

Citizen involvement in radiological monitoring in their environment

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ABSTRACT : This paper is intended to describe how the citizens who are living near power plants or more generally nuclear facilities can be involved in the radiological control of their environment. Through the experience of the last twenty years, the article describes the conditions of the progressive setting up of a non-governmental system of control to build its principles of action and put them into practice. Three kinds of actions are described, the first two dealing with the problems in France and the last one related to a post-accidental situation in the contaminated areas of Belarus. The conclusion underlines how important it is to encourage this kind of involvement in order to increase public awareness of nuclear activities and their consequences.

1. INTRODUCTION

The involvement of the citizens as regards the control of the radioactivity in their environment started in France hardly twenty years ago¹, just after the Chernobyl disaster. It seems important, before going straight to the point itself, to specify the context of emergence of such a step in a field hitherto reserved for the scientific sphere.

The first part of this document presents, by describing an experiment located in Western France, a short historical background which shows how, starting from the initial questions of the citizens especially related to information and the risks concerning them, it was necessary to develop a Non Governmental Organisation² which was going to give itself the means of

¹ S. Topçu (2004) « Emergence de nouvelles formes d'expertises dans l'histoire du débat nucléaire en France (1974-1988) », mémoire de DEA sous la direction de J-P. Gaudillère EHESS. P100 et suivantes

² G. Grandazzi, F Lemarchand (2004). « Les silences de Tchernobyl, l'avenir contaminé », Editions Autrement Paris : p 202, article de J-C Autret, « Quand l'accident engendre une prise de conscience citoyenne »

informing the public but also a laboratory to lead its own investigations.

The second part presents the trajectory and the orientations which were taken by the organisation during these twenty years to accompany the evolution of its members' requests, especially as regards the development of the activity of control itself. Besides, the NGO has agreed to take part in institutional working groups and has diversified its modes and sectors of intervention in the fields of control and information of the public.

The third part shows concretely how the NGO implements the principles of action adopted by its members. The examples which will be used as support of the presentation of work will be selected from the work carried out in the west of France and the south-east of Belarus.

The conclusion of the article pleads for the development of such an activity in a society where citizens should have their say in a field so far considered as purely techno-scientific and which may expose them to major risks.

2. SHORT HISTORICAL BACKGROUND

To understand the *raison d'être* of such a citizen NGO which controls the radioactivity in the environment, a short historical background is essential back to the period which followed the Chernobyl disaster. At that time the awkward communications, the dissimulations and the deficit of information, the quasi absence of means of measurement accessible to all and the obvious bias of some protagonists had for consequence to give a national extend to the feeling of suspicion among citizens, already existing among the neighbours of nuclear sites. ~~Thus, from the beginning doubt prevailed.~~ On one side, the vision of a childish population unable to understand radioactivity and who might panic because of irrational fears prevailed. On the other side, some legitimate questions, but a scarce information that, when it existed, did not answer the real questions of the citizens and was (and still is) the subject of many controversies between scientists who still find it difficult to stay away from the polemical field when dealing with the conflicts which oppose them in a field lacking real knowledge.

What followed was an original answer by the civil society. The engaged process then resulted in the creation of spaces of expression where the exchanges had, not only to answer a need for information, but also to enable everybody to assess the risk incurred and to act consequently (an inalienable individual right). In spite of the good wills and the participation of scientists in the debates, it is necessary to admit the limits of this approach due to the lack of knowledge of the levels of radioactivity in the environment and the food. Unfortunately data are scarce and citizens grant little credit to official ones. The next step consisted in having an independent

laboratory.

L'Association pour le Contrôle de la Radioactivité dans l'Ouest (ACRO) was born in this context. Fruit of a citizen step in a context of crisis of confidence towards the authorities of control, this new type of organization in the nuclear field, equipped with an independent laboratory, aims at offering the civil society a tool for investigation providing data accepted by everybody.

Today, the organization still exists. It answers the request from a part of the population which continues to be wary of the official speeches, to control the monitoring of its environment near nuclear installations if the concept of proximity can have some relevance in the nuclear field. It benefits from a capital of confidence in the population³ and from a recognition⁴ on the technical level.

3. TRAJECTORY AND ORIENTATIONS

The NGO has mainly a mission of information and training with its partners and more generally the general public, in particular with the people worried by the problems of environment, health and control of waste and radioactive emissions. Thanks to its structure, it makes it possible for the citizens to be involved with scientists in order to have access to information hitherto reserved to specialists. It proves its independence, indispensable condition of its existence, with the plurality of its members and voluntary militants and the diversity of its financial resources.

Besides the registered office located in the suburb of Caen, three antennas located in High-Normandy, in the Touraine area and North-Cotentin make possible for ACRO to be present and have genuine relays in the vicinity of nuclear facilities. The running of the NGO is ensured by a team of more than thirty people, voluntary or paid.

Thanks to the human and material competences that it federates, the ACRO has developed with the passing of years a capacity of expertise which makes it an actor in the public debate and leads it to take part in many institutional commissions and working groups.

Its fields of investigation have spread. In the field of control, its capacities of measurement

³ One can quote for example the survey of 200 GPs working around Cherbourg made by the CSPI in 1990. among the sources of information considered as "interesting" and "very interesting", ACRO comes first with 73,5%. to compare by using the same categories, the firms (Edf, Cogéma ...) only get 34,3% and elected officials only 10%.

⁴ 4 As soon as 1991, ACRO proved its know-how in the field of gamma -measurement within the framework of a campaign of inter-comparison organised by the CSPI. Since 1997, the laboratory has been technically certified (décret n°88-715) for the bêta-gamma transmitters.

have developed. On the geographical level, the ACRO intervenes with the populations of the contaminated territories of Bielorussia. In the field of the information of the public, the publications have diversified, an Internet site <http://www.acro.eu.org> has been created on which the studies are wholly accessible. Let us note on this last point that the interventions in schools are developing. This sector seems promising and should help to build a real future citizen-awareness among the public. The children prove to be more interested than the parents who seem to have difficulties with such a scary and unfathomable subject.

RADIOLOGICAL CONTROL AND INFORMATION (BY/OF THE) CITIZENS

Various means of monitoring

The monitoring of the environment is initially a legal control imposed to the firm. It aims, on the one hand, at checking the absence of significant medical consequences for the neighbouring populations and, on the other hand, at making sure of the expected dilution in the environment. Moreover, it must make it possible to check that there were no inopportune releases following an undetected or badly evaluated dysfunction on the site. Besides, the control of the State confirms and even supplements, that of the firm with an aim of checking its validity and relevance.

The action led by the NGO cannot, as for it, be codified as official controls are. The citizen monitoring does not aim at replacing the institutional ones, whether from the firms and/or the state. It does not have the means and above all it is not its business. It is a step of investigation based on the vigilant watch of citizens who wish to be actors of the control of their environment. This established fact thus has two consequences. On the one hand, the monitoring is done "with" the population and not "for". In La Hague, there are more than thirty local volunteers, trained beforehand, who take turns to pick up the samples. For the other measurements carried out in France, either from the contractual or non governmental field, the approach based on the participative mode remains overall the same one. Similarly, in Belarus, the action consists in accompanying the projects which are born locally with the people involved directly and concretely in the control and the information of the populations exposed to the risk, mainly pregnant women and children,

Moreover, the monitoring must make it possible to answer a sum of individual requests. To illustrate our idea, we will say ironically that the fundamental question is: *"what is going on here at home (or in the neighbourhood) in the water, the air, the vegetable garden, the milk, the jam, etc? "*; or: *"is this dangerous for health? "*. It frequently happens that additional

samples arrive to the laboratory on top of those which are regularly taken and codified in the legal process. When questioned, the applicants explain that they wish to have additional information which is truly in connection with their own practices or food habits. Very often, the step is justified by the suspicion towards the firms' communication or even lies when they proclaim loudly having a "zero impact"⁵.

Actions on the ground

In France

We have seen that the first questions asked by the promoters of control by the citizens of the radioactivity in the environment have led in a few years to the creation and the development of a nongovernmental structure including at the same time a laboratory and tools of information of the public. In the same way, the activity was structured gradually, taking into account the evolution of the requests and the factors related to the adaptation of the structure to the needs. Step by step, the all-out random interventions gave way, thanks to the wisdom gained from numerous experiments, to more elaborate methods and a better organization. Yet specific requests can still be dealt with, "freely" in the framework of usual processes. One can distinguish two intervention categories which are presented below by way of example.

The first falls under the "ordinary" activity of NGOs. It associates the investigating volunteers (the initial question, the collecting and conditioning of the samples, the transfer to the laboratory, the returned results to the interested public), the laboratory which treats and analyzes the samples, the scientific commission which validates the results of the measurements and the information commission which checks their legibility.

The second highlights the vigilance and alert function. It presents an action led in abnormal situation following an incident and shows an undervaluation of the radioactive emission by the owner. The presence of a local team which knows the place is here of first importance.

The "ordinary" follow-up

Today, the residents wonder about the consequences of the plants of La Hague on their own environment. Is the industrial component of radioactivity the main source of exposure? Do the beta-gamma radio-nuclides have always to be regarded as the scapegoat of radioactive pollution? Has the local problems changed?

In order to fathom the question, while being unable to really work it out at the moment, the ACRO has led since the start, with its means, multiple evaluations in this sector. For the first

⁵ David Boilley (2001), Les cahiers de l'ACRO, n° 2, L'impact sanitaire des installations nucléaires de la Hague

10 years of existence they have been related only to the watery terrestrial ecosystems present in the surroundings of La Hague.

The increase in the resources makes it possible today to better take the measurement of the zone of influence of the nuclear installations of La Hague. Thus was born the Réseau Citoyen de Veille, d'Information and d'Evaluation RadioEcologique (RIVIERE). This network, created by ACRO, makes it possible today to better target the levels of gamma radioactivity in the watery ecosystems in the Seine-Normandy area. The sector of intervention extends from the Nogent-sur-Seine to La Hague and from the Mount-Saint-Michel to Penly. Its characteristic is to closely associate all those who wish to know the levels of radioactivity "around their premises". With RIVIERE, the citizen becomes at the same time author and actor of the monitoring of his or her environment as well as his or her information.

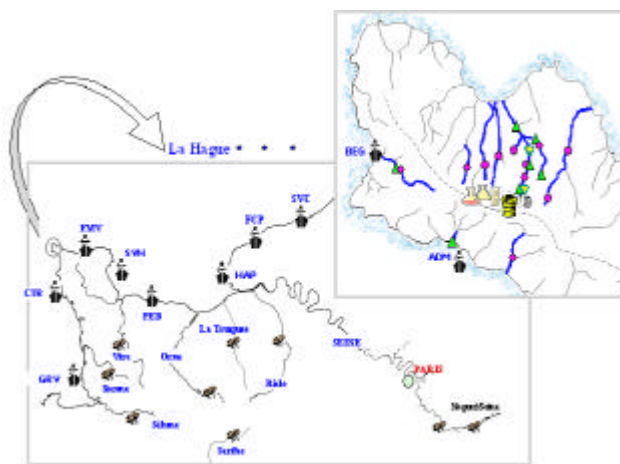


chart 1: localization of the samples carried out in the watery ecosystems in 2004 in the RIVIERE process.

The action integrates, in addition to the repercussions of the dumping of the nuclear installations, the problems of the natural radioactivity and that of the use of unsealed sources.

The widening of the sector of intervention, geographical or topical, answers a shared will to obtain all the information, all the contributions included within the limit of the sought radio-nuclides, including the places which are not officially checked (or little) because of their "distance" from the nuclear sites.

To account for the level of disturbance of the watery ecosystems, different biological and inert (sediments) samples are selected for the research of the transmitting gamma radio-elements whereas in the case of tritium (HTO) only water is analyzed because of the physicochemistry of this element.

The sampling rate is fixed according to the expected variability of the levels which rises from the experiment. The monitoring is articulated around two sampling campaigns each year: one in spring/summer; the other in autumn/winter.

The first results from the work led within the framework of RIVIERE refer to the monitoring of the coastal waters of the Norman littoral during the period going from 2001 to 2003. Other results exist for the terrestrial watery ecosystems and will be the subject for a later communication.

As always, it is advisable to reaffirm the limits of this process. All the artificial radio-nuclides released into the environment were not analysed, such as carbon-14 or isotopes of plutonium. Consequently, the conclusions formulated for the radioactivity gamma cannot be extended to the transmitting alpha and pure beta radio-nuclides.

All in all, one does not note an evolution of the levels during the three years of monitoring, except for the ^{129}I and the $^{110\text{m}}\text{Ag}$. When one observes the spatial distribution of the systematically detected gamma radio-nuclides from industrial origins, chart 2, it shows unambiguously, that the pressure created by the activities of COGEMA in La Hague relates to all the Norman coasts at least.

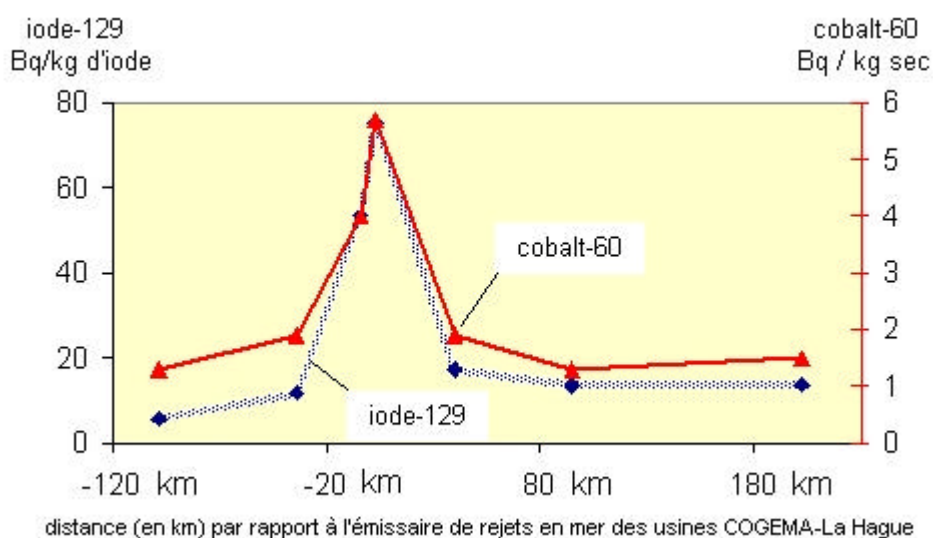


Chart 2: Space distribution of the average triennial levels of ^{60}Co and ^{129}I in the brown seaweeds taken along the Norman coasts between 2001 and 2003.

From the health point of view, some indications have been given to the neighbours although this monitoring was not initially conceived to do it. They relate to the molluscs (patella) which seem to be slightly concerned with the presence of artificial gamma radioactivity. The concentrations, sometimes spotted, generally do not exceed one Becquerel per kilogramme of fresh substances. This result, connected to the transfer factors can be applied to fish, shellfish

and other molluscs, except of course in the immediate vicinity of the source of emissions. This weak contamination of molluscs and more generally of the environment by artificial gamma radio-nuclides should not however mask new environmental problems.

The composition of the radioactive emissions has strongly evolved since the beginning of the nuclear activity. The studies carried out in the framework of the first mission of the Groupe Radioécologie Nord-Cotentin and the consecutive evaluations have shown that the "contemporary" radio-nuclides having an impact on the environment are not any more those of the past. For example, carbon-14 (^{14}C), a pure beta transmitter, has become the number one contaminant of the edible species and more largely of all the biological material. Replacing the stable carbon atoms, it enters the composition of the organic matter and thus of life. The network of evaluation created by the ACRO (RIVIERE) cannot currently provide data on these "contemporary" radio-nuclides due to the lack of ad hoc equipment, our NGO is however conscious of this evolution in the nature of emissions and the pressing need to adapt consequently our strategy of monitoring.

The citizen monitoring of the environment of the reprocessing plants in La Hague has changed the impact problematic from a purely scientific question into a political one and provoked a long process that lead to the decrease of the dumping. It is therefore very important to enlarge our measurement capacities to the worrying radioelements such as carbon-14.

The intervention in "incidental" situations

Sometimes a dysfunction of the nuclear installations may cause a leak of radioactive particles outside the site. It was the case twice in 2001 when two incidents took place, respectively on May 18 and October 31, which caused emissions out of the COGEMA La Hague factory⁶. The local team very quickly mobilized itself to take samples as soon as they were informed by the newspapers. Besides, they answered the questions of some inhabitants who could not understand how the car-park located outside the factory could have been contaminated without any environmental impact. These samples were analyzed at the laboratory and revealed a level of radioactivity much higher than what had been declared by the firm. A work was carried out to estimate the effects on the environment and to evaluate the "source term" that happened to be up to 1000 times higher than what was announced. Tools were produced to inform the population of the situation which was exposed during a public meeting

⁶ [All the files can be downloaded from our website](#)

organized for this purpose. It goes without saying that the NGO's first move was to alarm the authorities. Official investigations that followed revealed a generic failure in the measurement of the atmospheric dumping of Ruthenium-Rhodium. Such an event shows once again the importance of a citizen watchdog in addition to the official controls that did not notice anything.

The documents below were elaborated about the emission of October 31. They present in the form of a map the sector of intervention and the levels of contamination observed, the model of calculation and the graph of visualization which made it possible to present and put the event into perspective.



In Belarus

In the territories contaminated after the accident of the Chernobyl power plant, even if one should not neglect the external irradiation in certain places, or the inhalation of dust in the most touched zones, the impact on human beings is primarily done through food. Belarus, like its close neighbours (Russia and Ukraine), has set up a monitoring and standards concerning marketed products.

However, the main part of the products consumed in the rural areas results from self-production and thus escapes official control. To that, are added the products of gathering, fishing in the dead arms of the marshes or hunting, which strongly contribute to the ingestion of radioactivity. Indeed, the "wild" products are often strongly contaminated. Although these traditional practices are ill-advised, even, for some of them, prohibited in the country, the

instructions are often not respected because of: need (it is necessary to eat), weariness (how to remain vigilant after two decades?), ignorance (children born after the catastrophe, immigrants...), fatalism and finally quite simply by taste (mushroom soup is a traditional dish particularly appreciated, just like the bilberries, which grow in abundance in the forests).

Our intervention takes place within the scope of the CORE program⁷. The project in which we take part with other partners aims at setting up a system of radiological monitoring at the service of the population and at supporting the daily access to the measurements and information on the situation of the contamination at the village level in a highly contaminated district.

Concretely, it is a question of opening or reopening measurement stations⁸ in the main villages, of launching campaigns of measurements⁹ of the school-age children's internal contamination (anthropogammametry), of setting up an observatory of the radiological situation at the level of the villages, of supporting the organization of spaces of exchanges (public meetings, debating societies), and of information (public posting of the results of measurements) and of developing pedagogical actions in the schools.

The characteristic of this project is to entrust the inhabitants themselves with its coordination, via an NGO "Rastok Gesni" (Growth of Life), created recently in the district, which gathers a score of volunteers: mothers, health personnel, teachers...

It is important for the centres to be easily accessible to all the population from the villages. People can bring their products (milk, potatoes, fish, berries, mushrooms, game, etc.) to the radiometrist who measures them at once. The result, expressed in Bq/Kg is always explained, particularly on the consequences of internal contamination if the product is intended to be ingested. The potential medical danger is evoked by making a comparison with the values usually observed at the village or district levels. The "sensitive" products requiring a regular control are the dairy products, the meat, whose contamination depends directly on the radiological state of fodder (in winter) and of the pastures (in summer), the products of the gathering, fishing or hunting.

Our accompaniment, advice and technical assistance, consist, with the assistance of our partners, in carrying out a reflection with the local dosimetrists on the means of supporting the creation and the spreading of information in order to encourage people to measure their

⁷ COoperation program for REhabilitation of living conditions in the contaminated areas of Belarus : <http://www.core-chernobyl.org>

⁸ Belrad Institute managed by V B Nesterenko had all ready set up such a nationwide system in the first years after the Chernobyl tragedy. Because of a lack of financing, many working local laboratories had to close.

⁹ These measurement campaigns were attributed to the Belrad Institute of Minsk. Pupils get a written note describing clearly the test result.

products. The work in schools is certainly, from this point of view, the best means of reaching a large part of the population. The children are indeed good information vectors and represent at the same time the target most sensitive to the problems of radiological exposure. That's why it appeared essential to us to link the activities of measurement of the laboratories with the pedagogical actions led in the schools of the district. Two radiometrists already work in this way and open their centre of measurement to the pupils who bring and measure themselves the products collected in their neighbourhood.

Since September 2004, four schools have launched, on top of the school syllabus which tackle the subject in an academic way, workshops open to the pupils which enable them to acquire the basic concepts and necessary knowledge on radioactivity, its consequences on health and the elementary principles of protection against radiation.

The participation in the commissions

Our goal is and has always been to obtain a better transparency, as regards information on the impact of nuclear activities, and more democracy on the technological choices. We decided 8 years ago to adopt the principle of studying and possibly of accepting the overtures from the authorities in this direction. We thus take part in many pluralist groups, even if they appear often quite shy to us and even if the way the commissions work should be improved. It is a difficult and delicate voluntary work that we assume as well as we can, even if it includes the risk of making mistakes or having our position misinterpreted.

Even if the members and the employees fully assume the "participative step" decided by the board of directors, it does not mean at all that they can engage the NGO in a process of co-administration of the risks, especially concerning industrial facilities whose creation was not democratically decided and whose justification is not proved. If the debate is now possible and the confrontation necessary, the distinct and clearly defined roles and missions of the various stakeholders – owners, institutional and NGOs – must be respected.

Conclusion

The NGO ACRO was created in a strongly nuclearised French area. The local problems took a national importance after the Chernobyl disaster which showed that all Europeans are "neighbours" of a nuclear installation. The will to minimize the medical impact of the radioactive emissions around nuclear installations and the repercussions of Chernobyl seemed deliberate to many French citizens.

Thus, this emanation from the civil society, which decided to give every citizen a possibility of taking part in the monitoring of his or her environment thanks to a reliable and powerful analysis laboratory, made it possible for the citizens to be involved in a techno-scientific debate so far reserved to an elite. It quickly appeared indeed that a message based on an awakening, an intuition or even "common sense" was not strong enough to be heard by the decision makers, whether they are technocrats or elected officials. The NGO thus decided to use the same scientific tools as those of "official" techno-science to feed the debate. In spite of this will and the extension of competences as time went by, it is necessary to acknowledge the limits of our environment monitoring action. For lack of financing, it is indeed impossible at the moment for the NGO to control the presence of certain specific radio-nuclides as carbon-14 (^{14}C) or to measure some radio-emissions like beta total (except tritium) in the solid substances. In order to be faithful to the principles of its action and thus its militant commitment, it is however essential for the non-governmental monitoring to take into account the main radionuclides released or contributing significantly to the human exposure such as ^{14}C .

By guaranteeing the diversity of information sources and means of investigation, do we not avoid an increase of the suspicion of civil society towards its institutions? Citizens will no longer be told "we do not have anything to hide" since everybody has the means to check!

Nearly twenty years after the beginning of the mobilization, the citizen move as regards radiological control always seems to frighten and it is still necessary to drag the questions concerning everyone out of some experts. We trudge on an unknown road. Through practice we organize an original project to learn how to live with risk while transforming techno-scientific problems into political and public debates. The citizen's commitment to the life of the society can take various forms: trade-unions, political parties, NGOs... They all have advantages and drawbacks. A democratic society implies plurality of opinions and actions.