the nuclear installation has to be operated even if the site is under decommissioning. This network is under the responsibility of the plant operator.

4.2 NATIONAL NETWORKS FOR ENVIRONMENTAL RADIOACTIVITY MONITORING

The national monitoring programmes for environmental radioactivity (art. 104 Legislative Decree 230/95) and for alarm are established and co-ordinated by ISPRA.

In addition, a national network for the surveillance of gamma radiation exists under the responsibility of the Ministry of the Interior. Data collected from this network are considered confidential and are not publicly available. This network was not part of the verification.

The laboratory based national environmental radioactivity monitoring programme RESORAD is generally built up as a subset of the regional laboratory based environmental radioactivity monitoring programmes and has been strongly adapted to the EU Recommendation 2000/473/Euratom. The parameters covered by it are selected by the national agency ISPRA which also considerably influences and controls the regional implementation and the further development of the system. The RESORAD programme is implemented by the laboratories of the regional/provincial agencies system (ARPA, APPA) and other reliable and qualified institutions or bodies. The automatic systems GAMMA and REMRAD have been implemented and are managed directly by ISPRA. The GAMMA network is connected to the European Radiological Data Exchange Platform (EURDEP) set-up by the European Commission in the framework of the system for the early notification of nuclear and radiological emergencies within the EU Countries (European Community Urgent Radiological Information Exchange - ECURIE) in compliance with the EU Council Decision 87/600/Euratom.

The aim of the networks 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. They serve to assess the radiation doses which the Italian population may receive and to produce data for support to management and decisional processes in case of emergencies.

4.2.1 RESORAD network

The sampling network RESORAD has been set up in a way to give pertinent information on the average extent of environmental and dietary contamination. The 'ideal' sampling programme should provide representative samples able to reveal the average situation both in time and space. RESORAD is generally a subset of the regional/provincial sampling network with a selection of parameters to allow a picture at national level.

In order to guarantee that the laboratories participating in the RESORAD network perform measurements with a certain degree of accuracy and quality, ISPRA provides a reliability programme through the organisation of inter-comparison and inter-laboratory exercises. The reliability programme is performed with the collaboration of the National Institute of Ionising Radiation Metrology (INMRI) of the Italian National Agency for New Technologies, Energy and the Environment (ENEA).

The sampling programme has been defined in accordance with the EU Recommendation 2000/473/Euratom⁵ and in agreement with the organisations participating in the National Environmental Radioactivity Network. A general overview of the programme is shown in table 1.

⁵ 2000/473/Euratom. Commission Recommendation of 8 June 2000 on the application of Article 36 of the EURATOM Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole (OJ L 191, 27 July 2000, page 37 – 46).

Table 1: Sampling programme of the RESORAD network

Matrix	Sampling frequency	Measurement frequency
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

4.2.2 National telemetric networks

The REMRAD and GAMMA automatic monitoring networks have been installed in compliance with the Council Decision 87/600/Euratom on the basis of the experience acquired after the Chernobyl accident.

The main tasks of these networks are to confirm the information produced by the international notification systems, in particular when the national territory is involved in a possible contamination situation, to generate an early warning in case data exchange information would not be available. They are also meant to inform about the actual radiation level following fallout of radioactivity due to contamination crossing the national territory. Data from these networks are routinely transferred to the ISPRA data centre in Rome.

To fulfil the institutional duties related to the role of ISPRA in the emergency preparedness at national level, the institute realised this integrated support system for decision making in the case of a nuclear emergency with functions of early notification and information exchange, early warning, prognosis of the possible evolution of the radioactivity released to the atmosphere and measurement of the actual contamination level on the national territory.

For the results of the verification of the national networks' facilities see the chapters referring to the respective region.

4.2.2.1 GAMMA network

In Italy external gamma dose rate monitoring is mainly performed by the national telemetric network GAMMA.

The GAMMA network consists of 56 gamma dose rate probes, mostly placed at sites of the National Forestry Corps. The installation of another 8 probes is under implementation.

Each measuring device (gamma dose rate monitor *DLM 1450*, model *ROSA*, software version 15.01, gamma probe *IGS421B*, and data logger *LOGEM LGM 28.8D1*; manufacturer: *TechniData AG*, formerly *Hörmann*, now *Envinet*, Markdorf, Germany) is composed of three GM counting tubes. Two redundant large volume tubes for low dose rate levels, allow the detection of minor changes in the radiation level. The third counting tube is for higher radiation levels. The integrated control unit automatically switches between the detectors. Local data transfer to e.g. a notebook computer is possible via an RS232 interface.

A rain sensor (model *RD202*, on/off type) is connected to the system in order to allow taking into account the increase of the dose rate due to precipitation (radon washout effect).

The detection range of the gamma dose rate devices is 10 nSv/h to 10 Sv/h for photon energies of 40 keV – 1.25 MeV; the operating temperature range is -40°C to +60°C. Data are presented as ambient dose rate $H^*(10)$.

The measuring time of the devices is 1 min. Data are collected every 10 minutes and every hour. Data transmission to the centre is by ISDN and analogue lines (six stations).

Technicians from ISPRA perform the routine service for all stations of the GAMMA system in Italy; check sources are available at the ISPRA headquarters. With regard to technical assistance, ISPRA still has a contact with *TechniData*; all instrument documentation from *TechniData* is available.

For protection the stations are fenced in. Local batteries provide a power buffer with a capacity of 72 hours.

Data collected by this network provide input to the European EURDEP platform, with a daily transmission in routine operational mode and with 10 minute transmission intervals under emergency conditions.

The network is designed to send spontaneously an alarm signal to the GAMMA network control centre at the ISPRA Emergency Centre enabling the operator to effectively supervise operation of the remote monitoring stations.

The alert threshold level is set at three times the background value.

The team was informed that some regions (e.g. Piemonte) use the same type of equipment within their regional monitoring system, albeit within their technical responsibility (not serviced by ISPRA).

4.2.2.2 REMRAD network

In general, the REMRAD network was not included into this verification. REMRAD is a network of automatic monitoring stations, located at Air Force sites, performing measurements of airborne radioactive particulates. The network acts as an early warning system and includes seven monitoring stations. They are located in places of meteorological relevance chosen with a view of covering the most probable access routes of radioactivity in case of an accident in a plant outside Italy. The REMRAD automatic stations are able to perform the following functions:

- air particulate sampling on a continuous fibre-glass filter tape;
- on-line measurement of the alpha/beta total and artificial component;
- delayed (5 days after the sampling) measurement of artificial alpha/beta;
- on-line high resolution gamma spectrometry analysis by an HPGe electrically cooled detector;
- ambient gamma dose rate measurement;
- measurement of local meteorological parameters.

The monitoring equipment is manufactured by *Perkin Elmer Berthold*. The nominal air flow rate is 25 m³/h and the filter tape is advanced by means of a capstan which is provided with slits allowing the sampled air to pass through them to the collection area at close distance (4 mm) from the detector.

The alpha/beta detectors (prompt and delayed measuring unit) are ZnS/plastic sandwich scintillators coupled to 2" photo-multiplier tubes. Integration time for alpha/beta measurement is 60 min in routine condition and 10 min in emergency mode. The detection limit for on-line artificial beta measurements is about 0.5 Bq/m³.

For the high resolution gamma spectrometry devices, the spectrum analysis is performed every 2 hours on a sampling window of 24 hours. Besides, a daily sum spectrum is produced and analyzed. Detection limit of Cs-137 is less than 1 mBq/m³ for the sum spectrum, a few mBq/m³ on the 2 hours spectrum and less than 100 mBq/m³ as early warning signal, after an aerosol sampling of 2 hours.

The dose rate detectors installed in this system are not connected to the general national dose rate monitoring system (GAMMA) and thus also not to the EURDEP system.

Data transmission to the centre at ISPRA in Rome is by ADSL.

4.3 NATIONAL ACTIONS TO IMPLEMENT RADIOACTIVITY MONITORING IN THE ENVIRONMENT AND IN FOODSTUFF

In December 2006 the Ministry for the Environment and the Protection of Land and Sea (MATTM) started programmes to support the environmental monitoring, part of which was devoted to implement and reorganise the radioactivity monitoring in the environment and in foodstuffs including radon and NORM.

The programme in force (September 2009 to April 2011) is carried out through an agreement between MATTM and ISPRA called “Technical support to the Ministry of Environment and Protection of the Land and Sea for the elaboration of guidelines and methodological approaches in the framework of environmental safeguards”. The financing of this part of the programme is about 923 000 €.

The Operative Details Plan (POD) of the Agreement has been elaborated during 2008, approved in 2009 and the activities started in September 2009. An amount of about 681 000 € has been assigned to the monitoring of radioactivity in the environment and in foodstuffs, the rest of the funding is dedicated to radon measurements and to NORM and TENORM activities.

The main objective is the harmonisation between the national network RESORAD and the 21 regional/provincial networks. The foreseen activities are the revision of the regional monitoring plans in terms of matrices, sampling locations, radionuclides, frequencies of sampling and measurements, MDA's, in accordance with the Recommendation 2000/473/Euratom and the basic safety standards. Moreover, some guidelines will be developed and national inter-comparison exercises, for a reliability programme of the laboratories, will be carried out in accordance with the National Institute of Ionizing Radiation Metrology (ENEA – INMRI). The end of this agreement is scheduled for April 2011.

4.4 REGIONAL ENVIRONMENTAL RADIOACTIVITY MONITORING IN ITALY (ARPA/APPA)

The regional/provincial programmes for environmental radioactivity monitoring are under the responsibility of the regional/provincial government. Following the directives of the Ministry of Health and of the Ministry for the Environment and the Protection of Land and Sea, under the coordination of ISPRA, the regional/provincial agencies for environmental protection (ARPA/APPA) propose and implement these programmes. These should include the sampling and subsequent laboratory analysis of air (particulates), precipitation (fallout), various waters, soil and food (milk, 'pasta', mixed diet, meat, cereals, vegetables, fruit).

Concerning environmental protection in Italy there are nineteen administrative regions and two autonomous provinces. Each of them has its own environmental protection agency (ARPA/APPA), established by special regional laws and responsible to the local government. The ARPA/APPAs are environmental control and technical support bodies for the regional/provincial, district and local authorities. Generally, the competences of the regional agencies are almost the same as those of ISPRA. Although sponsored by their regions/provinces the ARPA/APPAs are administratively and technically independent. A list of all agencies can be found in Appendix 3.

The regional programmes differed very much in the past – there were remarkable differences of implementation of the monitoring programme for environmental radioactivity proposed by ISPRA between North and South. In 2006 some regions in southern Italy only had very little environmental radioactivity monitoring (if any at all). The purpose of this verification was to verify progress achieved in this area since the last Article 35 verification in 2006.

4.4.1 Regional actions to implement radioactivity monitoring in the environment and in foodstuffs in southern Italy

Since 2006 a number of measurements have been carried out in the southern Regions. In table 2 the number of samples analysed by the regional laboratories in 2005 (as shown during the last EC verification) and in 2008 (last updated data) are shown.

Table 2: number of samples analysed by the regional laboratories in 2005 and in 2008

Region / ARPA	Samples 2005	Samples 2008
Basilicata	0	144
Calabria	0	32
Campania	0	119
Puglia	75	128
Sicilia	81	170

Compared to the situation in 2006 some improvements have been made:

ARPA Basilicata started to produce some data in 2006 as well as ARPA Campania and ARPA Calabria, albeit mainly limited to foodstuff matrices.

ARPA Puglia and ARPA Sicilia increased the number of analysed samples.

In Chapter 7, detailed information on the activities currently performed and on the planned monitoring programmes of the southern regions is given.

5 NATIONAL SYSTEM FOR ENVIRONMENTAL RADIOACTIVITY MONITORING IN SOUTHERN ITALY – VERIFICATION

5.1 SICILY

In Sicily, automatic gamma dose rate monitoring stations of the national GAMMA system are located at Erice, Pergusa and Camerina.

The verification team was informed that the GAMMA dose rate probes in Erice, Pergusa and Camerina, and are in the process of being put into other more appropriate locations. For this purpose a contract was signed with *TechniData*.

The REMRAD station located in Cozzo Spadaro (Siracusa) whose verification was originally foreseen could not be verified because it was under repair.

The verification team encourages all efforts to find solutions for placing the equipment in locations that are technically well suited and easily manageable in the long-term.

5.2 CALABRIA

The REMRAD system in Calabria was not included in the verification.

In Calabria, automatic gamma dose rate monitoring stations of the national GAMMA system are located at Cupone and Mongiana.

The team verified the GAMMA station at Cupone, no. 43 in the national system, located in the *Parco Nazionale della Sila*, managed by the *Corpo Forestale dello Stato*. The whole park is fenced; a small wooden fence additionally protects the equipment. The general location of the installation is very good (a wide valley), some large trees are ca. 10 m away.

The team verified the presence of the gamma dose rate monitor with serial number 0043. At the time of the visit the display of the device showed the median measurement value (173 nGy/h) for terrestrial and cosmic radiation. The data sheet for the equipment was locally available (original 'equipment covering sheet' from 1999); the equipment covering sheet contained recent servicing information (e.g. date of last service - '06.11.06', names of technicians, action performed).

Two technicians from ISPRA were available to give explanations about the device.

Verification does not give rise to recommendations.

5.3 BASILICATA

In Basilicata, automatic gamma dose rate monitoring stations of the national GAMMA system are located at Accettura and Maratea. There are no REMRAD stations in this region.

The team verified the GAMMA station at Maratea, no. 41 of the national system; it is located at the *Corpo Forestale dello Stato* premises on the side of the coastal hill. Taking into account the orography of the area and the fact that the next wide valley is quite far inland, the location is well chosen.

The equipment is installed beside the meteorological mast of the *Corpo Forestale*; at the time of the visit it showed a 0.100 nGy/h average value. The data sheet showed factory approving on 20.5.1999; the equipment covering sheet showed the date of 5.10.2006 for the last change /repair / replacement.

Again, two technicians from ISPRA were available to give explanations about the device.

Verification does not give rise to recommendations.

5.4 CAMPANIA

Facilities in the region of Campania were not included in the verification.

In Campania, automatic gamma dose rate monitoring stations of the national GAMMA system are located at Airola, Castel Volturno and Pisciotta. There are no REMRAD stations in this region.

5.5 PUGLIA

In Puglia, automatic gamma dose rate monitoring stations of the national GAMMA system are located at Cassano delle Murge, Martina Franca and San Cataldo. There is one REMRAD station in this region, in Monte Sant'Angelo. This station was not part of the verification.

The team verified the GAMMA station at Martina Franca, no. 38 of the national system, located at the *Corpo Forestale dello Stato, Posto Fisso Galeone*. The placing is very well chosen, both, with regard to the general location in a wide plain, as with regard to the local positioning, in an area mainly grazed by horses. The nearest two-storey building is at a distance of ca. 30 m, the next 'trullo' ca. 20 m. Trees are ca. 30 m away, a 2 m wall ca. 15 m. The site has a wooden bar fence to avoid damage (by horses).

The information available on site showed that the device was mounted on 20.5.1999, using standard mounting. The date for the last change / repair / replacement was 4.8.2009. The display showed the current dose rate value of 88 nGy/h and an hourly average of 84 nGy/h.

Again, two technicians from ISPRA were available to give explanations about the device.

Verification does not give rise to recommendations.

6 REGIONAL/PROVINCIAL ENVIRONMENTAL RADIOACTIVITY MONITORING IN SOUTHERN ITALY (DESCRIPTION OF THE SITUATION AND VERIFICATION)

6.1 SICILY (ARPA SICILIA NETWORK)

6.1.1 Regional legislative acts regulating environmental radioactivity monitoring and funding

The team was informed that the Regional Agency for Environmental Protection of Sicily – ARPA Sicilia, established under the regional Law n. 6 of 3 May 2001, is the technical reference institution for environmental monitoring in Sicily.

Resolution n. 404 of 21 December 2004, following the previous Agreement between the Region and ARPA Sicilia signed in 2002, included the monitoring of environmental radioactivity within the duties assigned to the Agency.

Within the Regional Operative Programme 2000 – 2006 (POR) under the Regional Decree n. 913 of 2 November 2005, the Region of Sicily assigned 820 000,00 € for the implementation of the regional monitoring of environmental radioactivity. This financing has been used mainly for the acquisition of instrumentation and the renovation of the laboratory facilities. The team was informed that only a small part of that sum has been used to support the project with more staff.

6.1.2 Analytical laboratories for Sicily

The analytical laboratories involved in the monitoring of ionising radiation in Sicily are:

- For the territorial structure of Palermo: ARPA Sicilia - Via Nairobi 4, 90129 Palermo;
- For the territorial structure of Catania: ARPA Sicilia - Via Carlo Ardizzone 35, 95124 Catania.

Both laboratories act as interchangeable twin facilities covering the full territory of Sicily. The verification team verified the laboratory located in Palermo (see below).

The team learned that the implementation of this project was performed in three phases:

1. In July 2006 a notice for laboratory facilities was published.
2. In January 2007 a notice for the acquisition of instrumentation was published.
3. In October 2008 the acquisition phase was completed.

Table 3 shows the measurement techniques used in 2008 and those which are currently under implementation.

Table 3: Measurement techniques used in 2008 and those programmed for the near future

Measurement technique	In 2008	Under implementation
Gamma Spectrometry	X	X
Gamma dose rate		X
Liquid scintillation	X	X
Gross beta	X	X
Sr-90		X
H-3	X	X
Gross alpha		X
Alpha spectrometry		X

The team was informed that currently only three persons (all graduates) are involved in the authority's environmental radioactivity measurements in Sicily and that the working time allocated to this task totals 1.5 man-years. Of these three persons, one is based at Palermo and two at Catania.

The verification team recommends carefully evaluating the number of persons required to fully implement the foreseen analysis techniques at the desired high level of quality.

6.1.3 Samples analysed in 2008 for radioactivity monitoring and sampling locations

Tables 4 and 5 list the sampling locations, the matrices and the radionuclides analysed in 2008 by ARPA Sicilia for environmental and food samples. Radiation monitoring of foodstuffs is performed by the regional department of health.

Table 4: *Environmental samples*

Sampling location	Province	Matrix	Radionuclide	N. of samples
Palermo/ Via Nairobi 4	Palermo	Airborne particulates	Gross beta	26
Catania/ Dittaino river	Catania	Surface water (river)	K-40; Cs-134; Cs-137; H-3	1

Table 5: *Foodstuff samples*

Sampling location	Province	Matrix	Radionuclide	N. of samples
Agrigento	Agrigento	Cow (bovine) muscle	K-40; Cs-134; Cs-137	2
Licata	Agrigento	Cow (bovine) muscle	K-40; Cs-134; Cs-137	2
Misilmeri	Palermo	Durum Wheat	K-40; Cs-134; Cs-137	1
Partinico	Palermo	Durum Wheat	K-40; Cs-134; Cs-137	1
Gela	Caltanissetta	Fresh Fish (cuttlefish)	K-40; Cs-134; Cs-137	1
Trapani	Trapani	Fresh Fish (mix of fish and shrimp)	K-40; Cs-134; Cs-137	1
Trapani	Trapani	Fresh Fish (musky octopus, <i>Eledone moscata</i>)	K-40; Cs-134; Cs-137	1
Trapani	Trapani	Fresh Fish (red prawn)	K-40; Cs-134; Cs-137	1
Trapani	Trapani	Fresh Fish (swordfish)	K-40; Cs-134; Cs-137	1
Mazzarino	Caltanissetta	Honey	K-40; Cs-134; Cs-137	1
S. Lucia	Enna	Honey	K-40; Cs-134; Cs-137	1
Mazzarino	Caltanissetta	Cow Milk, crude	K-40; Cs-134; Cs-137	1
Agrigento	Agrigento	Cow Milk, UHT	K-40; Cs-134; Cs-137	2
Licata	Agrigento	Cow Milk, UHT	K-40; Cs-134; Cs-137	1

Numerous drinking water samples were also taken all over Sicily and analysed for K-40, Cs-134 and Cs-137.

The verification team acknowledges the former limited monitoring programme and recommends taking the experience gained in its implementation into account when devising future programmes.

6.1.4 Planned regional programme for radioactivity monitoring in Sicily

The team was informed that ARPA Sicily elaborated a regional radioactivity monitoring programme for 2010, which is under implementation. This plan was sent to the Region and to ISPRA for approval with an official letter dated 16 December 2009 and was approved at the beginning of 2010. Table 6 shows the programme that is implemented by ARPA Sicilia in 2010. Figure 1 shows the ARPA Sicilia network.

The team was informed that the regional programme for environmental radioactivity monitoring in 2010 is as shown in Figure 2.

- A) Airborne particulate
 F) Foodstuffs samples
 G) Gamma dose rate
 W) Water samples



Figure 1: ARPA Sicilia network

Table 6: ARPA-Sicily: Regional radioactivity monitoring programme implemented in 2010

Matrix	Sampling location	Province	Measurement	Frequency of measurements	N. of measurements /year
Air particulate	PALERMO/ARPA - Via Nairobi 4	PA	Gross alpha Gross beta Gamma Spectrometry (Cs-137)	3 measurements per week	300
Air	PALERMO; CATANIA	PA CT	Ambient gamma dose rate	Every day	330
Dry/wet deposition	PALERMO; CATANIA	PA CT	Gamma Spectrometry (Cs-137)	Every 2 months	6
Surface water (river)	CATANIA/ Dittaino river	CT	H-3; Cs-137; Rn-222	Variable	
Drinking Water (groundwater and spring water)	Variable, in accordance with the drinking water sampling programme of other ARPA Departments	In all Provinces	H-3; Cs-137; Rn-222	Variable	30
Milk Meat Pasta Flour Vegetables Honey Mushrooms	Variable, but at least one location per Province	In all Provinces	Cs-134; Cs-137; K-40	Variable	72

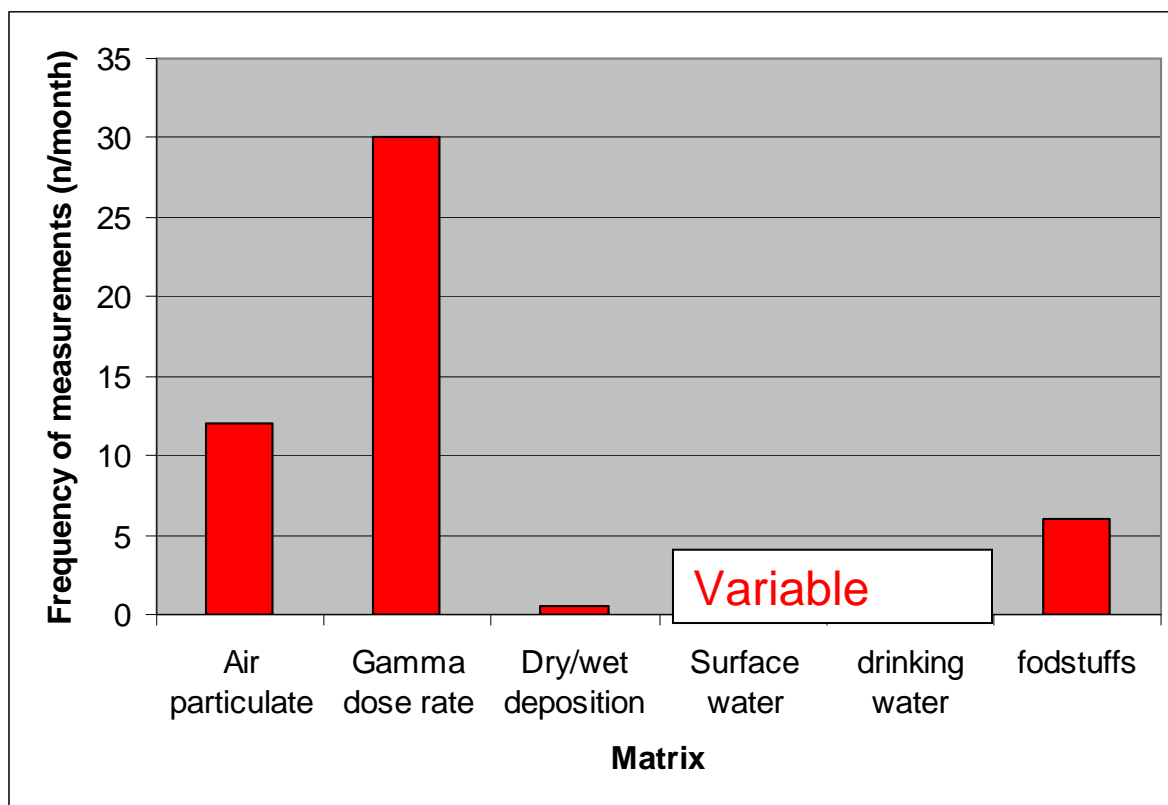


Figure 2: Regional programme for environmental radioactivity monitoring in 2010 in Sicily

The team learned also that Sicily conducts a radon monitoring project; totalling about 6000 dosimeters. Starting point was a pilot project in the Ragusa region with 500 dosimeters.

The verification team endorses the full implementation of the programme and encourages its perpetuation for the future.

6.1.5 ARPA Sicily laboratory Palermo

The team verified the ARPA Sicily laboratory located at Via Nairobi 4, Palermo. The laboratory is not accredited to ISO 17025.

Personnel situation

ARPA Sicily as a whole has 400 employees, of which 120 work in the administration. The radiological laboratory in Palermo is well equipped, but has only one person to perform all measurements. Although this person is very experienced and motivated, the efficient management of a laboratory that has to perform the tasks foreseen in the programme, by only one person is difficult if not impossible. The same also applies to the laboratory in Catania.

Sampling equipment

Several sampling and meteorological measuring devices are mounted on the roof of the laboratory. With regard to general positioning the location is well suited, an open terrace, high above ground. In the neighbourhood there is a large park/school yard; the nearest buildings are some 50 metres away. The team was told that 15 days per year hot winds from the Sahara (*Scirocco*) blow from the SE; the general wind direction is SW.

The team witnessed an old air sampler (*SAIC*; pump from *RADeCO*, San Diego, California, USA; model *AVS-28A*, serial number 5343). The system is homemade and was used until 2008. Currently the gas meter (*DEC Italia S.p.A*) is not working. When the device was in operation a system was in place to correct the flow rate for temperature and pressure.

A new aerosol sampler is in place with an air flow rate of 200 to 400 l per minute, electronic flow control and equipped with a digital flow indicator. For sampling, circular quartz microfiber filters with 10 cm diameter are used. The measuring device only allows filters of 4.7 cm diameter; thus a system was set up to allow for compensation.

For separate dry and wet deposition sampling a device (*INTEX Italia*) is available. However, at the time of the visit, it was not electrically connected. In case of rain the dry part is automatically covered and vice versa. The team was told that more such devices are installed (Cefalù, Corleone). The surface area is not very large. Thus under normal conditions (it usually rains only once per month) the amounts sampled are small and consequently the detection limits are not very good. Therefore the construction of a specific 2 m² system for wet plus dry deposition is foreseen. To avoid resuspension of any particulates collected in the dry part, the bottom of this area is covered with distilled water plus nitric acid.

The team was told that it is planned to put a net over the device to protect it from large objects (e.g. leaves).

The meteorological station measures wind direction, wind speed and precipitation. It is equipped with a data logger for data storage.

Sample receipt and registration

Sample receipt and registration is handled for the whole ARPA Sicilia/Palermo in the secretariat, using the 'normal' national laboratory procedure. Samples may be rejected (e.g. when obviously manipulated or samples with higher levels of radioactivity – measurement if suspicious).

Each sample, accompanied by a sampling sheet containing all information on the sample (what, where, when, taken by who, volume, weight, etc.) arrives at the sample reception room.

Upon arrival, these data are transferred into a computer together with information concerning the type of measurements to be performed and how to store the sample till measurement.

For registration, currently a local LIMS version (from 1980) and a new regional LIMS procedure are used in parallel. Basis is the sample reception sheet; a registration number is automatically generated; thus currently two numbers (local and regional LIMS) are allocated. In future there will be only one (regional system).

Generally, samples are kept frozen or cooled.

Since 1 January 2010 for the whole ARPA Sicilia 252 samples were processed, this being a decrease since in 2010 the chemical analysis of foodstuffs at ARPA was stopped. According to the new programme 75 samples will be managed each year for radioactivity measurements.

The team was given a demonstration of the registration procedure: e.g. the local code consists of the date (yyyymmdd) and a consecutive number.

The computer system used is a *Sun* workstation with *Open Office Org 3*, working on an *Oracle* database. For manual inputs an *Excel* procedure *OpenOffice.orgCalc* is available.

The team was told that for the regional LIMS *SiARPA* (current test Version 1.4.A.38) will be used (developed by '*CEDAF software + Persone*'). The current version is still not definitive due to some bugs. It is a web application based on an *Oracle* database; system maintenance will be by a regional office of the supplier, not by ARPA.

Sample preparation / Radiochemical facilities

The team verified the existence of a muffle oven (not connected to the electric grid) and of a grain grinder (*Ing ACRO & Co SRL*). With regard to sample preparation for alpha spectrometry the laboratory has an electrodeposition system, however not in operation due to lack of staff (*AMEL Instruments* general purpose potentiostat model 2049).

Gamma spectrometry

The laboratory is equipped with an *ORTEC* High Purity Germanium (HPGe) p-type coaxial detector with a relative efficiency of 30% and a resolution of ≤ 0.85 keV (at 122 keV) and of ≤ 1.85 keV at 1.33 MeV.

A second HPGe detector is from *Silena* (20-25%, 20 years old).

Three shields are available (5 cm Pb, 2 mm Cu); NIM electronics is from *Ortec* and *Silena*. Gamma spectrometry software installed on PC is *Ortec GammaVision*.

Calibrated geometries are: cylindrical, 0.5 l and 1 l Marinelli.

Energy and background checks are performed before each session; once per year detector efficiency is checked with a multi-radionuclide calibration source (*Amersham*); the certificate (from *DKD*) was immediately to hand.

For cost reasons no service contract has been signed; *Ortec* service is supplied on demand.

Detector cooling with LN₂ is done every two to three days depending on the outside temperature. LN₂ tanks are available.

For practical reasons measurements are organised in sessions (batches of 5-6 samples). For air filters the first measurement covers one filter (= 2 days sampling); after one month 15 filters (= 1 month sampling) are measured together.

Alpha-spectrometry

For alpha spectrometry one system based on an *Ortec Soloist* chamber is available; operation is foreseen. However, using high resolution mass spectrometry (available at APAT Sicily in another lab in the chemistry section that is dedicated to this method) is considered.

Gross Alpha and Beta

For gross alpha/beta measurements an anticoincidence measurement device is used (*ITECO engineering*, Castelbolognese, RA, IT; type 'ALBA'), suitable for 47 mm diameter filters. Since the new aerosol sampler works with 110 mm diameter filters, a strategy of reducing the sampling surface plus additionally cutting out a 47 mm diameter part of filter using a round cutting device has been developed.

Liquid scintillation counting

For determination of Sr-90, H-3 and Ra-226 a liquid scintillation counter *PerkinElmer Tri-Carb 2900TR* is available.

The necessary Ra-226 calibration source was borrowed from ARPA Lombardia; background water also comes from ARPA Lombardia ('prehistoric' water).

Gamma dose rate

The team witnessed a pressurised ion chamber (volume of 5.2 liters) for the monitoring of gamma radiation. The device has an energy range of 35 keV to 10 MeV and functions within a temperature range of -25 to +50°C. It measures dose rate within the limits of 10 nSv/h and 10 Sv/h.

Other measuring devices

For direct radon measurements a *Genitron AlphaGuard* device is used. With regard to integrated radon measurement based on the track etch method an automatic optical scanner (*MICOS Italia*) for up to 60 CR-39 samples is available. The team was told that a Rn chamber is available and the necessary checks are now finished. The laboratory could also analyse *Kodak LR115* dosimeters.

An *Ortec DigiDART* (portable MCA) device can be used for field measurements, as emergency equipment; or may be used as backup in case of problems with other gamma spectrometric apparatuses.

Reference sources and certificates

The verification team noted Am-241 (alpha), Sr-90 (beta) calibration sources and a mixed radionuclide source from *DKD* for gamma calibration. All sources are kept in a locked cupboard with lead shielding.

General

The laboratory currently has no UPS (the one available broke down). Repair failed due to lack of money. The team was told that there are one to two power failures per year.

The key to the laboratory is only available to the director and the head of unit (not for cleaning staff).

Tracing

With regard to the tracing of the reporting of measurement data the verification team originally asked for the results of gamma spectrometry on a May 2009 air sample. Since for 2009 no gamma spectrometry on an air sample was performed and for 2008 only gross alpha and beta measurements, a milk sample from May 2009 was chosen and all data were found to be in order.

Archiving

The verification team was informed that until 2006 backups were made on CD, now by copy on another PC in the network (manually, normally at the end of the week).

The team noted that the sample archive lacks space.

The verification team strongly urges to resolve the delicate personnel situation by recruiting additional staff. The availability of at least three technically skilled staff members for each laboratory seems to be necessary to be able to fulfil the laboratory's tasks in an efficient manner. The team also recommends accreditation of the laboratory to ISO 17025.

The team suggests to quickly repair or replace necessary auxiliary equipment when broken (e.g. UPS devices) in order to avoid delays in sample analysis.

With regard to data archiving the team suggests exploring the possibility to install an automatic routine within the network, with a view to avoid superfluous manual tasks.

6.1.6 General Recommendations by the Verification Team for the Region

Staffing should allow that each work task can be performed by at least two persons in order to allow operating a routine programme also during holiday times and in case of sickness of a staff member. The verification team recommends finding a stable solution to achieve this with trained personnel.

In particular with regard to highly specific tasks involving radiochemical sample preparation such as alpha spectrometry and analysis of Sr-90 the team recommends co-operation between the ARPAs/APPAs. Such co-operation should achieve that not each laboratory has to perform each of these complex analyses. For some tasks (e.g. with regard to mass spectrometry) other units of the local ARPA/APPA could be involved. Necessary training for such tasks could be organised and given by ISPRA. The team points out that in particular radiochemical work should be performed as a routine task to guarantee continuity and to reach a reasonably high qualitative standard.

6.2 CALABRIA (ARPACAL NETWORK)

6.2.1 Regional legislative acts regulating environmental radioactivity monitoring and funding

The local authorities responsible for radioactivity matters are the Regional Department (*Assessorato*) of Health and the Regional Department of Environmental Politics.

Following the Circular Letter of the Ministry of Health n. 2 /1987 the regional network for monitoring of environmental radioactivity was established by the Region in 1995 under resolution n. 7960 of 29/12/95.

In 1999 the Region instituted the Regional Agency for the Environmental Protection of Calabria – ARPACAL by Regional Law n. 20/99. In accordance with this Regional Law, ARPACAL became the technical regional reference body for environmental monitoring.

In the framework of the Regional Operative Programme (POR) 2007 – 2013, the Region of Calabria assigned 1 500 000 € to implement the environmental regional monitoring of radioactivity. ARPACAL sent to the Region with the Letter Nota Prot. 6919 of 23 April 2010 a newly proposed

project for the implementation of the regional monitoring network for radioactivity. On 26 April this proposal was approved by the regional committee.

6.2.2 Analytical laboratories involved in the monitoring of environmental radioactivity in Calabria

ARPACAL is organised in 5 provincial departments, in 2 of which there is a Physics Laboratory. These two analytical laboratories involved in the monitoring of environmental radioactivity are:

- Physics Laboratory – ARPACAL – Provincial Department of Reggio Calabria – Via Troncovito SNC – 89135 Gallico Superiore (RC);
- Physics Laboratory– ARPACAL – Provincial Department of Cosenza – Via Trento, 21 – 87100 Cosenza (CS).

At present, the main regional reference centre in Calabria is the Physics Laboratory – Provincial Department of Reggio Calabria.

In table 7, the measurement techniques used in 2008 and those programmed for the soon future are shown.

Table 7: Measurement techniques used in 2008 and those programmed for the near future

Measurement techniques	In 2008	Programmed
Gamma Spectrometry	x	x
Gamma dose rate		x
Liquid scintillation		x
Gross beta		x
Sr-90		
H-3		x
Gross alpha		x
Alpha spectrometry		

The personnel currently involved in the authority's radioactivity monitoring activity is shown in table 8.

Table 8: Personnel involved in radioactivity monitoring

Personnel type	Units	Man years
Graduate	5*	3.5
Technician	2**	1.5
Support		

* 1 unit (full time) in Reggio Calabria and 4 units (2.5 man years) in Cosenza

** 1 unit (full time) in Reggio Calabria and 1 (half time) in Cosenza

The verification team encourages the implementation of the foreseen (new) analysis techniques.

6.2.3 Samples analysed in 2008 for radioactivity monitoring and sampling locations

Between 1999 and 2009 Calabria performed the monitoring of airborne particulates. A detailed monitoring programme for radioactivity surveillance on the Region is not yet well developed, even if some measurements on environmental matrices and foodstuffs have been carried out, as shown in tables 9 and 10. These tables show the sampling locations, the matrices and the radionuclides analyzed by ARPA Calabria in 2008.

Table 9: Environmental samples

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
CROSIA/Fraz. Mirto	Cosenza	Marine sediment	Cs-137	1
ROSSANO/ Contrada S. Angelo	Cosenza	Marine sediment	Cs-137	1
LAMEZIA TERME/ Lido Finanza	Catanzaro	Marine sediment	Cs-137; K-40; Ra-226	1
LAMEZIA TERME/ Loc. Ginepri	Catanzaro	Marine sediment	Cs-137; K-40; Ra-226	1
LAMEZIA TERME/ Loc. Cafarone	Catanzaro	Marine sediment	Cs-137; K-40; Ra-226	1
LAMEZIA TERME/ loc. S.Pietro Lamentino	Catanzaro	Marine sediment	K-40; Ra-226	1
AMANTEA/ Via Montebianco	Cosenza	Soil	Cs-137; K-40; Ra-226	3

Table 10: Foodstuff samples

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
CROSIA	Cosenza	Cabbage	Pb-212; K-40; Ra-226	1
CASTROVILLARI/ Contrada Cammarata	Cosenza	Cow Milk, crude	Cs-137; K-40; Ra-226	2
CASTROVILLARI/ Contrada Ciparsia	Cosenza	Cow Milk, crude	Cs-137; K-40; Ra-226	3
CASTROVILLARI/ Coretto	Cosenza	Cow Milk, crude	Cs-137; Ra-226	1
CASTROVILLARI/ Loc. Ciparsia	Cosenza	Cow Milk, crude	Cs-137; K-40; Ra-226	3
CORIGLIANO CALABRO/ loc. Catinella	Cosenza	Cow Milk, crude	Cs-137; K-40	1
FRASCINETO/ Zona Industriale	Cosenza	Cow Milk, crude	Cs-137; K-40	1
FRASCINETO/ Zona Industriale	Cosenza	Cow Milk, crude	Cs-137; K-40; Ra-226; Pb- 212	1
LUZZI/ Contrada Ciparsia	Cosenza	Cow Milk, crude	Cs-137; K-40; Ra-226	1
SPEZZANO DELLA SILA/ Camigliatello	Cosenza	Cow Milk, crude	Cs-137; Ra-226	1
CORIGLIANO CALABRO	Cosenza	Green salad	Pb-212; K-40; Ra-226	1
ROSSANO	Cosenza	Green salad	Pb-212; K-40; Ra-226	1
TARSIA/ Loc. Ferramo	Cosenza	Green salad	K-40; Ra-226	1
ROSSANO/ Scalo	Cosenza	Tender wheat	Cs-137; K-40	1
BELVEDERE MARITTIMO/ Stazione	Cosenza	Tender wheat flour	Cs-137; K-40	1

The verification team acknowledges the current limited monitoring programme and recommends taking the experience gained in its implementation into account when devising future programmes.

6.2.4 Planned Regional programme for radioactivity monitoring

In addition to the monitoring of airborne particulates, dry and wet deposition will be monitored from 2010 onwards. Foodstuff samples such as milk will be sampled monthly at Castovillari (Loc. Ciparsia) and analysed for K-40, Cs-134 and Cs-137 by gamma spectrometry.

A major objective of the future monitoring is the harmonisation between the national network RESORAD and the regional monitoring network.

The verification team recommends developing a reasonable long-term analysis programme for environmental matrices and foodstuffs that is accepted and supported by the regional administration.

6.2.5 ARPACAL laboratory, Reggio Calabria

The team verified the ARPACAL laboratory (*Laboratorio Regionale per la Misura della Radioattività Ambientale in Reggio di Calabria*) at Via Troncovito SNC – 89135 Gallico Superiore, Reggio Calabria. The laboratory does not have ISO 17025 accreditation.

The laboratory moved from another place some one and a half years ago but it has only been operative since six months due to electricity supply problems in the beginning.

With regard to radioactivity analysis three persons are working in the laboratory, one in administration, one is available to help in sampling. An official car (used together with other units) is available for sample transport.

Sampling devices

The verification team was shown the aerosol sampler installed on the on roof of the building. It is a *SEA (Strumentazione Elettronica Avanzata) air series 5000* device with 16 filters. Air flow is 50 l/min. The device has downward facing filter holders; each day sampling is switched to another filter; the filters are changed every week). The device has a video camera system for remote visual control of switches, gauges and the programmable display. At the time of the visit the display showed the sample holder; the filter in operation could easily be distinguished due to its grey colour.

The placing of the sampler (both with regard to the general location in a wide valley as with regard to local criteria on a large flat roof without any obstacles) can be seen as very well chosen. The access to the roof was difficult but is under reconstruction.

A fallout sampler (separate for wet and dry deposition; battery operated system, 25 year old device) was recently repaired but is not yet in operation. The team was told that it will be installed on the roof in ten days.

The team was also shown a sand and soil sampling device (25 x 25 x 25 cm, made of iron).

In 2008 only few samples were taken because of moving the laboratory. In 2009 ca. 60 samples were handled.

Sample registration/data handling

Sample registration is done manually and using an *Excel* table. The sample form is prepared in such a way that it is passed on with the sample to the analysis. The analysis report is entered on the sample form by hand (only data that have to go to the RESORAD database), based on the measurement printout; then an 'ok' mark is given. The team was told that 'All staff can do everything'. No signatures are foreseen on the forms (the justification being that only three persons are involved).

Sample preparation

The verification team witnessed several devices used for preparation, in particular of soil and sand samples such as a '*Endecotts Octagon 200 test sieve shaker*' and a *Retsch SR2* mill. The sample dryer for soil etc. is set to 80°C for 24 hrs drying, then continuing until stable weight (this method is standard in Italy). Various devices for foodstuff preparation were shown.

Measuring devices

For alpha/beta measurements an *ITECO* device from 2007 (software *ALBA*), is available. Background determination is performed with unused 'white' filters; calibration is done with standards of Sr-90 and Am-241 on filters (10 years old; the team was told that new standards are about to be purchased).

The gamma spectrometry system consists of two *Ortec* HPGe detectors (one with 30% relative efficiency, marked as 'out of order' – the laboratory is currently waiting for a new detector with electrical cooling as a replacement; one with 40% relative efficiency and energy resolution of 1.78 keV, code *GMX404 PopTop*, the data sheet was available. In addition the device has an *ITECO* shield. The team was told that a change to electric cooling is foreseen due to problems with the supply of liquid nitrogen. Preamplifier output signal handling is analogue with *Ortec* NIM modules for the old detector, and digital with *Ortec DSPEC jr 2.0* for the new detector; a digital oscilloscope (*RIGOL DS5102MA*) is used to check the preamplifier signal pulse shape. For gamma spectrum analysis *Ortec GammaVision* software is installed. Background measurements are performed every month; energy checks are done with the K-40 peak on each sample; efficiency checks are performed regularly. Calibrated geometries are 1 l and 2 l Marinelli. A UPS is available to guarantee the electric power supply for gamma spectrometry.

The verification team was informed that the laboratory will do radiochemistry for sample preparation for alpha spectrometry; the equipment for alpha spectrometry is available, but operation has not yet started (*Canberra Electro alpha* electrodeposition system; two *Canberra 7401VR* alpha spectrometers in NIM frame; PIPS detectors - surface 450 mm² - the specification sheet was available). *Canberra*

Genie 2000 V3.1 is foreseen as software. The laboratory thinks to be ready in 5-6 months, however staff did not yet have training for alpha spectrometry. With regard to alpha measurements, no mass spectrometry device is available at ARPACAL. However discussions are ongoing with the laboratory in Catanzaro to install such a device there.

The team was informed that with regard to highly specific analysis tasks such as alpha spectrometry the ministry has the intention to transfer knowledge between ARPAs (e.g. from ARPA Piemonte to ARPA Basilicata). There could also be help from the (conventional) chemistry division of the ARPA.

For future portable use (alpha, beta, radon measurements) a *Canberra iCAM Alpha/Beta Air Monitor* is available.

The laboratory also owns an *Ortec Detective-EX* portable high resolution gamma spectrometry device (electrically cooled; with external Cs-137 check source) for use when called to investigate suspected radioactivity.

Two *Durridge professional* (Bedford, MA, USA) *RAD7* radon detectors are available as well.

For dose rate measurements the laboratory has a *SEA SMP 01/T* device with ionisation chamber (on tripods) and a *Thermo Scientific FHT 191N* ionisation chamber on tripod

With regard to LSC a *Hidex Triathler* single sample counter has been bought: tests are ongoing for H-3 determinations (some staff members had training for LSC). The team was told that there are plans to buy a *Quantulus* device.

An old *Ortec NaI(Tl)* detector (≥ 3 " diameter) was used in the past (on tripod).

The team was shown a series of portable devices such as a *Berthold Universal Monitor UMo LB123* (type *LB1230*), two *Berthold TOL-F* dose rate meters (with gauging certificate) and *Berthold Isotrak Sr-90/Am-241* check source, an *Automess* (Ladenburg, DE) contamination probe type *6150 AD6* with *6150AD-k* mounting and telescope extension, and a *SEA 465* portable device with alpha, beta and gamma probes.

QM/QA

For calibration purposes the laboratory uses Sr-90 standards from the Czech Metrological Institute, Inspectorate for Ionising Radiation; and for gamma spectrometry an old mixed radionuclide source (type *QCRB1244*; *PTB-DKD-QSA Global GmbH*; bought from *Campoverde*; the team was shown the certificate).

Reporting

The verification team was informed that no publications are produced on a regional basis; all publication is done via ISPRA. Currently work on detailing a new sampling programme is seen as next important step.

Tracing

The team checked the data of a vegetable sample (chard, 'beta vulgaris') of May 2009 with the analysis result in the certificate being '*no artificiale*' (determination of natural radionuclides had not been demanded); all values were in order.

Sample archive

The team saw a sample archive of dried mushrooms in a cupboard.

Radioactive sources

Radionuclide standards are kept in a locked wooden chest stored in a locked room (key in the office). At the time of the verification the list of sources in the box dated from 2007. An extra locked chest is present for an old Lucas cell Ra-226 source.

The verification team encourages all efforts to install sampling devices on the roof of the building and to make access to the roof more convenient. It also encourages shifting to electric cooling systems for gamma spectrometry to avoid LN₂ supply problems.

The team recommends signing all basic forms (sample sheet, results sheets) to allow traceability of any change of custody. The team suggests exploring the advantages of

introducing a LIMS for sample registration and data management with a view to avoid manual input activities as much as possible. This could, in particular, be efficient when large sample numbers have to be handled.

The team also recommends accreditation of the laboratory to ISO 17025.

With regard to alpha spectrometry (respectively analysis using mass spectrometry) the team recommends collaboration with laboratories within the regions and with other regions. It points out that thorough training for radiochemical sample preparation and regularly performing a routine programme is necessary to guarantee a high level of analysis quality. Such training could e.g. be organised by ISPRA.

6.2.6 General Recommendations by the Verification Team for the Region

Staffing should allow that each work task can be performed by at least two persons in order to allow operating a routine programme also during holiday times and in case of sickness of a staff member. The verification team recommends finding a stable solution to achieve this with trained personnel.

In particular with regard to highly specific tasks involving radiochemical sample preparation such as alpha spectrometry and analysis of Sr-90 the team recommends co-operation between the ARPAs/APPAs. Such co-operation should achieve that not each laboratory has to perform each of these complex analyses. For some tasks (e.g. with regard to mass spectrometry) other units of the local ARPA/APPAs could be involved. Necessary training for such tasks could be organised and given by ISPRA. The team points out that in particular radiochemical work should be performed as a routine task to guarantee continuity and to reach a reasonably high qualitative standard.

6.3 BASILICATA (ARPAB NETWORK)

6.3.1 Regional legislative acts regulating environmental radioactivity monitoring and funding

In 1997 the Regional Agency for the Environmental Protection of Basilicata – ARPAB – was established under regional Law n.27/97. In accordance with this law, among the duties of the ARPAB there is the organisation and management of the regional networks for the monitoring of foodstuffs and the environment.

Since 2006 ARPAB started to carry out several radiometric measurements on environmental matrices and foodstuffs. A study on a regional scale was carried out to investigate all the potential sources of contamination in the regional territory. The ITREC (*Impianto di Trattamento e Rifabbricazione Elementi di Combustibile*; pilot reprocessing facility operated by *Sogin*), located in Rotondella (MT), has been identified as a possible source of radioactivity pollution for the region, for this reason ARPAB implemented a site-related monitoring programme. This programme has been approved on September 19th 2008 through the ARPAB resolution n.287. The Region of Basilicata has not yet officially approved this monitoring programme.

Moreover, the ARPAB participated in the Project *A.G.I.R.E.* - POR to spread know how from one ARPA to another in radioactivity matters under the coordination of ISPRA; an agreement between ARPAB, ARPA Emilia-Romagna and ARPA Piemonte was signed. The ARPAB personnel improved its technical skills in sampling and radioactivity measurement thanks to the other two partners in this project.

6.3.2 Analytical laboratory for Basilicata

The analytical laboratory currently involved in the monitoring is:

- Radioactivity Regional Centre (CRR) – ARPAB – Provincial Department of Matera – Via dell'Industria snc, 75100 Matera

The analysed matrices consist of airborne particulate, air dose rate, soil, seawater, marine sediment, oceanic *posidonia*, river water, river sediments and sedimentable mineral-organic detritus (SMOD), milk, grain, drinking water.

The measurement techniques used in 2008 and those programmed for the near future are shown in table 11.

Table 11: measurement techniques used in 2008 and those programmed for the near future

Available measurement techniques	In 2008	Programmed
Gamma Spectrometry	X	X
Gamma dose rate	X	X
Liquid scintillation		X
Gross beta	X	X
Sr-90		X
H-3		X
Gross alpha		X
Alpha spectrometry		

The personnel currently involved in the authority's radioactivity monitoring activity is shown in table 12.

Table 12: Personnel involved in radioactivity monitoring activity

Personnel	Units	Man years
Graduate	2	2
Technician	2	2
Support		

The verification team encourages the implementation of the foreseen (new) analysis techniques. It recommends allowing for thorough training for Sr-90 analysis (in particular radiochemical sample preparation) and introducing all necessary steps for its application in a routine way.

6.3.3 Samples analysed in 2008 for radioactivity monitoring and sampling locations

In tables 13 and 14, the sampling locations, the matrices and the radionuclide analysed by ARPA Basilicata in 2008 are listed.

Table 13: Environmental samples

Sampling location	Prov.	Matrix	Radionuclide	N. of samples
ROTONDELLA / Az. Agr. Agrifela	Matera	Groundwater	Cs-137	2
ROTONDELLA / Pozzo 32.2	Matera	Groundwater	Cs-137	2
ROTONDELLA / Pozzo 32.1	Matera	Groundwater	Cs-137	2
ROTONDELLA/ Mare	Matera	Gamma dose rate in air	T-GAMMA	4
ROTONDELLA/ 2	Matera	Gamma dose rate in air	T-GAMMA	9
ROTONDELLA / Az. Agr. Agrifela	Matera	DMSO	Cs-137	1
NOVA SIRI/ ITREC	Matera	Marine sand	Cs-137	2
ROTONDELLA / vecchio Gabbiotto	Matera	Marine sand	Cs-137	1
ROTONDELLA / Lido mare	Matera	Marine sand	Cs-137	1
ROTONDELLA / ITREC	Matera	Marine sediment	Cs-137	2
ROTONDELLA / oltre boa ITREC	Matera	Marine sediment	Cs-137	2
MARATEA / Fiumicello di Maratea	Potenza	Marine sediment	Cs-137	1
ROTONDELLA / Punto 1	Matera	Soil	Cs-137	1
CAMPOMAGGIORE / Basentana	Potenza	Surface water	Cs-137	1
ROTONDELLA / Az. Agr. Agrifela	Matera	River water	Cs-137	2
VALSINNI	Matera	River water	Cs-137	2

Table 14: Foodstuff samples

Sampling location	Prov.	Matrix	Radionuclide	Number of samples
ROTONDELLA/ Az. Agr. Agrifela	Matera	Drinking water	Cs-137	2
ROTONDELLA/ Via G. L. Bernini	Matera	Drinking water	Cs-137	2
NOVA SIRI/ Az. Agr. Guida Giuseppe C.da Tavena	Matera	Durum Wheat	Cs-137	2
ROTONDELLA/ Boa ITREC	Matera	<i>Mytilus galloprovincialis</i>	Cs-137	Variable
MARATEA/ Marina	Potenza	<i>Scomber scombrus</i>	Cs-137	Variable
POLICORO/ Pescheria di De Cono Antonio	Matera	<i>Scomber scombrus</i>	Cs-137	Variable
POLICORO/ Pescheria di Miola Giovanni	Matera	<i>Scomber scombrus</i>	Cs-137	Variable
NOVA SIRI/ Az. Agr. Pugliese	Matera	Cow Milk, crude	Cs-137	5
TURSI/ Az. Agr. Marta Giuseppe C.da Filici	Matera	Cow Milk, crude	Cs-137	2
TURSI/ Az. Agr. Zecca Giuseppe	Matera	Cow Milk, crude	Cs-137	3

In addition to this, there is a special environmental radioactivity surveillance plan in place for the ITREC plant.

The verification team was informed that at the ITREC plant the Italian National Agency for new Technologies (ENEA) formerly performed experimental nuclear fuel reprocessing. Now the '*area disattivazione Trisaia*' is managed by SOGIN.

The team visited the sampling site at the coast near Trisaia.

Formerly there was a discharge pumping station with sampling possibility for ARPAB; however this was swept away due to erosion of the shoreline. The location is still used by ARPAB as a sea water sampling point.

The new discharge pump building by SOGIN ('*Cabina manovra condotta scarico effluenti liquidi*') is ca. 150 m inland to avoid being damaged by erosion; from there an underground pipe leads to the sea, the real discharge point of ITREC being ca. 100 m off the coast, marked by a buoy.

At the same site (some 50 m inland of the coastline) ARPA Basilicata operates an automatic gamma dose rate monitoring station with solar power and a small meteorological mast as control of ITREC.

The verification team acknowledges the current monitoring programme and recommends taking the experience gained in its implementation into account when devising future programmes.

6.3.4 Planned Regional programme for radioactivity monitoring

ARPAB planned a radioactivity surveillance programme on the regional territory in accordance with CE Recommendation 473/2000/EURATOM. The ARPAB resolution n. 89 of 1 April 2010 approved the regional monitoring programme for foodstuffs and environmental radioactivity. The Region of Basilicata has approved this planned monitoring programme officially. Table 15 shows the programme planned by ARPA Basilicata.

Table 15: Sampling programme planned by ARPAB

Matrix	Number of locations	Sampling Location	Analysis	Sampling frequency	Measurement frequency
Airborne particulates	1	ARPAB - Prov. Department MT	Gamma spectrometry Gross alpha and beta	continuously	fortnightly daily
Airborne particulates	1	ARPAB Potenza	Gamma spectrometry	continuously	monthly
Fallout	1	ARPAB - Matera	Gamma spectrometry	continuously	monthly
Soil	11	Ferrandina, Irsina, Lauria, Lavello, Marsico Nuovo, Matera, Oliveto Lucano, Potenza, Rionero in Vulture, Sant'Arcangelo, Terranova, Pollino	Gamma spectrometry	annual	annual
Sea water	2	Tyrrhenian Sea - MARATEA	Gamma spectrometry	half-yearly	half-yearly
Sea sediment	2	Tyrrhenian Sea - MARATEA	Gamma spectrometry	half-yearly	half-yearly
<i>Posidonia oceanica</i>	2	Gamma spectrometry	half-yearly	half-yearly	Variable
Fish	4	Major distribution centres in Potenza, Matera, Melfi and Pisticci	Gamma spectrometry	half-yearly	half-yearly
Meat	4	Major distribution centres in Potenza, Matera, Melfi and Pisticci	Gamma spectrometry	half-yearly	half-yearly
Ambient gamma dose rate (nSv/h)	2	Upstream and downstream of the plant compared to the prevailing wind direction	By fixed stations installed in the outside area of ITREC		continuously
Ambient gamma dose rate (nSv/h)		Plant Sider-Potenza Potenza	By fixed stations installed in the outside area of ITREC		continuously
Ambient gamma dose rate (nSv/h)		CROB (<i>Centro Regionale Oncologico della Basilicata</i> , Rionero in Vulture)	By fixed stations installed in the outside area of ITREC		continuously
Fruit and vegetables	3	Farms close to ITREC plant	Gamma spectrometry	quarterly	quarterly
Green salad	3	Farms close to ITREC plant	Gamma spectrometry Gross beta	quarterly	quarterly
Wheat	2	Farms close to ITREC plant	Gamma spectrometry	annual	annual
Fish	2	Sea close to ITREC plant	Gamma spectrometry	half-yearly	Half-yearly

Matrix	Number of locations	Sampling Location	Analysis	Sampling frequency	Measurement frequency
Cow milk	2	Livestock farms near ITREC plant	Gamma spectrometry Gross beta Sr-90	monthly	Monthly Quarterly Quarterly/annually
Cow milk	4	Major distribution centres in Potenza, Matera, Melfi and Pisticci	Gamma spectrometry Gross beta Sr-90	monthly	Monthly Quarterly Quarterly/annually

The verification team endorses the full implementation of the programme and encourages its perpetuation for the future.

6.3.5 ARPAB laboratory, Matera

The team verified the ARPAB laboratory (located at the Radioactivity Regional Centre – ARPAB – Provincial Department of Matera) at Via dell'Industria snc, 75100 Matera. The laboratory is not accredited to ISO 17025.

The personnel of the centre consists of altogether 33 staff members of which four are working in the radiological laboratory.

Sampling devices

The team verified an air sampler (*Zambelli* with external pump; flow rate measurement with a variable area flow meter; temperature and air pressure measurement; integrator), installed on the wide terrace at the entrance underneath the roof. The nominal flow rate is 70 m³/d, at the time of the visit the device showed 27 l/min, i.e. ca. 39 m³/d. The general location (on a slight hill in a wide plain) is evaluated as well chosen. With regard to micro-meteorology the closeness to the building walls that leads to sometimes very windy situations seems not to be ideal. Filters are changed daily for alpha beta measurement.

A precipitation sampler (consisting of nine plastic pots with a collection area of together 1.56 m², covered with a net to protect against leaves etc.) is located in the backyard.

Sample registration / preparation

For registration of samples (e.g. milk, water, filters) a large book is used which is manually filled in; the number given is based on 'C + number in the year + date'. The team was told that normally there are zero to two, maximum four samples per day.

The sample preparation room is quite spacious and well equipped. The laboratory has new chemical hoods, an ion exchange resin device for 20 l, and a new, programmable muffle furnace (*Neytech Vulcan*) available.

The team noted that procedures, e.g. for milk sample preparation, were available at the respective workplaces.

Measuring devices

Gamma spectrometry: The gamma spectrometry system consists of two HPGe detectors (48%, 1.78 keV; 45,4%, 1.88 keV; data sheets were available at the workplace), both from *Ortec*, type *PopTop*, electrically cooled (*X-Cooler II*, *Cryo-Secure* compressor power controller). The shields are cylindrical with 10 cm Pb and 0.5 mm Cu liner; the end caps are covered with cling film for protection against contamination. Signal processing is digital with *Ortec DSPEC jr 2.0* units; spectrum handling and analysis is done with *Ortec GammaVision*.

For calibration of the various geometries used (500 ml and 1 l Marinelli; 1 air filter; 15 air filters; density = 1 and 'high') self prepared standards are available, based on a mixed radionuclide source from *Framatome* (ANP CERCA certified). Both gamma devices were last calibrated in January 2010. Efficiency controls are performed once per quarter, energy controls each month. The last background spectrum acquisition was done in January 2010 (57600 sec), the next being foreseen for June; background checks are performed every two months.

Until 2009 the laboratory had a service contract with *Ortec*; it will have a new one (including fortnightly controls; extraordinary visits not included).

Analysis results are manually transferred to a PC in specific sub-directories installed for the analysed media, calibration files etc., and from there to further sub-directories for gamma spectra and the measurement report. Thus data search is quick and effective.

Alpha/Beta measurement: The lab has a device from *ITECO engineering* (+ *ALBA* software on PC) that was formerly used for gross alpha/beta measurements of air filters. Now a *Berthold technologies LB770 10 channel low level counter* with *Berthold LB5330* interface and a PC (with *Berthold Universal Measurement System* software) is available and used e.g. for measuring gross alpha and beta on air filters, Sr-90 in milk (was a project in 2007 using a method with *Eichrom* Sr resin 100-150 μm ; two persons were trained for the procedure) and *ITREC* composite samples (done in 2009; in the future this will be a quarterly task).

A *Perkin Elmer Wallac 1220 Quantulus LSC* device (for H-3, gross alpha, gross beta measurements) was installed on 8.3.2008.

For radon measurement a *Radosys* system (track etch method) has been installed, but not yet used; a pilot project covers three radon prone areas in Basilicata.

With regard to alpha spectrometry an old NIM based *Ortec 676A* device is available. The team was told that this device was used by the chemistry department that moved to the APRPAB premises at Potenza. ICP-MS is not available at Matera, but there are talks about an agreement with the chemistry department to be able to use this analysis option.

Other measuring devices: The laboratory owns a portable gamma spectrometer type *Ortec Detective-EX* with high resolution gamma spectrometry (electrically cooled; with external Cs-137 check source). The team was told that it is used in the 'identifying' mode; in case of suspicious results a sample is taken and laboratory gamma spectrometry is performed.

For gamma dose rate measurement a *SEA SMP 01/T* device with ionisation chamber (on tripods) can be used.

QM/QA/QC

For the production of standards the laboratory has a certified multigamma solution (from *Framatome/CERCA/LEA*, Tricastin, Fance, purchased via *Servizi Nucleari s.n.c.*) and a certified mixed radionuclide source (*GE Healthcare Ltd.*, Amersham, UK) at it's disposal.

The team was told that with regard to unusual measurement results ISPRA is contacted. Apparently this is in connection to the rumours of sunken ships loaded with radioactive waste.

Radioactive standards are stored in locked stainless steel cabinet.

Tracing

For tracing of measurement data the verification team chose the milk sample N. 28/06, sampled on 26.7.2006. The report showed a K-40 value of 39.1 ± 2.9 Bq/l, the gamma spectrum printout showed 45.309 (background subtracted with '26.312 Bq' in the background spectrum). The difference could not be immediately explained and the team decided to trace a second sample. For this purpose the soil sample C35/08 from Rotondella was chosen. The value in ISPRA's RESORAD system (viewed by online connection with ISPRA) was 0.756 ± 0.114 Bq/kg for Cs-137, the value in the gamma spectrometry analysis file 0.75556 ± 0.11437 (2 sigma uncertainty), thus in perfect agreement.

Reporting

The verification team was informed that reporting to the region at the moment was physically not possible; reporting is not done regularly.

The verification team suggests exploring the advantages of introducing a LIMS for sample registration and data management with a view to avoid manual input activities as much as possible. This could, in particular, be efficient when large sample numbers have to be handled.

The team also recommends accreditation of the laboratory to ISO 17025.

6.3.6 General Recommendations by the Verification Team for the Region

Staffing should allow that each work task can be performed by at least two persons in order to allow operating a routine programme also during holiday times and in case of sickness of a staff member. The verification team recommends finding a stable solution to achieve this with trained personnel.

In particular with regard to highly specific tasks involving radiochemical sample preparation such as alpha spectrometry and analysis of Sr-90 the team recommends co-operation between the ARPAs/APPAs. Such co-operation should achieve that not each laboratory has to perform each of these complex analyses. For some tasks (e.g. with regard to mass spectrometry) other units of the local ARPA/APPAs could be involved. Necessary training for such tasks could be organised and given by ISPRA. The team points out that in particular radiochemical work should be performed as a routine task to guarantee continuity and to reach a reasonably high qualitative standard.

6.4 CAMPANIA (ARPAC NETWORK)

Due to lack of time, the verification of the environmental radioactivity monitoring in the region of Campania by the verification team could only be performed by a verification of the submitted written documents and the oral presentation of the situation at the opening meeting.

6.4.1 Regional legislative acts regulating environmental radioactivity monitoring and founding

The Regional Agency for the Environmental Protection of Campania – ARPAC, established under the regional Law n. 10 of 29 July 1998, is the technical reference institution for the environmental monitoring of the Region. Among its institutional duties there is the environmental surveillance in the matter of radioactivity.

The ARPAC resolution n. 193 of 26 July 2001 established the Regional Reference Centre (CRR) of the National network for the surveillance of the environmental radioactivity.

The CRR carried out radioactivity measurements on foodstuffs and beverages in accordance with the Regional Department (*Assessorato*) of Health and with the local sanitary departments of the Regional Public Health Service (ASL). Environmental radioactivity monitoring has not been carried out on the basis of a defined plan. A few environmental measurements have been performed, but mainly on request.

Within the Regional Operative Programme 2000 – 2006 approved with the Regional Decree n. 788 of 30 March 2004 the Region of Campania has allocated 840 490.81 € to implement the regional monitoring of environmental radioactivity. The verification team was told that this financing has been used mainly for the acquisition of new instrumentation and equipment for the laboratory currently in the process of being set up.

6.4.2 Analytical laboratories for Campania

The analytical laboratories involved in the radioactivity monitoring are:

- Reference Regional Centre of Radioactivity (CRR) – ARPAC – Via Lanzalone 54/56, Salerno.
- Provincial Department of Avellino – ARPAC – Via Tiratore 83, Atripalda

The team was informed that the Reference Regional Centre of Radioactivity Laboratory is currently not operative because it is moving into new buildings, which will be ready in June 2010.

In table 16 the measurement techniques used in 2008 and those programmed for the future are shown.

Table 16: measurement techniques used in 2008 and programmed for the future

Available measurement techniques	In 2008	Programmed
Gamma Spectrometry	x	x
Gamma dose rate		x
Liquid scintillation		x
Gross beta		x
Sr-90		x
H-3		x
Gross alpha		x
Alpha spectrometry		x

The personnel currently involved in the authority's radioactivity monitoring activity is shown in table 17.

Table 17: Personnel involved in radioactivity monitoring in Campania

Personnel	Units	Man year
Graduate	4	3.5
Technician		
Support		

The verification team recommends carefully evaluating the number of persons required to fully implement the foreseen analysis techniques at the desired high level of quality.

6.4.3 Samples analysed in 2008 for radioactivity monitoring and sampling locations

In table 18, the sampling locations, the matrices and the radionuclide analysed by ARPAC in foodstuff samples in the year 2008 are listed. No environmental samples have been analysed in that year.

Table 18: Foodstuff samples

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
SALERNO	Salerno	Apples	Cs-(134+137), K-40	1
CAPUA	Caserta	Aubergine	Cs-(134+137), K-40	2
FISCIANO	Salerno	Aubergine	Cs-(134+137), K-40	1
CASERTA	Caserta	Beans	Cs-(134+137), K-40	1
SALERNO	Salerno	Beans	Cs-(134+137), K-40	1
MARCIANISE	Caserta	Biscuits	Cs-(134+137), K-40	1
PIANA DI MONTE VERNA	Caserta	Biscuits	Cs-(134+137), K-40	1
SALERNO	Salerno	Blueberry	Cs-(134+137), K-40	
CAIAZZO	Caserta	Blueberry jam	Cs-(134+137), K-40	
CAPODRISE	Caserta	Blueberry jam	Cs-(134+137), K-40	
CASERTA	Caserta	Blueberry jam	Cs-(134+137), K-40	
MARCIANISE	Caserta	Blueberry jam	Cs-(134+137), K-40	
PIEDIMONTE MATESE	Caserta	Bread	Cs-(134+137), K-40	
CASERTA	Caserta	Carrots	Cs-(134+137), K-40	1
BRACIGLIANO	Salerno	Cherries	Cs-(134+137), K-40	1
SALERNO	Salerno	Cherries	Cs-(134+137), K-40	2
SALERNO	Salerno	Chestnut	Cs-(134+137), K-40	1
MERCATO SAN SEVERINO	Salerno	Coffee	Cs-(134+137), K-40	1
CASERTA	Caserta	Carrots	Cs-(134+137), K-40	1
BAIA E LATINA	Caserta	Corn	Cs-(134+137), K-40	1
CASERTA	Caserta	Courgette	Cs-(134+137), K-40	1
FISCIANO	Salerno	Courgette	Cs-(134+137), K-40	1
MADDALONI	Caserta	Cranberry juice	Cs-(134+137), K-40	1
NAPOLI	Napoli	Vodka (Ukraine)	Cs-(134+137), K-40	1
SANTA MARIA CAPUA VETERE	Caserta	Endives	Cs-(134+137), K-40	1
CAIAZZO	Caserta	Breakfast cereals	Cs-(134+137), K-40	1
CASERTA	Caserta	Fennel	Cs-(134+137), K-40	1
NUSCO	Avellino	Hay	Cs-(134+137), K-40	1
SPERONE	Avellino	Hazelnut paste	Cs-(134+137), K-40	1
BARONISSI	Salerno	Homogenised fruit	Cs-(134+137), K-40	2
BRACIGLIANO	Salerno	Homogenised fruit	Cs-(134+137), K-40	2
CAPODRISE	Caserta	Homogenised fruit	Cs-(134+137), K-40	1
SANTA MARIA CAPUA VETERE	Caserta	Endives	Cs-(134+137), K-40	1
CAIAZZO	Caserta	Breakfast cereals	Cs-(134+137), K-40	1
CASERTA	Caserta	Homogenised fruit	Cs-(134+137), K-40	1
CASERTA	Caserta	Homogenised fruit	Cs-(134+137), K-40	1
SANTA MARIA A VICO	Caserta	Homogenised fruit	Cs-(134+137), K-40	1
MADDALONI	Caserta	Honey	Cs-(134+137), K-40	1

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
MARCIANISE	Caserta	Honey	Cs-(134+137), K-40	1
SALERNO	Salerno	Kiwi	Cs-(134+137), K-40	1
SANTA MARIA A VICO	Caserta	Lentils	Cs-(134+137), K-40	1
SALERNO	Salerno	Lupin	Cs-(134+137), K-40	1
AGROPOLI	Salerno	Mollusc (<i>Ensis siliqua</i>)	Cs-(134+137), K-40	1
CASERTA	Caserta	Homogenised fruit	Cs-(134+137), K-40	1
CASERTA	Caserta	Homogenised fruit	Cs-(134+137), K-40	1
CAPACCIO	Salerno	Mollusc (<i>Ensis siliqua</i>)	Cs-(134+137), K-40	3
GIOIA TAURO	Reggio Calabria	Mushrooms (<i>Agaricus bisporus</i>)	Cs-(134+137), K-40	1
SALERNO	Salerno	Mushrooms (<i>Agaricus bisporus</i>)	Cs-(134+137), K-40	1
CAPODRISE	Caserta	Mussels	Cs-(134+137), K-40	1
BACOLI	Napoli	Mussels	Cs-(134+137), K-40	9
BATTIPAGLIA	Salerno	Mussels	Cs-(134+137), K-40	1
GIUGLIANO IN CAMPANIA	Napoli	Mussels	Cs-(134+137), K-40	3
POZZUOLI	Napoli	Mussels	Cs-(134+137), K-40	6
CASAGIOVE	Caserta	Oil of sunflower seeds	Cs-(134+137), K-40	1
CAPACCIO	Salerno	Mollusc (<i>Ensis siliqua</i>)	Cs-(134+137), K-40	3
GIOIA TAURO	Reggio Calabria	Mushrooms (<i>Agaricus bisporus</i>)	Cs-(134+137), K-40	1
SALERNO	Salerno	Mushrooms (<i>Agaricus bisporus</i>)	Cs-(134+137), K-40	1
CAPACCIO	Salerno	Mollusc (<i>Ensis siliqua</i>)	Cs-(134+137), K-40	3
GIOIA TAURO	Reggio Calabria	Mushrooms (<i>Agaricus bisporus</i>)	Cs-(134+137), K-40	1
SALERNO	Salerno	Mushrooms (<i>Agaricus bisporus</i>)	Cs-(134+137), K-40	1
CAPODRISE	Caserta	Mussels	Cs-(134+137), K-40	1
BACOLI	Napoli	Mussels	Cs-(134+137), K-40	9
BATTIPAGLIA	Salerno	Mussels	Cs-(134+137), K-40	1
GIUGLIANO IN CAMPANIA	Napoli	Mussels	Cs-(134+137), K-40	3
POZZUOLI	Napoli	Mussels	Cs-(134+137), K-40	6
CASAGIOVE	Caserta	Sunflower seed oil	Cs-(134+137), K-40	1
MONTESARCHIO	Benevento	Sunflower seed oil	Cs-(134+137), K-40	2
CASAGIOVE	Caserta	Corn seed oil	Cs-(134+137), K-40	1

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
CASAGIOVE	Caserta	Olive oil	Cs-(134+137), K-40	1
SALERNO	Salerno	Olives	Cs-(134+137), K-40	1
SALERNO	Salerno	Olives (Argentina)	Cs-(134+137), K-40	1
CAIAZZO	Caserta	Pasta	Cs-(134+137), K-40	1
CASERTA	Caserta	Pasta	Cs-(134+137), K-40	3
SANTA MARIA A VICO	Caserta	Pasta	Cs-(134+137), K-40	1
MARCIANISE	Caserta	Peach nectar	Cs-(134+137), K-40	1
CASAGIOVE	Caserta	Peanut seed oil	Cs-(134+137), K-40	1
CAPUA	Caserta	Peppers	Cs-(134+137), K-40	1
MONTESARCHIO	Benevento	Sunflower seed oil	Cs-(134+137), K-40	2
CASAGIOVE	Caserta	Corn seed oil	Cs-(134+137), K-40	1
CASAGIOVE	Caserta	Olive oil	Cs-(134+137), K-40	1
SALERNO	Salerno	Plums	Cs-(134+137), K-40	2
NAPOLI	Napoli	Poplar chips	Cs-(134+137), K-40	1
CAPODRISE	Caserta	Rice flour	Cs-(134+137), K-40	2
MADDALONI	Caserta	Rice flour	Cs-(134+137), K-40	1
SANTA MARIA A VICO	Caserta	Strawberry jam	Cs-(134+137), K-40	1
CASERTA	Caserta	Tomatoes	Cs-(134+137), K-40	1
SANTA MARIA CAPUA VETERE	Caserta	Tomatoes	Cs-(134+137), K-40	1
CAIAZZO	Caserta	Vegetable soup	Cs-(134+137), K-40	1
CASERTA	Caserta	Vegetable soup	Cs-(134+137), K-40	1
PIEDIMONTE MATESE	Caserta	Wheat flour	Cs-(134+137), K-40	2
NAPOLI	Napoli	Wheat, hard	Cs-(134+137), K-40	1
NAPOLI	Napoli	Wheat, soft	Cs-(134+137), K-40	18
MADDALONI	Caserta	Whole cow milk UHT	Cs-(134+137), K-40	1
CASAGIOVE	Caserta	Wine	Cs-(134+137), K-40	1
MADDALONI	Caserta	Wine	Cs-(134+137), K-40	1
SALERNO	Salerno	Plums	Cs-(134+137), K-40	2
NAPOLI	Napoli	Poplar chips	Cs-(134+137), K-40	1
CAPODRISE	Caserta	Rice flour	Cs-(134+137), K-40	2
MADDALONI	Caserta	Rice flour	Cs-(134+137), K-40	1
SANTA MARIA A VICO	Caserta	Strawberry jam	Cs-(134+137), K-40	1

The verification team acknowledges the current monitoring programme and recommends taking the experience gained in its implementation into account when devising future programmes.

6.4.4 Planned Regional programme for radioactivity monitoring

By letter of 23 April 2010 Region Campania transmitted to the Ministry of Environment and Protection of Land and Sea a proposal to implement the regional network for the surveillance of the radioactivity in the environment and in foodstuffs developed by ARPAC.

In table 19, the regional monitoring programme proposed by ARPAC is shown.

Table 19: Regional monitoring programme proposed by ARPAC

Matrix	Sampling locations	Radionuclides	Sampling frequency	Measurement frequency
Air	Variable points of the Region	Gamma dose rate	Continuous/ Daily	Continuous/ Daily
Soil	Grid network	Artificial radionuclides	Three-year	Three-year
Airborne particulate	One point per province	Artificial radionuclides; gross alpha and beta	Daily	Continuous/Weekly/ Monthly
Fallout	One point per province	Artificial radionuclides	Monthly	Monthly
SMOD	Main rivers	Artificial radionuclides	Quarterly	Quarterly
Sea water	At least one point	Artificial radionuclides	Half-yearly	Half-yearly
River water	Main rivers	Artificial radionuclides, radon	Half-yearly	Half-yearly
Sludge (treatment plants)	Main plants	Artificial radionuclides	Half-yearly	Half-yearly
Waste water (treatment plants)	Main plants	Artificial radionuclides	Half-yearly	Half-yearly
Drinking water	Main aqueducts	Artificial radionuclides	Daily	Monthly
Main aqueducts and aquifers	Gross alpha, gross beta and radon	Half-yearly	Half-yearly	
Cow's milk	Main centres of production/distribution	Artificial radionuclides	Weekly	Monthly
Buffalo milk	Main centres of production/distribution	Artificial radionuclides	Weekly	Monthly
Dairy	Main centres of production/distribution	Artificial radionuclides	Monthly	Monthly
Buffalo Dairy	Main centres of production/distribution	Artificial radionuclides	Monthly	Monthly
Beef	Main centres of production/distribution	Artificial radionuclides	Monthly	Quarterly
Pork	Main centres of production/distribution	Artificial radionuclides	Monthly	Quarterly
Poultry meat	Main centres of production/distribution	Artificial radionuclides	Monthly	Quarterly
Wheat	Main centres of production/distribution	Artificial radionuclides	Quarterly	Quarterly
Rice	Main centres of production/distribution	Artificial radionuclides	Quarterly	Quarterly
Pasta	Main centres of production/distribution	Artificial radionuclides	Quarterly	Quarterly
Flour	Main centres of production/distribution	Artificial radionuclides	Seasonal	Seasonal
Fruit	Main centres of production/distribution	Artificial radionuclides	Weekly	Monthly
Green salad	Main centres of production/distribution	Artificial radionuclides	Weekly	Monthly

Matrix	Sampling locations	Radionuclides	Sampling frequency	Measurement frequency
Vegetables	Main centres of production/distribution	Artificial radionuclides	Weekly	Monthly
Mushrooms	Main centres of production/distribution	Artificial radionuclides	Seasonal	Seasonal
Berries	Main centres of production/distribution	Artificial radionuclides	Quarterly	Quarterly
Wine	Main centres of production/distribution	Artificial radionuclides	Monthly	Monthly
Olive oil	Main centres of production/distribution	Artificial radionuclides	Monthly	Monthly
Fish and mollusc	Main centres of production/distribution	Artificial radionuclides	Quarterly	Quarterly
Baby products	Main centres of production/distribution	Artificial radionuclides	Monthly	Monthly
Animal feed	Main centres of production/distribution	Artificial radionuclides	Seasonal	Seasonal
Products from food industry	Main centres of production/distribution	Artificial radionuclides	Quarterly	Quarterly
Moss	All provinces	Artificial radionuclides	Seasonal	Seasonal

The verification team endorses the full implementation of the programme and encourages its perpetuation for the future.

6.4.5 General Recommendations by the Verification Team for the Region

Staffing should allow that each work task can be performed by at least two persons in order to allow operating a routine programme also during holiday times and in case of sickness of a staff member. The verification team recommends finding a stable solution to achieve this with trained personnel.

In particular with regard to highly specific tasks involving radiochemical sample preparation such as alpha spectrometry and analysis of Sr-90 the team recommends co-operation between the ARPAs/APPAs. Such co-operation should achieve that not each laboratory has to perform each of these complex analyses. For some tasks (e.g. with regard to mass spectrometry) other units of the local ARPA/APPAs could be involved. Necessary training for such tasks could be organised and given by ISPRA. The team points out that in particular radiochemical work should be performed as a routine task to guarantee continuity and to reach a reasonably high qualitative standard.

6.5 PUGLIA (ARPA PUGLIA NETWORK)

6.5.1 Regional legislative acts regulating environmental radioactivity monitoring and funding

The local authorities responsible for radioactivity matters are the Regional Department (*Assessorato*) of Ecology, Environmental Protection, Energy Politics, Garbage Disposal Extraction Activities, Protected Areas and the Regional Department of Health Politics.

The Regional Agency for the Environmental Protection of Puglia – ARPA Puglia – was established under the regional Law n. 6 of 22 January 1999. In accordance with this law, ARPA Puglia is the technical reference body for the environmental monitoring of the Region, among its institutional duties are the surveillance of the physical, chemical and biological factors of the environmental pollution as well as the surveillance in ionising radiation and non-ionising radiation.

6.5.2 Analytical laboratory for Puglia

The analytical laboratory involved in the radioactivity monitoring is

- Unità Operativa Semplice (U.O.S) Agenti Fisici – ARPA Puglia - Provincial Department of Bari - Via Piccinni, 164, 70122 Bari

In table 20, the measurement techniques used in 2008 and those programmed for the near future are shown.

Table 20: Measurement techniques used in 2008 and those programmed for the near future

Available measurement techniques	In 2008	programmed
Gamma Spectrometry	X	X
Gamma dose rate		X
Liquid scintillation		X
Gross beta		X
H-3		
Sr-90		X
Gross Alpha		
Alpha spectrometry		

The personnel currently involved in the authority's radioactivity monitoring activity is shown in table 21.

Table 21: Personnel involved in radioactivity monitoring

Personnel	Units	Man years
Graduate	1	0.33
Technician		
Support		

The verification team recommends carefully evaluating the number of persons required to fully implement the foreseen analysis techniques at the desired high level of quality.

6.5.3 Samples analysed in 2008 for radioactivity monitoring and sampling locations

The sampling locations, the matrices and the radionuclides analysed by ARPA Puglia for foodstuffs in 2008 are listed in table 22.

Table 22: Foodstuff samples

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
TAVIANO	Lecce	Barley	Cs-137, K-40	1
TAURISANO	Lecce	Beef meat muscle	Cs-137, K-40	2
LECCE	Lecce	Cabbage	Cs-137, K-40	1
UGENTO	Lecce	Celery	Cs-137, K-40	1
PRESICCE	Lecce	Chard	Cs-137, K-40	1
ALESSANO	Lecce	Cow's milk, raw	Cs-137, K-40	1
CAMPI SALENTINA	Lecce	Cow's milk, raw	Cs-137, K-40	1
COPERTINO	Lecce	Cow's milk, raw	Cs-137, K-40	2
SALICE SALENTINO	Lecce	Cow's milk, raw	Cs-137, K-40	1
SANARICA	Lecce	Cow's milk, raw	Cs-137, K-40	1

Sampling location	Prov.	Matrix	Radionuclides	N. of samples
SCORRANO	Lecce	Cow's milk, raw	Cs-137, K-40	1
TAVIANO	Lecce	Cow's milk, raw	Cs-137, K-40	1
TREPUZZI	Lecce	Cow's milk, raw	Cs-137, K-40	1
TAVIANO	Lecce	Barley	Cs-137, K-40	1
TAURISANO	Lecce	Beef meat muscle	Cs-137, K-40	2
BARI	Bari	Cow's milk, pasteurised	Cs-137, K-40	9
CORATO	Bari	Cow's milk, pasteurised	Cs-137, K-40	10
GIOIA DEL COLLE/ Ditta Granarolo	Bari	Cow's milk, pasteurised	Cs-137, K-40	12
LECCE	Lecce	Cow's milk, pasteurised	Cs-137, K-40	1
PUTIGNANO/ Ditta CAP	Bari	Cow's milk, pasteurised	Cs-137, K-40	11
ADELFA	Bari	Cow's milk, UHT	Cs-137, K-40	1
BARI	Bari	Cow's milk, UHT	Cs-137, K-40	2
BITRITTO	Bari	Cow's milk, UHT	Cs-137, K-40	10
CAPURSO	Bari	Cow's milk, UHT	Cs-137, K-40	10
GIUGGIANELLO	Lecce	Cow's milk, UHT	Cs-137, K-40	1
ANDRIA	Bari	Lettuce	Cs-137, K-40	1
BARI	Bari	Lettuce	Cs-137, K-40	3
BITRITTO	Bari	Lettuce	Cs-137, K-40	1
CONVERSANO	Bari	Lettuce	Cs-137, K-40	1
CORATO	Bari	Lettuce	Cs-137, K-40	1
GRAVINA DI PUGLIA	Bari	Lettuce	Cs-137, K-40	1
LECCE	Lecce	Lettuce	Cs-137, K-40	4
LOCOROTONDO	Bari	Lettuce	Cs-137, K-40	1
MONOPOLI	Bari	Lettuce	Cs-137, K-40	1
PRESICCE	Lecce	Lettuce	Cs-137, K-40	1
BARI	Bari	Cow's milk, pasteurised	Cs-137, K-40	9
CORATO	Bari	Cow's milk, pasteurised	Cs-137, K-40	10
GIOIA DEL COLLE / Ditta Granarolo	Bari	Cow's milk, pasteurised	Cs-137, K-40	12
LECCE	Lecce	Cow's milk, pasteurised	Cs-137, K-40	1
PUTIGNANO	Bari	Lettuce	Cs-137, K-40	1
TRICASE	Lecce	Lettuce	Cs-137, K-40	1
SPECCIA	Lecce	Pork meat muscle	Cs-137, K-40	1
ARNESANO	Lecce	Potatoes	Cs-137, K-40	1
CAPRARICA DI LECCE	Lecce	Potatoes	Cs-137, K-40	1
COPERTINO	Lecce	Potatoes	Cs-137, K-40	1
LECCE	Lecce	Potatoes	Cs-137, K-40	2
LEQUILE	Lecce	Potatoes	Cs-137, K-40	3
LEVERANO	Lecce	Potatoes	Cs-137, K-40	1
NARDÒ	Lecce	Potatoes	Cs-137, K-40	1
TRICASE	Lecce	<i>Scomber scombrus</i>	Cs-137, K-40	1
LECCE	Lecce	Sheep Milk	Cs-137, K-40	1
LEVERANO	Lecce	Sheep Milk	Cs-137, K-40	1
SCORRANO	Lecce	Sheep milk	Cs-137, K-40	1
CASARANO	Lecce	Wheat flour	Cs-137, K-40	3
MATINO	Lecce	Wheat flour	Cs-137, K-40	1
TAVIANO	Lecce	Wheat flour	Cs-137, K-40	2

In 2008 ARPA Puglia did not perform any measurements on environmental samples. However, since April 2010, a continuous sampling system for airborne particulates is in use (Bari/Via delle Magnolie; *Assessorato all'Ambiente*; for determination of Cs-137 and gross beta).

Bari: Verification at Regional aerosol sampling station

The verification team witnessed the 'Air monitoring' station at the premises of the '*Assessorato all'Ecologia*', Region of Puglia, Via delle Magnolie 6, Bari 'Modugno ENAIP'.

Basically the air sampling station has been installed for other (environmental but non-radiological monitoring) purposes. The team was informed that 50 such stations exist in Puglia, however only one is routinely used; the other 49 are for use in emergencies. For radioactivity monitoring sampling is done at the visited station; the composite sample of several days is taken for analysis to the laboratory. The general location of the sampler in the area is very good (flat plain). With respect to the local conditions it is an unused area (ca two ha locked), with medium size trees, the container with the sampler being in one corner in a ca. 10x10x10 m triangular area, again fenced and locked. The container ('*Stazione Automatica Controllo Ambientale*') is locked and air conditioned. The sampler is a *swam5a* dual-channel beta attenuation monitor, *FAI Instruments*, Fontenuova, RA, Italy. It is mainly used to monitor non-radiological parameters (PM10) and has a C-14 source built in. An automatic system allows for filter changes every 24 hours (0:00 to 24:00); the filter have 47 mm diameter and are made of Teflon; the flow rate is ca. 50 m³/day). Every ten days a technician refills the filter holder, takes the used filters, places them individually in boxes, labels them with the date and takes them to the radiological laboratory. A notebook PC (*Panasonic toughbook*) is available for data transfer using '*Hyper terminal*' software (flow rate data, temperature, pressure etc. for calculation of Norm-m³). The team received a demonstration. The use of the filters for radiological analysis is only a 'side effect'; the equipment may be replaced by a specific alpha/beta air monitor. In a few months two more stations may be set up.

A UPS for the sampling device available in the container.

Other equipment (not for radiological surveillance purposes) is operated in the location.

The team had the opportunity to meet the *Assessore* responsible for environment in Puglia on the political level and to explain the content of the verification mission. In particular, the discussion focussed on the interest in a well organised radioactivity monitoring programme in southern Italy.

Gioia dell Colle: Verification at milk dairy

The verification team visited the milk dairy of *Granarolo perla* (formerly *SAIL SpA*) at Gioia dell Colle. The headquarters of this firm are in Bologna. The dairy deals with milk production and distribution in mainland southern Italy. It is the biggest such production place in southern Italy; there is one more in Calabria (also belonging to *Granarolo*). In Italy *Granarolo* (29%) and *Parmalat* (22-23%) are the largest milk distributors.

The team was informed that local milk from Puglia, Basilicata and Calabria (2500 – 2700 hectolitres per day; only cow's milk) are used for the production of fresh and UHT milk. The company also manages the distribution of all *Granarolo* products in the regions via local stores.

Milk arrives from the producers (co-operatives covering several milk farms; 310 producers as starting point) daily and is divided in two lines: high quality and normal milk. During the whole production process traceability to the origin is maintained. First, acceptance tests are performed in the laboratory (temperature, acidity, antibiotics, detergent content etc.); if accepted the milk is stored, always refrigerated to 2°C.

Around midnight milk pasteurisation and filling into final product bottles / boxes starts.

Samples of 1 l are taken after bottling (selection based on chance), one per month; the sample containers are sealed and the accompanying papers are signed. The transport to the radiological measurement laboratory is managed by the Regional Health Service (responsible for foodstuffs) in a thermos.

A data base with all information is available, allowing full tracing of the samples in case of any exceptional analysis results.

The team was told that with regard to other locations samples of cow's and sheep milk are taken at the farm, however in small numbers.

The verification team acknowledges the current monitoring programme and recommends taking the experience gained in its implementation into account when devising future programmes.

With regard to radioactivity determinations in air the team encourages setting up dedicated air samplers or dedicated air monitors.

6.5.4 Planned Regional programme for radioactivity monitoring

The Regional Departments for environment and health signed, on 13 April 2010, a proposal for a Regional Resolution (code ECO/DEL/2010/00023) to establish a regional programme for environmental radioactivity monitoring which will be carried out by ARPA Puglia.

In this proposal, a funding of 60 000 € is foreseen (operating budget under Regional Law n. 28/01) to implement the regional air monitoring programme with gamma dose rate monitoring devices and airborne particulate continuously sampling systems for gross alpha and gross beta measurements.

In table 23 the programme planned by the Region is shown.

Table 23: Measuring programme planned by ARPA Puglia

Matrix	Measurement	Frequency of measurement
Airborne particulate	Cs-137, Be-7, gross beta, gross alpha	Daily, monthly
Gamma dose rate (air)	Gamma dose	Daily
Gamma dose rate (soil)	Gamma dose	Three-year
Soil	Cs-137, Co-60	Three-year
Deposition	Cs-137, Be-7, Sr-90	Monthly
SMOD	Cs-137, I-131, Sr-90, residual beta	Half-yearly
Sea water	Cs-137, I-131, Sr-90, residual beta	Half-yearly
Sludge treatment plant	Cs-137, I-131, In-111	Annual
Waste water	Cs-137, I-131, In-111	Annual
Drinking water	Cs-137, I-131, Sr-90, H-3, gross alpha	Half-yearly
Cow's milk	Cs-137, Sr-90	Monthly
Meat bovine	Cs-137, Sr-90	Quarterly
Cereals	Cs-137, Sr-90	Seasonal
Vegetables	Cs-137, Sr-90	Seasonal
Fish	Cs-137, Sr-90	Seasonal

The verification team endorses the full implementation of the programme and encourages its perpetuation for the future.

6.5.5 Bari – ARPA Puglia, Radiological Laboratory

The verification team visited the 'Unità Operativa Semplice (U.O.S) Agenti Fisici – ARPA Puglia - Provincial Department of Bari' at Via Piccinni, 164, 70122 Bari ('Laboratorio di Riferimento Regionale per la Radioattività Ambientale'). The team was told that moving to another location is foreseen.

The laboratory employs two technicians and a physicist (head of the laboratory, specialist in health physics); since ca. 20 April 2010 an additional physicist is working in the laboratory. The verification team was informed that the field of work covers both, ionising radiation (IR) and non-ionising radiation (NIR), NIR being the main activity (ca. 70% of the workload). Since the largest part of the routine work deals with NIR, 'only' the head of the laboratory is involved in environmental

radioactivity monitoring tasks and thus – besides administrative work – has to perform all tasks related to IR.

Sampling

Besides the routine programme, the laboratory also does radioactivity measurements for import/export customers.

The verification team noted the presence of an old air sampler (*SEA air series 5000 multifunction sampling system*) that is only used in emergencies.

Generally, at each sampling occasion four equivalent samples are taken: one stays on site with the 'owner', one is available for measurement on site, one is kept as a proof sample, one is transferred to the laboratory for analysis.

The team noted various sampling tools for different media.

Sample registration, sample preparation

The registration of documents and samples is done centrally (not restricted to radiological samples), producing a bar code. The team received a demonstration with scanning and allocation of a protocol number. All steps are done on a network PC; a sample sheet is generated for further use. The team was told that for radiological samples when all documents including any certificates are available, the information is signed off by the head of the radiological laboratory.

The sample preparation room was not very spacious (the offices being more spacious) and gave the impression of needing renovation. Samples are prepared according to the next analysis step; sample containers are well labelled (e.g. air filters with all data on the containing box and also the filters themselves).

Measuring devices

For gross beta measurements, e.g. of air filters, a *SEA 373 C* microprocessor controlled measuring unit with a detector in a *SEA 300 PMS* housing is used. Following the ANPA protocol the measurement is done 120 hours after sampling. Calibration is done with a Sr-90 source. Calculations are performed with an *MS Excel* programme. As a next step 20 filters are combined for gamma spectrometry. The team was told that after moving to the new location gamma spectrometry may be performed on daily filters.

A *Perkin Elmer Wallac 1220 Quantulus* liquid scintillation counter was installed two days before the visit; a ca. 2x2 m construction serves to distribute the weight of the device; staff expects to be able to start tests by the end of May 2010 (H-3 analysis).

For gamma spectrometric determinations the laboratory operates a 'new' *Ortec 28%* HPGe with thin Be window and an *Ortec 28%* HPGe detector in standard configuration. It uses *Ortec NIM* electronics and *Ortec GammaVision* software (the original *Ortec* equipment was bought in 1986 based on funding by the Ministry of Health, the later upgrades being for the same system). The team noted that high level expertise is available for gamma spectrometry. Calibrated geometries are 450 ml and 1 l Marinelli and filter sets. The last calibration for Marinelli beakers was in 1999 on the occasion of an inter-comparison exercise. Generally, energy checks are based on the nuclides detected in the samples, if needed separate sources are used. Efficiency checks are done every 3-4 months with a certified source in Marinelli geometry. *Amersham Buchler* mixed radionuclide standard sources and also a Eu-152 source are available for such checks. Background checks generally are done over a weekend.

Radioactive sources are kept in marked locked safes..

The team noted the presence of other measuring devices, e.g. an old gamma dose rate monitor that currently is used for monitoring the radiation level in the laboratory (will be replaced); a *SEA SMP 01/T* ionisation chamber, and a *RADOS DOSACUS* TLD reader (not in operation).

Archives and backups

All PCs are connected in a network, the server being located in the second floor of the building. All relevant data (including gamma spectra) are archived; daily an incremental backup on a 'virtual' disk and weekly a total backup is performed, the total backups being managed by the IT department at Corso Trieste (ARPA Puglia central offices), as part of ARPA Puglia's security policy. The team saw a

demonstration of the backup routine on PC. All data from 2000 to now are available, even older data for beta measurements are stored in a backup *Excel* file. Data from registration information is transformed to such files for easier use in the laboratory.

The team noted the presence of an archive with deep frozen samples that will be measured when time allows.

Reporting, data presentation

The verification team was told and could verify that all data for 'conventional' parameters are placed on the ARPA's public web site: for example air quality data as tables and colour coded on a map. The team was told that in about a month this will include also gross beta air data, in the form of a table. Also dose rate data from regional stations of the national GAMMA system will be presented (an agreement with ISPRA has been signed; data from ISPRA are received as FTP download; the verification team was given a demonstration).

Quality management

The team was informed that currently the laboratory is not accredited. The chemistry laboratory, which is situated in another location, has ISO17025 accreditation; there, a LIMS system is available. However, accreditation may come as a future step in quality management.

To verify its quality the laboratory takes part in IAEA proficiency tests and inter-comparisons (e.g. the 'IAEA-CU-2006-03 world-wide open proficiency test on the determination of gamma emitting radionuclides').

The verification team strongly recommends finding a sustainable solution for the personnel situation, i.e. having at least two persons available for performing all necessary tasks within the domain of ionising radiation.

The team encourages accreditation to ISO17025 for the main tasks in radiological analysis.

It also supports all efforts for public presentation of monitoring data on the web and encourages all work related to tritium determinations.

6.5.6 General Recommendations by the Verification Team for the Region

Staffing should allow that each work task can be performed by at least two persons in order to allow operating a routine programme also during holiday times and in case of sickness of a staff member. The verification team recommends finding a stable solution to achieve this with trained personnel.

In particular with regard to highly specific tasks involving radiochemical sample preparation such as alpha spectrometry and analysis of Sr-90 the team recommends co-operation between the ARPAs/APPAs. Such co-operation should achieve that not each laboratory has to perform each of these complex analyses. For some tasks (e.g. with regard to mass spectrometry) other units of the local ARPA/APPAs could be involved. Necessary training for such tasks could be organised and given by ISPRA. The team points out that in particular radiochemical work should be performed as a routine task to guarantee continuity and to reach a reasonably high qualitative standard.

7 CONCLUSIONS

All verifications that had been planned by the verification team were completed successfully. In this regard, the information supplied in advance of the visit, as well as the additional documentation received during and after the verification, was useful.

- (1) The verification activities that were performed demonstrated that the facilities necessary to carry out continuous monitoring of levels of radioactivity in the air, water and soil in Southern Italy (Sicily, Calabria, Basilicata and Puglia) are adequate. The Commission services could verify the operation and efficiency of these facilities in these four regions and was informed of the situation in Campania.
- (2) Under the co-ordination of ISPRA a detailed monitoring programme for environmental radioactivity has been elaborated and proposed for the whole of Italy. As far as concerns the implementation of the regional/provincial programmes they are under the responsibility of the regional/provincial authorities. The verification noted that the facilities for monitoring environmental radioactivity on a regional scale on the territory of the regions of Sicily, Calabria, Basilicata and Puglia are present and that each of these regions are currently implementing a specific programme for the monitoring of environmental radioactivity. The Commission services were also informed about the situation in Campania. On the basis of the verification findings the Commission services request the Italian authorities to fully implement the said monitoring programmes as a matter of high priority as projected for 2010. The Commission services might conduct in due time a re-verification in these regions to verify the state of implementation of these programmes. This observation is valid as well for other regions that may not have yet implemented this programme in its full extent.
- (3) A number of topical recommendations are formulated. These recommendations aim at improving some aspects of the surveillance of environmental radioactivity in Southern Italy. The recommendations do not discredit the fact that this environmental monitoring – after its full implementation – is in conformity with the provisions laid down under Article 35 of the Euratom Treaty.
- (4) The verification findings and ensuing recommendations are compiled in the ‘Main Findings’ document that is addressed to the Italian competent authorities through the Italian Permanent Representative to the European Union.
- (5) The Commission services will closely follow up the progress made by the Italian authorities with respect to point (2) concerning the full implementation of the monitoring programmes in all five regions.
- (6) The present Technical Report is to be enclosed with the Main Findings.
- (7) Finally, the verification team acknowledges the excellent co-operation it received from all persons involved in the activities it performed.

Art. 35 verification Italy – 02 to 07 May 2010

Southern Italy

VERIFICATION PROGRAMME

Sunday 02/5

EC party travels to Palermo

Monday 03/5

1. ARPA Sicily, **Palermo**: Opening meeting: introductions / presentations / programme of the visit (09:00 – 12:00).
2. ARPA Sicily, **Palermo**: Verification activities (monitoring and sampling devices, laboratory) (13:00 to 17:00).
3. Travel to Messina (evening, rented car)

Tuesday 04/5

4. Transfer to mainland; travel to Reggio di Calabria (AM, rented car).
5. ARPACAL **Reggio di Calabria**: Verification activities (monitoring devices, sampling, laboratory); sunken ships issue (11:00 to 15:00).
6. Travel to Maratea (PM, rented car), on the route verification of GAMMA station at **Cupone**.

Wednesday 05/5

7. Verification of GAMMA station at **Maratea** (08:00 to 09:00)
8. Travel to Matera (AM, rented car); on the route verification of measurement and sampling location at discharge point (ITREC, **Trisaia**)
9. ARPAB **Matera**: Verification activities (monitoring and sampling devices, laboratory) (14:00 to 17:00).
10. Travel to Bari (evening, rented car)

Thursday 06/5

11. ARPA Puglia, **Bari**: Verification activities (monitoring and sampling devices, laboratory) (10:00 to 14:30).
12. Verification at Granarolo dairy, **Gioia del Colle** (15:30 to 16:15).
13. Verification of GAMMA station at **Martina Franca** (17:00 to 17:30).

Friday 07/5

14. ARPA Puglia, **Bari**: Continuation of verification activities (10:00 to 11:30)
15. Closing meeting at ARPA Puglia, **Bari**: Presentation of preliminary verification findings (12:00 to 13:00)

DOCUMENTATION RECEIVED AND CONSULTED

1. Main Legislation

- Legislative Government Decree Nr 230 of 17 March 1995 transposing the European Directives 89/618/Euratom, 90/641/Euratom, 92/3/Euratom and 96/29/Euratom.
- Legislative Decree Nr 241 of 26 May 2000, amending Government Decree Nr 230.
- Legislative Decree Nr 257 of 9 May 2001, amending Government Decree Nr 230.
- Legislative Decree Nr 151 of 26 March 2001, amending Government Decree Nr 230.

2 Legislative acts regulating environmental radioactivity monitoring

- Treaty of Rome (1957) establishing the European Atomic Energy Community.
- Circular n. 2 of 3 February 1987 of the Health Ministry “Directives to the Regions for the execution of the controls on the environmental radioactivity”.
- Legislative Decree 230/1995 modified to: Legislative Decree 187/2000, Legislative Decree 241/2000, D.Lgs 257/2001, Legislative Decree 151/2001 “Implementation of EC Directives EURATOM 89/618, 90/641, 92/3/ and 96/29 on ionising radiation” Ordinary Supplement OJ, 13 June 1995, n.136.
- Commission Recommendation 2000/473/Euratom of 8 June 2000 on the application of Art. 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole (Official Journal L 191, 27 July 2000, pg 0037 – 0046).

3 Legislative acts regulating the radiological surveillance of foodstuffs

- Treaty of Rome (1957) establishing the European Atomic Energy Community.
- Council Regulation EURATOM 3954/87 of 22 December 1987 laying down maximum permitted levels of radioactive contamination of foodstuffs and of feeding stuffs following a nuclear accident or any other case of radiological emergency (OJ L371, 30 December 1987, pg 11). Amended by: Council Regulation EURATOM 2218/89 of 18 July 1989 (OJ L211, 22 July 1989, pg 1).
- Council Regulation EEC 737/90 of 22 March 1990 on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power station (OJ L82, 29 March 1990, pg 1ff). Amended by: Council Regulation EEC 616/2000 of 20 March 2000 (OJ L75, 24 March 2000, pg 1).
- Council Regulation EURATOM 944/89 of 12 April 1989 laying down maximum permitted levels of radioactive contamination in minor foodstuffs following a nuclear accident or any other case of radiological activity (OJ L101, 13 April 1989, pg 17).
- Commission Regulation (ECC) 2219/89 of 18 July 1989 on the special conditions for exporting foodstuffs and feeding stuffs following a nuclear accident or any other case of radiological activity (OJ L211, 22 July 1989, pg 4).
- Commission Regulation (EC) 1661/99 of 27 July 1999 laying down detailed rules for the application of Council Regulation 737/90/EEC on the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl nuclear power-station (OJ L197, 29 July 1999, pg 17). Amended by: Commission Regulation (EC) n° 1621/2001 of 8 August 2001 (OJ L215, 9 August 2001, pg 18); Commission Regulation (EC) n° 1608/2002 of 10 September 2002 (OJ L243, 11 September 2002, pg 7).
- Commission Recommendation 2000/473/Euratom of 8 June 2000 on the application of Art. 36 of the Euratom Treaty concerning the monitoring of the levels of radioactivity in the environment for the purpose of assessing the exposure of the population as a whole. Official Journal L 191, 27 July 2000, pg 0037 – 0046).

- Commission Regulation (EC)1609/2000 establishing a list of products excluded from the application of Council Regulation 737/90/EEC the conditions governing imports of agricultural products originating in third countries following the accident at the Chernobyl power station (OJ L185, 25 July 2000, pg 27).
- Legislative Decree 31/2001, “Implementation of EC Directive 98/83 on the quality of water intended for human consumption” (Ordinary Supplement OJ, 3 March 2001, n. 52).
- Commission Recommendation 2003/274/EURATOM of 14 April 2003 on the protection and information of the public with regard to exposure resulting from the continued radioactive caesium contamination of certain wild food products as a consequence of the accident at the Chernobyl nuclear power station (OJ L99, 17 April 2003, pg 55f and OJ L109, 1 May 2003, pg 27).

4 Main national guidance documents

- *"Raccolta dei risultati dell'attività dei Gruppi di Lavoro delle Reti Nazionali"*, ANPA, May 1995.
- CTN_AGF (AGF-T-RAP-99-13) *"Rassegna di Bioindicatori per la Radioattività Ambientale"*, 2000.
- CTN_AGF (AGF-T-RAP-00-13) *"Criteri per l'adeguamento degli insiemi di dati sulla radioattività ambientale"*, 2000.
- CTN_AGF (AGF-T-RAP-01-12) *"Assistenza all'ANPA per la revisione delle reti nazionali di controllo della radioattività ambientale"*, 2001.
- CTN_AGF (RTI CTN_AGF 2/2002) *"Guida tecnica sulle misure di radioattività ambientale"*, 2002.
- CTN_AGF (AGF-T-SFW-01-05) *"Sviluppo della banca dati delle reti nazionali di monitoraggio della radioattività ambientale"*, 2001.
- CTN_AGF (AGF-T-GTE-03-01) *"Guida tecnica sulle misure di radioattività ambientale: H-3 α e β totale in acque potabili, α e β emettitori artificiali e naturali in matrici ambientali"*, 2004.
- CTN_AGF (AGF-T-RAP-03-15) *"Adeguamento della rete nazionale della radioattività ambientale: completamento della proposta operativa e integrazione con la rete d'allarme"*, 2005.
- CTN_AGF (AGF-T-RAP-04-04) *"Definizione di standard informativi per la gestione del flusso di dati sulla radioattività ambientale"*, 2005.

5 Main international guidance documents

- IAEA (1985), “Survey of currently available Reference Materials for use in Connection with the determination of Trace Elements in Biological and Environmental materials”, IAEA/RL/128 REP-1, IAEA, Vienna.
- IAEA (1989) “Measurement of radionuclides in food and the environment. A guidebook” Technical Report Series N° STI/DOC/010/295 TRS 295. IAEA, Vienna
- IAEA (1998) “Analytical Quality Control Services, AQCS Programme 1998, Intercomparison Runs, Reference Materials”, IAEA, Vienna.
- National Council on Radiation Protection and Measurements (1978), “A Handbook of Radioactivity Measurements Procedures”, Report n° 58, Washington D.C.
- WHO, (2004) “Guidelines for Drinking-water Quality”, 3rd edition

6. Documents received:

- ISPRA: Descriptive report with annexes, April 2010
- Power Point presentation by MATTM
- Power Point presentation by all concerned regions

7 Web sites consulted

Environment Ministry (MATTM)	http://www.minambiente.it/home_it/index.html?lang=it
Health Ministry (MH)	http://www.salute.gov.it/
Legislation	http://www.parlamento.it/elenchileggi/87088/gencopertina.htm
ISPRA	http://www.isprambiente.it/site/it-IT
ARPA Basilicata	http://www.arpab.it/
ARPA Calabria	http://www.arpacal.it/
ARPA Campania	http://www.arpacampania.it/index.asp
ARPA Puglia	http://www.arpa.puglia.it/include/default.asp?conta=Si
ARPA Sicilia	http://www.arpa.sicilia.it/
SOGIN	http://www.sogin.it/

Provincial and Regional Environmental Protection Agencies – APPA/ARPA Network

1. Provincial Agency for Environmental Protection – Bolzano
2. Provincial Agency for Environmental Protection – Trento
3. Regional Agency for Environmental Protection of Emilia-Romagna
4. Regional Agency for Environmental Protection of Veneto
5. Regional Agency for Environmental Protection of Calabria
6. Regional Agency for Environmental Protection of Campania
7. Regional Agency for Environmental Protection of Lazio
8. Regional Agency for Environmental Protection of Marche
9. Regional Agency for Environmental Protection of Molise
10. Regional Agency for Environmental Protection of Piemonte
11. Regional Agency for Environmental Protection of Puglia
12. Regional Agency for Environmental Protection of Toscana
13. Regional Agency for Environmental Protection of Umbria
14. Regional Agency for Environmental Protection of Basilicata
15. Regional Agency for Environmental Protection of Friuli Venezia Giulia
16. Regional Agency for Environmental Protection of Liguria
17. Regional Agency for Environmental Protection of Lombardia
18. Regional Agency for Environmental Protection of Sicilia
19. Regional Agency for Environmental Protection of Valle d’Aosta
20. Regional Agency for Environmental Protection of Abruzzo
21. Regional Agency for Environmental Protection of Sardegna