



# Executive Summary 2011

Radiological Protection Institute of Ireland



**Radiological Protection  
Institute of Ireland**

An Institiúid Éireannach um  
Chosaint Raideolaíoch

# Executive Summary

**During 2011, the RPII continued to focus its efforts on protecting people from the harmful effects of ionising radiation through effective regulation, monitoring of the environment and provision of accurate and timely advice to the public and to Government. The RPII's emergency response arrangements and the wider capability within the Irish public service to respond to a nuclear accident abroad was tested during the response to the Fukushima accident which occurred in Japan on 11 March 2011.**

## Fukushima accident

The Fukushima accident was the first large-scale nuclear emergency since Ireland's *National Emergency Plan for Nuclear Accidents* was first established after the Chernobyl accident in 1986. Immediately on receipt of notification by the International Atomic Energy Agency (IAEA) of the developing situation at the Fukushima Dai-ichi nuclear power plant on 11 March, a meeting of the National Co-ordination Group (NCG) was called. The role of the Group was to co-ordinate the provision of information and advice to Irish citizens in Japan and to the Irish public and media, and to make arrangements for monitoring food imports from Japan. The RPII's role within the Group was to provide information on the evolving situation at Fukushima, on the protective actions being applied in Japan and the results of environmental monitoring being carried out in North America and Europe, including Ireland.

The RPII's emergency response arrangements rely on atmospheric dispersion modelling and actual on-the-ground monitoring to determine the likelihood and quantity of radioactivity reaching Ireland. Throughout the period from 11 March to mid-May, the RPII mobilised its resources to ensure that the Government and public were kept informed of the likely impact of the Fukushima accident in Ireland. Although the releases from the nuclear plant were substantial, the transit time and significant dilution across the large distance from Japan to Ireland meant that increases in levels of radioactivity here were expected to be extremely small and not of concern from a public health point of view. The monitoring conducted by the RPII confirmed that this was the case. Based on the peak concentrations in air and milk and assuming these concentrations persisted until mid-May, the estimated maximum radiation dose that an adult in Ireland might expect to receive arising from the Fukushima accident was calculated to be a tiny fraction of the typical annual average dose a person in Ireland might receive from all sources of radiation. The doses resulting from Fukushima were therefore deemed to be of no significance from a public health or food safety point of view.

Towards the end of 2011, in line with best practice, the RPII conducted a formal review of its response to the Fukushima accident. While it was felt that the RPII generally responded well to the demands put on it in dealing with the situation, a number of areas for improvement were identified, including internal communications, resource allocation and training of additional staff. These areas will be followed up in 2012 and 2013.

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## Regulation and licensing

Every business or organisation which is involved – or may become involved – in storing, using, transporting, or disposing of radioactive materials, irradiation apparatus or other sources of ionising radiation, must apply to the RPII for a licence. At the end of 2011, licences were held by 1743 licensees across a range of sectors, including dental, medical, industrial, educational and veterinary. The RPII issued 59 new licences during the year, 29 of them to dental practices. The most notable licence application received during the year was for a hand-held dental X ray unit. Units of this type had not previously been licensed in Ireland and consequently required a comprehensive assessment in order to ensure that they could be used safely. Seventy-one licences were terminated during the year, 40 of which were in industry, reflecting the continuing downturn in the economy.

The RPII carried out 224 inspections during the year, with particular focus on holders of radioactive waste and disused sources, holders of nuclear moisture density gauges, non-destructive testing companies and dental licensees in the public sector. The inspection of non-destructive testing companies included both announced and unannounced inspections. As a follow-up to the 50 inspections undertaken in private dental practices during 2010, the RPII carried out 34 inspections of public dental clinics and a further 23 inspections of private dental practices in 2011. Overall, the RPII was satisfied with the standards of radiation protection observed during inspection.

The incidents reported and investigated during the year also contribute to the overall assessment of radiation protection among licensees. In 2011, nine incidents were reported to the RPII. One of these involved the theft of a portable veterinary X-ray unit and the remaining eight were in the medical sector. Two of the incidents involved patients and, as such, were outside the remit of the RPII. A further five involved individuals who were subjected to radiological procedures in error, because hospital staff failed to implement the correct patient ID protocol. The final incident involved a software malfunction in a CT unit which gave rise to an unintended exposure to the medical physicist setting up the equipment. In all cases the associated exposures were low and the incidents were fully investigated to the satisfaction of the RPII. As part of the follow-up, all reasonable measures to prevent such an incident happening were put in place by the licensee concerned.

In addition to the incidents highlighted above, the RPII was also notified during the year of 14 cases where the dose recorded on a personal dosimeter worn by staff working with ionising radiation exceeded the reporting levels specified in the licence. Six of the 14 cases were reported from cardiology departments

where the dosimeters were inadvertently worn by staff on the outside of lead aprons. Following investigations into each of the reported cases, none of them was classified as a dose actually received by the wearer.

Under the joint programme of work with An Garda Síochána, one security survey of an industrial licensee was undertaken by the National Crime Prevention Unit, as well as follow-up visits to licensees surveyed in previous years.

In July 2011, in line with a commitment in the Strategic Plan to enhance the transparency of the RPII's regulatory process, the RPII published the *RPII Inspection and Licensing Activities and Annual Inspection Programme for 2011*, which provides details of the processes and priorities associated with licensing and inspection. Also, in 2011, the RPII Board approved an enforcement policy that sets out the principles guiding enforcement action, the procedures to be followed in cases that might lead to a prosecution and the criteria to be taken into account in deciding the action to be taken. This enforcement policy will be published in 2012.

Each year, in addition to its ongoing licensing and enforcement activities, the RPII seeks to improve the overall framework for the safe use of ionising radiation in Ireland. During 2011, two new policies affecting the dental sector were developed following extensive review of existing practice. Under the first policy, a personal dosimetry programme is no longer mandatory for staff working in dental radiology – instead, dentists may undertake a risk assessment, in conjunction with their Radiation Protection Adviser, to determine whether or not such a programme is required. The second policy, developed jointly with the Health Service Executive (HSE), advises that staff using x-ray equipment are not required to wear lead aprons, except in very particular circumstances which are set out in the policy, and there is no need for patients to wear lead aprons.

The requirement for the RPII to establish and maintain a register of Radiation Protection Advisers (RPAs) was introduced in S.I. No. 125 of 2000. Radiation Protection Advisers are recognised as experts in radiation protection and can advise both applicants and existing licensees on radiation safety issues. Two registers have been established: the medical/dental register (set up in 2005) and the industrial/educational register (set up in 2009). A total of 59 applications for membership of the registers have been received, of which 44 have been successful. Approval to act as an RPA is granted for a five-year period, after which an RPA can apply for re-approval for a further five years. The first RPA approvals were due to expire in March 2011, but were automatically extended for a further 12 months as a re-approval fee had not been set. Ministerial approval for the fee was granted in November 2011, and the re-approval process commenced in March 2012.

In the development of its *Strategic Plan* covering the period 2011–2013, the RPII carried out an in-depth evaluation of all its work programmes, including its regulatory activities. With the ever-increasing demands on staff resource, the RPII recognised that the current ‘one size fits all’ licensing system is not sustainable into the future. Towards the end of 2011, work began on a new project to develop an authorisation model that would take a risk-based or graded approach to authorisation. Such an approach will provide users with a more efficient and effective service and will also require less administration. In this way, it will allow more resources to be allocated to inspection activities and to the development of guidance documents for users where they are needed.

The RPII has repeatedly emphasised the need for a broad-based government policy on the management of radioactive waste, and in particular, the need for a central storage facility for radioactive waste and orphan sources so that these can be effectively managed. In December 2010, the Government agreed to recommendations to establish a national storage facility, to endorse a national source reduction programme to be co-ordinated by sector and to the development of a temporary operational protocol to clarify the roles and responsibilities of agencies in the event of a source being seized or an orphan source being discovered. Progress was made in each of these areas during 2011, and while there is clearly a long way to go, the agreement of a national policy is a significant milestone and a clear endorsement of the RPII’s long-standing advice.

There were a number of developments in EU legislation during the year which impacted on the regulation of radioactive materials in Ireland. In July, a new Council directive establishing a community framework for the responsible and safe management of spent fuel and radioactive waste was finalised

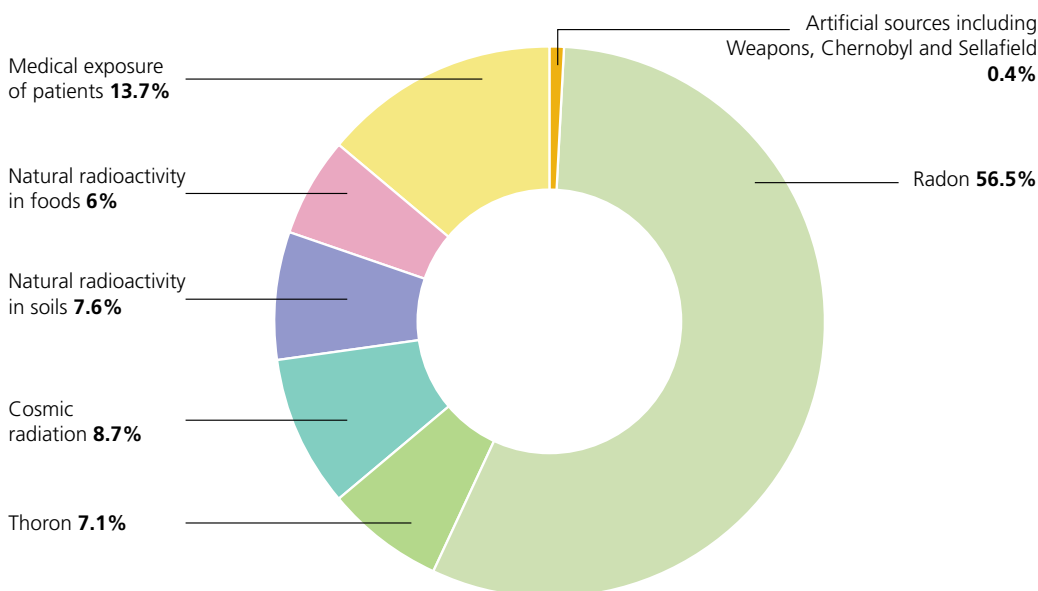
following intensive negotiations. The directive deals with the management of radioactive waste from generation to disposal and sets out requirements for a national waste management framework, including the role of the competent regulatory authority as well as the responsibilities of licence holders. The RPII provided advice to Government during the negotiations and will provide further advice on the transposition of the directive into national legislation which is due by August 2013.

Also during the year, negotiations commenced on a revision of the Euratom Basic Safety Standards Directive, which consolidates the provisions of the five existing directives that underpin the statutory framework for radiation protection in Europe. The directive sets out measures for the protection of the public, workers and patients from the harmful effects from both man-made and natural sources of radiation and, as such, is the key basis for national legislation on radiation protection.

## Exposure of the Irish population to radiation

On average, a person in Ireland receives an annual dose of 3950  $\mu\text{Sv}$  from all sources of radiation. By far the largest contribution (approximately 86 per cent – 3400  $\mu\text{Sv}$ ) comes from natural sources, mainly from the accumulation of radon gas in homes. Man-made radiation contributes approximately 14 per cent (550  $\mu\text{Sv}$ ), which is accounted for almost entirely by the beneficial use of radiation in medicine (540  $\mu\text{Sv}$ ). Doses from other man-made sources account for less than 1 per cent (15  $\mu\text{Sv}$ ). The contribution from all sources of radiation to the average annual dose to a person in Ireland is shown in the figure below.

### Contribution from all sources of radiation



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## Radon

The RPII's strategic objectives relating to radon are to 'drive the implementation of a national control strategy to reduce radon exposure in Irish homes and workplaces' and 'to provide advice to stakeholders on ways to protect the public from exposure to ionising radiation'.

A key milestone was reached in September 2011, with the Government decision to establish an inter-agency group to develop a National Radon Control Strategy for Ireland. The inter-agency group is chaired by the Department of Environment, Community & Local Government and includes a broad range of Government departments, local authorities and agencies with remits covering health and housing. The task of the inter-agency group is to develop a strategy that will reduce both the overall population risk and the individual risk for people living with high radon concentrations. The RPII is centrally involved in the group, providing technical input as well as administrative support. The group has been asked by the Minister to provide an interim report by the end of 2012 and to report to Government with a draft national radon control strategy by November 2013.

During the year the RPII continued to work to increase public awareness of radon through working in partnership with local authorities and state agencies as well as engaging directly with the public. The RPII worked with 13 local authorities during the year to implement radon measurement and remediation programmes. To date radon levels have been measured in almost 10,000 local authority homes. All houses found to be above the reference level have been or are in the process of being remediated by the local authority. Under a Memorandum of Understanding between the RPII and the Health and Safety Authority (HSA), measurement of radon was included by the HSA in 79 workplace inspections it carried out during the year. A further initiative to highlight the issue of radon in the workplace is the inclusion of radon measurement in the HSA's online health and safety assessment tool, BeSmart. The RPII also worked closely with the HSE to raise awareness of radon among health professionals – this included conducting a training course on radon and placing articles on radon in medical and nursing periodicals.

A key stakeholder event hosted by the RPII each year is the National Radon Forum. The 2011 Forum was opened by Minister Phil Hogan and was the largest to date, with over 100 people attending. The theme of the Forum was 'An effective response to the radon problem in Ireland'.

Integrated local radon information campaigns were held in South Tipperary and Galway. These two campaigns incorporated multiple communication channels, including radio advertising, billboard information, public relations activities, leafleting, public meetings and social media campaigns.

By the end of the year, the RPII's radon database included measurements for over 50,000 homes. Of these 6392 have radon concentrations above 200 Bq/m<sup>3</sup> with 747 having levels above 800 Bq/m<sup>3</sup>. During the year, 17 homes with radon levels of more than 10 times the reference level were identified. The highest level of 37,000 Bq/m<sup>3</sup>, almost 200 times the reference level, was found in a home in Castleisland, Co. Kerry. (This house is close to the house with the highest ever reading measured for a house in Ireland – 49,000 Bq/m<sup>3</sup>, measured in 2003.) In these cases the RPII provided the householders with information to assist them to reduce the radon levels in their homes.

Two surveys of householders conducted by the RPII in 2011 provided useful information on a range of issues connected with remediation. The surveys identified active radon sumps as the most common remediation method in Ireland. Typically, these cost €1100 to install. Of the houses found to have high radon levels, however, only 25 per cent were subsequently remediated.

## Monitoring of the environment

The RPII continued its programme of monitoring radiation in the environment with the aim of assessing the exposure of the population. The 2011 programme showed that liquid discharges from the nuclear fuel reprocessing plant at Sellafield remain the dominant source of artificial radioactivity in the Irish Sea and that the consumption of seafood continues to be the main way in which the public is exposed to this radiation source. The radiation doses to typical consumers of seafood were below 1 microsievert (µSv), and this represents only a small fraction of the average annual dose (3950 µSv) to a person in Ireland from all sources of radioactivity.

Levels of ambient gamma dose rate were measured at 15 stations and levels of radioactivity in air were measured at 11 stations around the country. Even when the contamination from the nuclear accident at Fukushima that was detected in Ireland during March and April 2012 is taken into account, overall levels of artificial radioactivity in the Irish environment during 2011 were broadly in line with levels reported in recent years. The levels of radioactivity in milk, drinking water and mixed diet were also low and consistent with levels measured in previous years, and provide confirmation that the levels of artificial radioactivity in the environment do not constitute a risk to health and are very small when compared with the dose received as a result of natural background radiation.

The study of radioactivity in groundwater supplies, commenced in 2008, involved the analysis of samples collected from the EPA's network of 220 groundwater monitoring stations. The final results of the study found that all samples complied with the radioactivity parameters set out in the EU Drinking Water Directive

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and all had radon activity concentrations less than 500 Bq/l, which is the recommended maximum level of radon activity concentration in public drinking water supplies set by the RPII. A report of the completed study is planned for publication in 2012.

Specific projects such as that described above on groundwater are essential to complement and inform the ongoing monitoring programmes. During 2011, a research strategy was developed with the objectives of maintaining core technical skills, of updating the national dose assessment due to be published in 2013 and of underpinning the RPII's capacity to advise the Government and the public. A project to assess radioactivity levels in Carlingford Lough was commenced in collaboration with UCD and the Northern Ireland Environment Agency. In addition to the scientific results, the project provides an opportunity to strengthen links with partner organisations.

During 2009, a specially constituted group of five independent experts carried out a comprehensive review of the RPII's monitoring programme with a view to ensuring that the programme meets its stated aims and to make recommendations for improvement, if required. The review group broadly endorsed the RPII's monitoring programme and made some specific recommendations concerning sampling and skills maintenance for consideration in future programmes. The most significant changes implemented in 2011 were enhancements of the marine monitoring programme (which now includes greater use of bio-indicators such as seaweed), an increase in the number of measurements of plutonium and americium, and improvements in the efficiency and representativeness of sampling. In addition to these changes, the sample preparation area of the RPII's environmental monitoring laboratory was completely refurbished to enhance the agency's capacity to handle the large volume of samples that would need to be processed in the event of a nuclear accident or crisis.

## Radiation measurement services

In total, the RPII measured the radioactivity content in 1663 environmental samples and foodstuffs during the year. Certificates specifying the radioactivity content issued to exporters of Irish produce numbered 3893, compared with 3211 in 2010 and 3198 in 2009. The increase in 2011 can be attributed to increased demand for the service following the Fukushima Accident. The RPII's Dosimetry Service supplied approximately 74,000 dosimeters to clients during the year. These dosimeters were used to monitor the radiation exposure of over 8000 individuals. The Calibration

Service tested 327 instruments for compliance with the relevant manufacturers' specifications. Radon measurements were completed in 5504 homes and 364 workplaces.

A major development during the year was the approval by the Board in October of a detailed plan setting out the steps the RPII will take to move from being a direct provider of dosimetry services to taking on a supervisory role in relation to dosimetry services operating in Ireland. The steps include the establishment of an approval process for dosimetry services and a National Dose Register.

During the year, the RPII maintained accreditation to the ISO 17025 standard for its key measurement services. Development work on a new Laboratory Information Management System (LIMS) for the RPII's Calibration Service was also completed, greatly enhancing the administrative efficiency of the service, including the logging of instruments, recording of calibration data and the issuing of calibration certificates.

## Emergency preparedness

As indicated above, the RPII's response to the Fukushima Accident dominated the institute's activities in the early part of the year, most especially for the small number of staff routinely involved in emergency preparedness work. However, there were a number of other noteworthy developments in this area during the year.

One of the challenges that the RPII faces when responding to an emergency is that of access to the appropriate expertise and data. In this context, the commissioning in 2011 of a microwave link between the RPII and Met Éireann is significant, as it will allow the Met Éireann forecaster assigned to the RPII's Technical Assessment Team to have direct access to a suite of forecasting tools run from Met Éireann headquarters in Glasnevin, Dublin.

In all, the RPII participated in six international emergency exercises organised by the IAEA and the European Commission. Of particular note was the exercise held in February which was designed to test the information exchange arrangements that would follow a simulated accident that had the potential to affect citizens in a number of countries. The lessons identified for Ireland from the exercise included the need to improve notification arrangements between An Garda Síochána and the RPII, and the need to document the procedures for the operation of the atmospheric dispersion model used during the exercise. These actions were completed by the end of 2011.

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In November 2011, the RPII was notified through the international alerting arrangements that trace levels of radioactive iodine-131 had been detected in a number of countries across Europe, with a medical isotope manufacturing facility in Hungary identified as the most probable source. No iodine was detected on the RPII systems; but this was not unexpected, as the pattern of dispersion indicated that the concentrations in air were already close to the limit of detection by the time the plume reached France.

## Safety of nuclear facilities abroad

Following the events at Fukushima, the European Council requested a review of safety at all European nuclear power plants. The European Nuclear Safety Regulators Group (ENSREG) produced criteria and a plan for the so called 'stress tests', which required plant operators to reassess the safety of nuclear plants against the type of extreme events that occurred at Fukushima. All EU member states with operating nuclear power plants, together with Switzerland and Ukraine participated in the process. Each country's nuclear safety regulator then reviewed the operators' reports and commented on their findings, identifying areas for further work and/or plant improvements. The plan includes a peer review element in 2012, and this involves the assessment of the 17 national reports by teams set up by ENSREG. As a member of ENSREG, the RPII is contributing to this peer review process. All relevant documents are published on the ENSREG website [www.ensreg.eu](http://www.ensreg.eu).

The RPII continued to monitor developments at Sellafield and other UK nuclear sites closely. During the year, the RPII was briefed by UK authorities on developments in relation to activities at Sellafield. One briefing covered the new Sellafield Performance Plan, which describes the work that will be performed on the Sellafield site over its lifetime until closure in 2120. The progress being made by Sellafield against

key safety-related targets will be monitored by the RPII into the future. Other noteworthy developments relating to Sellafield include the announcement that the Sellafield MOX (mixed oxide fuel) Production Plant would close at 'the earliest practical opportunity' and that the UK Government's preferred option for dealing with the UK's stock of plutonium is to incorporate it into MOX rather than disposing of it as waste or storing it indefinitely.

A number of incidents at Sellafield and other UK nuclear sites were brought to the attention of the RPII during the year. All of these incidents were rated as Level 1 or lower on the seven-point International Nuclear Event Scale and had no radiological implications for Ireland.

In 2010, the UK Government announced plans to develop new nuclear power stations on eight sites in England and Wales, five of them on the Irish Sea coast. During 2011, the RPII advanced a study to assess the likely effects on Ireland of these new power stations. The assessment considers radioactive discharges to air and sea from the proposed stations, both under normal operating conditions and in the event of an accident. The work was originally scheduled to be completed in 2011, but was delayed to 2012 as a result of the RPII's Fukushima response.

During the year, the RPII continued to provide scientific and technical advice to the Department of the Environment, Community & Local Government on a range of nuclear-related issues. In particular, the RPII assisted with the preparation and follow-up of Ireland's national report to the IAEA Convention on Nuclear Safety submitted to the IAEA in September 2010 and presented orally during the fifth review meeting held in Vienna in April 2011. The RPII also acts as a scientific adviser to the Irish Government on the implementation of the OSPAR Strategy, which requires contracting parties to take all possible steps to prevent and eliminate pollution of the marine environment of the North East Atlantic by 2020.



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## Corporate services

The Corporate Services Division supports the scientific and technical work of the RPII and its good governance through the provision of services in the areas of Finance, Human Resources, Communications and other essential services. It aims to ensure that conditions are created that promote efficiency and effectiveness and a positive organisational culture, as well as a strong governance and compliance infrastructure.

### Provision of advice

The RPII plays a key role in the provision of advice on radiation protection matters to the Government and to the public. Easy access to high-quality information on the RPII website and interaction with the media are key elements in improving awareness of radiation protection.

The RPII website performed consistently well throughout the year with over 82,000 visits by over 60,000 unique visitors. In particular, over 18,000 unique visitors to the website were recorded in June on foot of a press release about radon and over 7500 visitors were recorded in March surrounding media activity in relation to the Fukushima accident.

During the year the RPII continued to communicate with the public through the media by participating in 6 television and 38 radio programmes at national and regional level. Print media coverage was also strong with 250 published articles referring to the RPII, relating predominantly to radon gas and the Fukushima accident.

To ensure that the information provided meets public needs, the RPII undertook focus group research and some face-to-face interviews with key stakeholders to determine public attitudes towards radiation in the environment. The research found the two greatest public concerns relate to the low-level pollution of the Irish Sea from Sellafield and the possibility of a major accident as a result of terrorist attack on Sellafield. The research also highlighted the importance of openness and transparency for organisations such as the RPII in their dealings with the public.

## Looking forward

Continuing to deliver the RPII's statutory functions against a background of reducing staff numbers remains challenging. The RPII remains focused on seeking efficiencies and improved customer service where possible and details of initiatives are provided in the RPII's Action Plan under the Croke Park Agreement. Particular developments during 2011 included individual skills appraisal and career planning in the management and administrative functions of the RPII in preparation for future staff losses through retirements. Specific initiatives to improve energy efficiency, IT security and records management were also advanced during the year.

In the context of public sector reform, and in light of the focus on merging agencies, the Department of Environment, Community & Local Government requested the RPII and the EPA to consider what savings could be made if the two organisations were to merge. The two organisations collaborated on a joint preliminary assessment of a potential merger and compiled a report for submission to the Department. In November, the Government indicated that a critical review of the proposal to merge the RPII and the EPA was to be conducted and reported on by mid-2012. The RPII is participating in this process.