

## CRIIRAD

Commission de Recherche  
et d'Information Indépendantes  
sur la Radioactivité

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### A1 / Short presentation of CRIIRAD and its laboratory

CRIIRAD (Commission de Recherche et d'Information Indépendantes sur la RADioactivité / Commission for Independent Research and Information about RADiation) is a non-governmental and non-profit organisation that operates according to the 1901 French law and works to improve **information and protection of the public** against **ionizing radiation**.

CRIIRAD objectives are:

- to give people an access to scientific information about the impact of ionizing radiations and the actual radiological contamination of their environment,
- to improve people's ability to participate (as citizens) to the actions and decisions in the field of environmental protection, protection of public health, the rights of future generations,
- to give people scientific tools in order to help them to make independent preliminary assessments of a radiological contamination (CRIIRAD is organising seminars "how to use your own Geiger Muller counter),
- to circulate information on radioprotection through a web site ([www.criirad.org](http://www.criirad.org), leaflets and brochures, books, lectures, seminars, videos, etc.(see a selection of written material ).

CRIIRAD was created in **May 1986** by French citizens willing to obtain reliable data on the actual intensity of radioactive fallout from **Chernobyl**, the consecutive food chain contamination and the related risk for their health. At that time, the French Government stated that absolutely no radioactive contamination from the Chernobyl Nuclear Plant could have reached the French territory.

In order to provide such information, CRIIRAD set up in Valence (France) an **independent laboratory** specialised in radiological analysis and radio-ecological studies. Since 1986, the CRIIRAD laboratory has implemented more than 20 000 measurements by gamma spectrometry and hundreds of environmental studies in France and abroad.

The CRIIRAD laboratory demonstrated that the French territory (soil, food chain) had been contaminated by radionuclides to values exceeding health standards. Due to the lack of proper information and protection of the public, CRIIRAD and the French Association of Thyroid Disease Sufferers (AFMT) made a complaint in March 2001 to the Court of the French Republic.

As is illustrated hereafter (Annex A1-1 references), the CRIIRAD laboratory is experienced in the surveillance of levels of **radioactivity in air, water, soil and the food chain**, whatever be the source term (natural radiation, enhanced levels of natural radiation, nuclear fuel cycle, research facilities, military facilities, hospitals, non nuclear industry).

The CRIIRAD laboratory is used to make independent and critical analysis of monitoring facilities and environmental assessments established by National authorities or plant operators.

Since 1986 CRIIRAD demonstrated **weaknesses of official monitoring systems** in many areas : Chernobyl fallout, impact of uranium mining and milling, nuclear plants, reprocessing plants, military plants, nuclear research centres, hospitals, etc.

<sup>1</sup> The CRIIRAD Laboratory is equipped with 2 gamma spectrometry devices in order to measure gamma emitting radionuclides, a liquid scintillation counter in order to measure tritium and alpha and beta emitters and on site equipment (portable radiation meters, doserate meter and gamma spectrometer, radon monitor). The CRIIRAD gamma spectrometry laboratory regularly participates in French (IRSN) and international (IAEA) programs of intercomparaison and proficiency tests. It is certified by the French Department of Health for the measurement of gamma emitting nuclides in the environment and the food chain and for radon diagnosis in public buildings.



CRIIRAD is devoting its work at improving knowledge on actual radioactive discharges, environmental impacts and dose calculations in order to contribute strongly to the optimisation of doses to **workers and the public**.

For this purpose CRIIRAD is conducting research and radiological expertise as well as training sessions and seminars<sup>2</sup>.

CRIIRAD is totally **independent** from the State, National Authorities and the Nuclear Industry.

Its funding comes from the **citizens** which are supporting the controls (approximately 4 000 citizens) and the customers for which the laboratory is working (justice, city councils, county councils, regional councils, NGO's, private citizens, companies, administration, etc...)

CRIIRAD experience is now recognised internationally and people from abroad ask for CRIIRAD scientific support. For example, during the last 4 years, the CRIIRAD laboratory conducted studies :

- In **Niger** for a local NGO called AGHIR IN MAN (see pictures below). This mission was organised in order to help the local NGO for making an independent evaluation of the radiological impact of the **uranium mines** and mills situated at Arlit. CRIIRAD discovered several problems : radioactive scrap metal from the uranium mill was sold on the city market, uranium contamination of drinking water exceed WHO standards, radioactive tailings from the uranium mill were stored in the open air, etc.
- In **Italy** (Sardinia) for local NGO's (WWF) in relation with the potential radiological impact of a **US nuclear submarine** base.
- In **Spain**, at the request of an independent journalist. CRIIRAD demonstrated that a company (ERKIMIA) was manufacturing **food additives** (bicalcic phosphates) containing elevated concentrations of radioactive Lead 210 and Polonium 210.
- In **Japan** for Greenpeace International and Greenpeace Japan. The mission was designed to evaluate the radiological situation before starting of a **Reprocessing Plant** at ROKKASHO Mura. Through press conferences and meetings, CRIIRAD also tried to improve people awareness about the future radiological contamination to be induced by radiological discharges to the atmosphere and the Pacific Ocean.
- In French **Polynesia** at the request of a special commission set up by the local Parliament and dealing with the consequences of past atomic tests.

CRIIRAD support is required by many individuals and organisations in France and Abroad. But CRIIRAD resources are not sufficient to provide help to all the organisations that need it.

For the years to come main projects are :

- The continuation of the international campaign "No radioactivity in our food" in order to stop the project of revision of the **Codex Alimentarius**
- The studies and public actions for the improvement of the radiological situation near **uranium mines in Africa** (Niger and Gabon).
- The creation of a private laboratory in **Belarus** in order to help **Dr Bandazhevsky** in pursuing its research on the health consequences of the Chernobyl accident, especially on children's health.

<sup>2</sup> CRIIRAD organised in April 2005 a Seminar at the Conseil Régional Rhône-Alpes in Lyon (FRANCE) : "Radioactive Contamination and people protection" with International experts (Dr Baverstock, Prof Goncharova, Prof Lajuk), NGO representatives, etc..



**To contact CRIIRAD laboratory :**

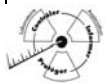
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Left : A computer, Geiger Muller counters and radon monitoring devices are offered to the AGHIR IN'MAN president (M Almostapha ALHACEN) by the CRIIRAD laboratory manager (Bruno Chareyron) / Niger, December 2003.

Right: CRIIRAD laboratory manager (Bruno Chareyron) is showing to the AGHIR IN'MAN president (M Almostapha ALHACEN) how to use a small Geiger Muller counter in order to check the level of radiation of the ground and mud from former drills



## A1-1 / References – CRIIRAD Laboratory

### Qualification and experience of the CRIIRAD laboratory related to environmental monitoring and inspection activities

#### Experience relative to surveillance of levels of radioactivity in air

The CRIIRAD Laboratory has technical and scientific experience for the surveillance of levels of radioactivity in air.

Since 1990, the CRIIRAD laboratory is operating air samplers for continuous monitoring of the level of radioactivity in the air for the cities of Valence, Roman, Montélimar and Avignon.

This work is supported by the City Councils and the "Département de la Drôme". This network enabled the CRIIRAD laboratory to detect an increase in caesium 137 activity in air, in June 1998, after the accidental burning of a Caesium 137 source at Algeciras in southern Spain.

For non continuous monitoring, the CRIIRAD laboratory is currently using terrestrial mosses to monitor the accumulation of radionuclides. This methodology enabled the CRIIRAD laboratory to demonstrate:

- The impact of **uranium mining** and milling activities near Bessines-sur-Gartempe in the Limousin region of France (4 fold excess of Th 234, Ra 226) / Year 1994. This study enabled CRIIRAD to demonstrate that the operator official monitoring network was not pertinent (it detected no radioactive aerosol excess in the air),
- The impact of iodine 129 discharges by the **La Hague Reprocessing Plant** (year 1995). At that time iodine 129 actual discharges were not published by the plant operator. This study enabled CRIIRAD to demonstrate that the official air monitoring network based on aerosol monitoring only, could detect less than 0.01 % of the actual air contamination as the main contributors to air activity were radioactive gases (krypton 85, iodine 129, tritium, carbon 14, etc...).
- The impact of **Chernobyl** fallout over France (reconstruction of Caesium 137 / Caesium 134 ratios).

The CRIIRAD laboratory has been the first independent laboratory to monitor indoor and outdoor **radon** concentration in France (1988). It tried to improve public awareness about the necessity of a proper radon policy in France. At that time the French Radioprotection Authorities were neglecting this issue. The CRIIRAD laboratory is using Charcoal canisters, Passive Nuclear tracks detectors and active samplers (ALPHAGUARD) to monitor radon gas concentrations in air. CRIIRAD demonstrated the high radon concentrations in various private and public buildings in places where **radium plants** or laboratories had been formerly operated (a school at Nogent-sur-Marne at the beginning of the 90's, private houses at Gif-sur-Yvette during year 2000). As an independent expert, CRIIRAD attended some of the meetings of the "Radium Fund", set up by the French Government to find solutions for rehabilitating these places.

The CRIIRAD laboratory has recently demonstrated (year 2004) that the official current environmental monitoring programs near the **Rokkasho Mura Reprocessing plant** in Japan or the United States nuclear **submarine harbour** at Santo Stefano (Italy) were not suitable to properly monitor the impact of routine or accidental atmospheric discharges (krypton 85, tritium, carbon 14, iodine 129).

Through a critical review of data from Fessenheim, le Blayais and Saint-Alban **Nuclear reactors**, CRIIRAD has also demonstrated that current monitoring protocols were not suitable for a precise assessment of the radiological impact of atmospheric discharges (tritium, carbon 14, rare gases).

#### Experience relative to surveillance of levels of radioactivity in water

For more than 10 years, the CRIIRAD laboratory is being operating a water sampler for continuous monitoring of the level of radioactivity in the Rhone river's waters. This work is performed for the city of Avignon, downstream the Marcoule nuclear center.

CRIIRAD is used to analyse radiological impacts to the surface or the underground aquatic areas. Some of these studies and main findings are summarised below.

- Radiological impact of radioactive liquid discharges to the Rhone river by the **Marcoule nuclear center** (research reactors, reprocessing plant, waste treatment and storage). Using sediment and aquatic plants, CRIIRAD demonstrated the river contamination by fission and activation products and plutonium isotopes. Maximum plutonium accumulation in sediments was detected in the Rhône Delta (Camargue) approximately 100 kilometres downstream the discharge point. This study has been performed from 1990



to 1994 for the Avignon City Council. CRIIRAD demonstrated also that the Marcoule nuclear center had contaminated underground water supplies by tritium.

- Radiological impact of the **Valduc military nuclear center** in Côte d'Or (France). Tritium activity in underground waters was above background values on the 2/3rd of the county territory.
- Radiological impact of liquid discharges from **uranium mines**. CRIIRAD has demonstrated that due to insufficient effluent treatment by mining companies, uranium 238 and radium 226 accumulation in river sediments, river banks soil and aquatic plants was very high and in some cases above values recommended by sanitary authorities.
- Radiological impact of Rhône Poulenc **Rare Earth processing** facilities at la Rochelle (France).

### **Experience relative to surveillance of levels of radioactivity in soil**

Between 1987 and 1993, the CRIIRAD laboratory sampled soil cores from 152 sites in different areas of France in order to evaluate the initial Caesium 137 and Caesium 134 **Chernobyl** fallout.

From 1996 to 1998, the CRIIRAD laboratory has undertaken a specific soil sampling programme in the **French, Italian, Swiss and Austrian Alps**, in order to study Chernobyl associated contamination of soil at high altitudes (above 1 600 m). CRIIRAD demonstrated<sup>3</sup> that, due to Chernobyl fallout, some soil samples in the Alps (mountains) had caesium activities exceeding 10 000 Bq/kg.

In 1999-2000, CRIIRAD laboratory has undertaken a detailed mapping of residual Caesium-137 ground contamination in France and part of **Europe** (based on 3 000 onsite measurements). This research has been published in January 2002 (radioactive contamination atlas, CRIIRAD – A. Paris, Ed. Yves Michel).

CRIIRAD also analysed samples of soil, mud, river and marine sediments in order to evaluate radioactive impact of discharges from uranium mines, nuclear power plants, reprocessing plants, hospitals, plants discharging effluents containing materials with enhanced levels of natural radionuclides, military facilities, etc...(see references below).

### **Experience relative to surveillance of levels of radioactivity in foodstuffs**

Since 1986, the CRIIRAD laboratory has checked the radioactive contamination of French and imported food. In addition, special studies were implemented on critical items such as mushrooms, thyme, meat, fresh milk and cheese. For example, several hundreds of gamma spectrometry analysis of mushrooms has enabled CRIIRAD laboratory to classify species according to their ability to concentrate caesium.

During years 2003-2004, CRIIRAD demonstrated the increase of tritium and carbon 14 activity in foodstuff in the immediate vicinity of the Saint-Alban **nuclear power plant** (study performed for a local NGO, the Rhône-Alpes Région and the Isère County).

### **Experience relative to surveillance of nuclear fuel cycle installations**

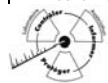
#### **Uranium mines**

From 1992 to 1994, CRIIRAD Laboratory demonstrated the radioactive contamination of the environment near uranium mines in Limousin and Loire Atlantique Prefectures (France). These studies were made for Local Authorities. CRIIRAD proved that the operator's monitoring protocols completely failed to properly evaluate actual contamination of soils, rivers, and the open air, by uranium decay products (radium 226, radon 222 and lead 210). CRIIRAD has recently finished a preliminary radiological evaluation of the impact of uranium extraction in Niger.

#### **Nuclear Power Plants and reprocessing plants, research centers, military facilities**

Through radioecological studies based on sampling campaigns and review of official data, CRIIRAD laboratory demonstrated that current monitoring plans of nuclear power plants and reprocessing plants failed to properly evaluate the impact of liquid and atmospheric discharges. The main problems had to do with effluents

<sup>3</sup> B. Chareyron / "Chernobyl fallout over France. The specific situation of the alpine environment" / In International Journal of Radiation Medicine – special issue 4 (1-4), 2002, p. 163-172.



sampling and counting and environmental monitoring (inadequate monitoring technologies, inconsistency of sampling strategies, inadequate modelling of transfer routes and doses). Some references are listed below :

### **Nuclear power plants**

- Radioecological impact study of Saint-Alban Nuclear Power Plant atmospheric discharges (tritium and carbon 14) (France) / 2003-2004 / for Environmental NGO, Region and County
- Critical analysis of official impact study for radioactive discharge authorisations renewal by the Cattenom Nuclear Power Plant (France) / 2003 / for Environmental NGO
- Radioecological study of plants and sediments from the Rhône river, under influence of Saint-Alban NPP (France) / 2000-2001 / for Environmental NGO, City councils and County
- Critical review of environmental monitoring near Le Blayais Nuclear Power Plant (France) / 2001-2002 / for Local Commission and County
- Critical review of environmental monitoring near Fessenheim Nuclear Power Plant (France) / 1999-2000 / for Local Commission and County

### **Nuclear research centers**

- Radioecological impact study of Saclay nuclear site (underground waters) (France) / 2001-2003 / for Local Commission and County
- Radiological inspection at the high energy laboratory CERN (France / Switzerland) / 1996 / for Environmental NGO

### **Reprocessing plants**

- Radioecological impact study of Rokkasho-Mura nuclear site (Japan) / 2002-2003 / for Environmental NGO
- Radioecological impact study of Marcoule nuclear site (France) / 2002-2003 / for Environmental NGO
- Radioecological impact study of La Hague nuclear site (France) / 1995-1997 / for Environmental NGO
- Radioecological impact study of Marcoule nuclear site (France) / 1993-1994 / for City Council

### **Radioactive waste repositories**

- Improvement of Environmental Monitoring of the Maisiagala radioactive waste Repository (Lithuania) / 2005-2006 (under PHARE Project 632.06.01).

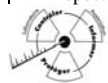
Note : In 1998-1999 CRIIRAD scientists participated in the Nord-Cotentin Radioecology Group (NCRG). This group of experts<sup>4</sup> had been appointed by the French Government in order to estimate the radiological exposure of the population near La Hague and to predict the expected number of leukaemia cases induced by exposure to radiation from the plants.

### **Experience relative to surveillance of radioactive isotope production plants and hospitals using radioactive isotopes.**

During year 2000, the CRIIRAD laboratory made an environmental assessment of the contamination of the CIS BIO facility at Saclay (France) for the German company (KPMG). CIS BIO was running there a radioactive isotope production plant.

CRIIRAD laboratory has demonstrated the impact of liquid discharges from hospitals since 1991 studying the contamination of aquatic plants. From 1994 to 1995 it studied the contamination of the City of Toulouse sewage network by radioactive discharges from local hospitals and universities (study made for the local company and ARPE (Agence Régionale Pour l'Environnement) .

<sup>4</sup> Inspectors, governmental experts, operators, experts from non governmental laboratories, foreign experts.



CRIIRAD studied the impact of radioactive liquid waste from hospitals in the rivers of the Seine Normandy hydrographical basin for the Agence de Bassin Seine-Normandie (1998-2000). This study showed that downstream sewage treatment plants of cities including a nuclear medicine facility, the aquatic plants were contaminated with iodine 131. CRIIRAD then studied the radioactive discharges from a French Hospital (Institut Jean Godinot : Reims City, year 2000) and made proposals for an improvement of liquid waste management.

**Experience relative to surveillance of plants discharging effluents containing materials with enhanced levels of natural radionuclides.**

CRIIRAD laboratory has made several studies relative to environmental impact assessment or dose calculations to workers or the general public from plants discharging effluents containing materials with enhanced levels of natural radionuclides. Some references are listed below :

- Contamination of water and seafood by liquid discharges from Rhône Poulenc rare earth chemicals and minerals processing plant at La Rochelle (France) / 1987-1988 / for Environmental NGO
- Radiological measurements on waste and manufactured products from the Erkimia phosphate production plant (Spain) / 2004 / for Environmental NGO
- Radioecological impact study of radioactive waste repository (uranium and thorium) from the zircon producer CEZUS at Vif (France) / 1994-2003 / for Region and operator
- Radioecological study plants and sediments from the Rhône river, under influence of Rhodia Chimie phosphoric acid plant at Les Roches de Condrieu (France) / 2000-2001 / for Environmental NGO , city councils and County

