



Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raideolaíoch



ANNUAL REPORT AND ACCOUNTS 2001



Radiological Protection Institute of Ireland

To the Minister for the Environment and Local Government

In accordance with the requirements of the Radiological Protection Act, 1991,
I have the honour to present the Annual Report and Statement of Accounts
of the Radiological Protection Institute of Ireland
for the year ended 31st December 2001.

Francis J Mulligan, Chairman

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CHAIRMAN'S STATEMENT

I am pleased to introduce the Annual Report and Accounts of the Radiological Protection Institute of Ireland for 2001, which was an eventful year for the Institute.

The Institute had for some time been calling for a major exercise of the National Emergency Plan for Nuclear Accidents, involving all the national agencies, which were assigned significant responsibilities under the Plan. It is therefore noteworthy that such an exercise took place in November 2001. Planning of the exercise, by consultants commissioned by the Department of Public Enterprise, was at an advanced stage before the events of 11th September led to a very much-heightened public and media interest in it. The Consultants' report on the exercise contained important findings, for the Plan as a whole and for the Institute in particular, which are referred to in the Main Developments and Emergency Planning sections in this Annual Report.

The Institute also welcomes its substantial role in co-ordinating the assembly of scientific evidence in support of legal actions by the Government against the MOX plant at Sellafield under the OSPAR Convention and the United Nations Convention on the Law of the Sea. The Institute will continue to give priority to its role as advisor to the Government on all matters relating to nuclear safety.

I warmly welcome the passage into law of the Radiological Protection (Amendment) Act, 2002. This legislation strengthens and clarifies certain important aspects of the Institute's licensing powers. It provides the legislative basis for a scheme of grants to assist householders with the cost of remedying high radon levels in their homes. The Institute has long advocated such a scheme as an important inducement to homeowners, whose homes have high radon levels, to take the necessary steps to mitigate this established risk of lung cancer to members of their household.

For many years the Institute has been calling for the provision of a national facility for the storage of disused radioactive isotopes which result from many essential applications of ionising radiation in medicine, industry and education. The Institute is aware that efforts to identify a suitable site for such a facility have so far proved unsuccessful, but I welcome the renewed effort being made to ensure that this long-standing problem is finally resolved. The need to do so is reinforced by the obligations Ireland has incurred by its ratification in 2001 of the International Atomic Energy Agency's Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Furthermore, the European Council Directive on High Activity Sealed Sources, which is currently being drafted, also obliges Member States to make provision for the safe storage of disused sources.

I wish to record my own thanks and that of the Institute to Mr James Gibney, who retired from the Board on the 31st March 2002, having served a five-year term. I welcome Mr James Fitzmaurice to the Board in his place. I welcome also the re-appointment to the Board of Mr Gregory Burke, as nominee of the Institute of Food Science and Technology of Ireland, and Dr Lesley Malone, as nominee of the Irish Nuclear Medicine Association.

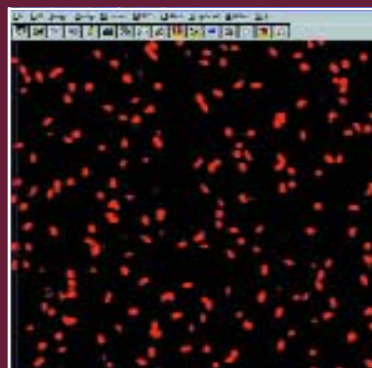
I wish to express my sincere thanks and that of my fellow Board members to Dr Tom O'Flaherty who retired as Chief Executive of the Institute on the 30th April 2002. Dr O'Flaherty joined the Nuclear Energy Board (NEB), the forerunner to the Institute, in 1990 having served as a Board member between 1982 and 1987. In 1992, the NEB was replaced by the RPII and Dr O'Flaherty was appointed as its first Chief Executive. During his tenure, Dr O'Flaherty oversaw the establishment of the Institute as a strong scientific organisation whose primary role is the protection of the Irish public against the dangers of ionising radiation. The Institute is deeply indebted to Dr O'Flaherty for his valuable contribution to the Institute during its formative years. I wish the Institute's new Chief Executive, Dr Ann McGarry, every success in her new role and I look forward to working with her in the years ahead.

I wish to record my appreciation of the dedication and expertise which has at all times characterised the work of the Institute's staff. I also wish to acknowledge the contributions of the members of the Institute's Advisory Committees who give their time voluntarily to assist the Institute in its work.

In June 2002, responsibility for the Institute at Government level moved from the Department of Public Enterprise to the Department of the Environment and Local Government (DOE&LG). I wish to record the Institute's appreciation for the support received from successive Ministers for Public Enterprise since its establishment in 1992 and I look forward to a good working relationship with the Minister for the Environment and Local Government, Mr Martin Cullen, TD. It is also a pleasure to acknowledge the co-operation received at all times from the officials of the Nuclear Safety Division, now part of DOE&LG, as well as the assistance received from other national organisations and from third-level institutions.

Francis J Mulligan
Chairman





The Institute's automated radon measurement system can process more than 300 individual radon detectors per day



RÁITEAS AN CHATHAOIRLIGH

Tá an-áthas orm Tuarascáil Bhliantúil agus Cuntais na hInstitiúide Éireannai um Chosaint Raideolaíoch do 2001 a chur i láthair, do bhliain inar tharla cuid mhaith don Institiúid.

Bhí an Institiúid le roinnt ama ag éileamh go ndéanfaí cleachtadh suntasach ar an bPlean Náisiúnta Éigeandála do Thimpistí Núicléacha, ina mbeadh na gníomhaireachtaí náisiúnta ar fad páirteach agus freagrachtaí suntasacha sannta orthu faoin bPlean. B'fhiú a thabhairt ar aird dá bhrí sin gur tharla a leithéid de chleachtadh i mí na Samhna 2001. Bhí pleanáil don chleachtadh, a bhí idir lámha ag comhchomhairleoirí arna gcoimisiúnú ag an Roinn Fiontar Poiblí, go mór chun cinn sular mhúscail eachtraí an 11ú Meán Fómhair suim an phobail agus na meán go mór ann. Bhí torthaí tábhachtacha don Phlean ar an iomlán i dtuarascáil na gComhchomhairleoirí ar an gcleachtadh agus don Institiúid go háirithe agus tagraítear dóibh sna codanna Príomhfhorbairt agus Pleanáil Éigeandála sa Tuarascáil Bhliantúil seo.

Fáiltíonn an Institiúid chomh maith roimh a ról substaintiúil maidir le comhordú a dhéanamh ar fhianaise eolaíoch a thiomsú chun tacú le caingne dlí an Rialtais in aghaidh ghléasra MOX ag Sellafield faoi Choinbhinsiún OSPAR agus faoi Choinbhinsiún na Náisiún Aontaithe ar Dhlí na Farraige. Leanfaidh an Institiúid ag tabhairt tús áite dá ról mar chomhairleoir don Rialtas i gcás gach ní a bhaineann le sábháilteacht núicléach.

Fáiltim ó chroí roimh an Acht um Chosaint Raideolaíoch, 2002, a ritheadh ina dhlí. Láidríonn an reachtaíocht gnéithe tábhachtacha áirithe de chumhachtaí ceadúnaithe na hInstitiúide, agus déanann sí soiléir iad. Soláthraíonn sí an bonn reachtúil do scéim deontas chun cabhrú le teaghlach leis an gcostas a bhaineann le leibhéil arda radóin ina dtithe a leigheas. Is fada scéim den sórt sin molta ag an Institiúid mar spreagadh tábhachtach d'úinéirí tí, a mbíonn leibhéil arda radóin ina dtithe, na céimeanna riachtanacha a ghlacadh chun an baol seanbhunaithe ailse scamhóg do mhuintir an teaghlach a mhaolú.

Le blianta fada anuas tá an Institiúid ag iarraidh go gcuirfí saoráid náisiúnta ar fáil d'iseatóp radaighníomhach nach mbíonn á úsáid a thuilleadh agus a bhíonn ann mar thoradh ar go leor feidhmeanna riachtanacha radaíochta ianaíche i gcúrsaí liachta, tionsclaíochta agus oideachais a stóráil. Is eol don Institiúid nár éirigh go dtí seo le hiarrachtaí chun láithreán oiriúnach do shaoráid den sórt sin a aithint, ach fáiltim roimh an iarracht nua atáthar a dhéanamh lena chinntiú go réiteofar sa deireadh an fhadhb seo atá ann le fada. Cuirtear tuilleadh leis an riachtanas sin a dhéanamh trí na hoibleagáidí atá leagtha ar Éirinn trí dhaingniú a dhéanamh in 2001 ar Chomh-Choinbhinsiún na Gníomhaireachta Idirnáisiúnta Fuinnimh Adamhaigh ar Shábháilteacht Bhainistiú Breosla Ídithe agus ar Shábháilteacht Bhainistiú Fuill Radaighníomhaigh. Chomh maith leis sin, cuireann Treoir ó Chomhairle na hEorpa ar Fhoinsí Séalaithe Ard-Ghníomhaíochta, atá á dréachtadh faoi láthair, na Ballstáit faoi oibleagáid foráil a dhéanamh do stóráil shábháilte foinsí nach mbíonn in úsáid a thuilleadh.

Ba mhaith liom mo bhuíochas féin agus buíochas na hInstitiúide a chur in iúl don Uasal James Gibney, a d'éirigh as an mBord an 31ú Márta 2002, tar éis dó téarma cúig bliana a bheith curtha isteach aige. Cuirim fáilte roimh an Uasal James Fitzmaurice ar an mBord ina áit. Fáiltim freisin roimh athcheapachán an Uasail Gregory Burke chuig an mBord agus é ainmnithe ag Institiúid na hÉireann um Eolaíocht agus Teicneolaíocht an Bhia, agus an Dr Lesley Malone agus é ainmnithe ag Cumann Míochaine Núicléach na hÉireann.

Ba mhaith liom mo bhuíochas ó chroí agus buíochas na gcomhaltai ar an mBord a léiriú don Dr Tom O'Flaherty a scor mar Phríomhfheidhmeannach na hInstitiúide an 30ú Aibreán 2002. Tháinig an Dr O'Flaherty ar an mBord um Fhuinneamh Núicléach (NEB), a bhí ann roimh an Institiúid, i 1990 agus bhí sé ina chomhalta den Bhord idir 1982 agus 1987. I 1992, tháinig an RPII in áit an NEB agus ceapadh an Dr O'Flaherty mar a chéad Phríomhfheidhmeannach. I rith a thréimhse mar Phríomhfheidhmeannach, rinne an Dr O'Flaherty maoirsiú ar bhunú na hInstitiúide mar eagraíocht láidir eolaíochta arbh é cosaint phobal na hÉireann in aghaidh na gcontúirtí a bhaineann le radaíocht ianaíoch a príomhról. Tá an Institiúid go mór faoi chomaoín ag an Dr O'Flaherty as an obair luachmhar a rinne sé don Institiúid i rith na blianta tosaigh. Guím gach rath ar Phríomhfheidhmeannach nua na hInstitiúide, an Dr Ann McGarry ina ról nua agus táim ag tnúth le bheith ag obair léi sna blianta amach romhainn.

Ba mhaith liom mo bhuíochas a léiriú as an dúthracht agus as an saineolas a bhain i gcónaí le hobair fhoireann na hInstitiúide. Ba mhaith liom aitheantas a thabhairt chomh maith do rannpháirtíocht chomhaltai Choistí Comhairleach na hInstitiúide a thug a gcuid ama go deonach chun cabhrú leis an Institiúid ina cuid oibre.

I Meitheamh 2002, ghluais an fhreagracht don Institiúid ag leibhéal an Rialtais ón Roinn Fiontar Poiblí go dtí an Roinn Comhshaoil agus Rialtais Áitiúil. Ba mhaith liom meas na hInstitiúide a léiriú as an tacaíocht a fuarthas ó Airí Fiontar Poiblí éagsúla ó bunaíodh an Institiúid i 1992 agus táim ag tnúth go mór le dea-chaidreamh oibre leis an Aire Comhshaoil agus Rialtais Áitiúil, an tUasal Martin Cullen, TD. Is mór agam chomh maith aitheantas a thabhairt don chomhoibriú a fuarthas i gcónaí ó oifigigh an Rannáin Sábháilteachta Núicléiche, ar cuid anois é den Roinn Comhshaoil agus Rialtais Áitiúil, chomh maith leis an gcabhair a fuarthas ó eagraíochtaí náisiúnta eile agus ó institiúidí tríú leibhéal.

Francis J Mulligan
Cathaoirleach



STAFF STRUCTURE



Dr Tom O'Flaherty, Chief Executive, retired from the RPII on 30th April 2002.

OBJECTIVES OF THE INSTITUTE

THE INSTITUTE'S PRINCIPAL OBJECTIVES ARE:

- To provide advice to the Government, the Minister for the Environment and Local Government and other Ministers on matters relating to radiological safety.
- To provide information to the public on any matters relating to radiological safety which the Institute deems fit.
- To maintain and develop a national laboratory for the measurement of levels of radioactivity in the environment, and to assess the significance of these levels for the Irish population.
- To provide a personnel dosimetry and instrument calibration service for those who work with ionising radiation.
- To control by licence the custody, use, manufacture, importation, transportation, distribution, exportation and disposal of radioactive substances, irradiating apparatus and other sources of ionising radiation.
- To assist in the development of national plans for emergencies arising from nuclear accidents and to act in support of such plans.
- To provide a radioactivity measurement and certification service.
- To prepare codes and regulations for the safe use of ionising radiation.
- To carry out and promote research in relevant fields.
- To monitor developments abroad relating to nuclear installations and radiological safety generally, and to keep the Government informed of their implications for Ireland.
- To co-operate with the relevant authorities in other states and with appropriate international organisations.
- To represent the State on international bodies.
- To be the competent authority under international conventions on nuclear matters.

MEMBERS OF THE BOARD

On 31st March 2001 the terms of office of Dr George Duffy, Ms Darina Muckian and Dr Geraldine O'Reilly expired. Ms Darina Muckian was re-appointed and Mr Francis J Turvey and Ms Anita Dowling were appointed to the Board, the last named on the nomination of the Association of Physical Scientists in Medicine. The term of office of Ms Adi Roche expired on 4th June 2001, and she was re-appointed to the Board with effect from 24th September 2001.

The Board met eight times during the year. The number of meetings attended by each Board member is shown below, the number in brackets indicating the number of meetings the member in question was eligible to attend. Also shown, in the case of the six members who were nominated for appointment to the Board by particular organisations, is the name of the respective nominating organisations.

Chairman	Francis J Mulligan	8(8)
	William Blunnie <i>Medical Council</i>	6(8)
	Gregory Burke <i>Institute of Food Science and Technology of Ireland</i>	7(8)
	Mary Coffey	7(8)
	Patrick Connellan <i>Dental Council</i>	3(8)
	George Duffy	2(2)
	Edward Fitzgerald <i>Faculty of Radiologists RCSI</i>	5(8)
	James Gibney	7(8)
	Lesley Malone <i>Irish Nuclear Medicine Association</i>	6(8)
	Darina Muckian	8(8)
	Geraldine O'Reilly <i>Association of Physical Scientists in Medicine</i>	2(2)
	Adi Roche	1(5)
	Francis J Turvey	5(6)
	Anita Dowling <i>Association of Physical Scientists in Medicine</i>	4(5)

On 31st March 2002 the terms of office of Mr Gregory Burke, Mr James Gibney and Dr Lesley Malone expired. Mr Burke and Dr Malone were re-appointed to the Board with effect from 18th April 2002. Mr James Fitzmaurice was appointed to the Board with effect from 18th April 2002.

MAIN DEVELOPMENTS

By far the most notable development affecting the Institute during 2001 was the intense focus of public interest, following September 11th, on the possible consequences for Ireland of a terrorist attack on Sellafield. Attention focussed on both the potential danger to people in this country which might result from such an attack and, arising from that, on the capability of the National Emergency Plan for Nuclear Accidents to deal adequately with the situation which could arise.

A number of events during the last months of the year intensified public and media interest in these matters. These included the announcement by the UK Government on 3rd October of its approval for the commissioning of the Sellafield MOX Plant; a major exercise of the National Emergency Plan which took place on 10th November; and the legal action taken by Ireland against the UK regarding the MOX Plant under the United Nations Convention on the Law of the Sea, the preliminary proceedings of which were heard by the International Tribunal on the Law of the Sea in Hamburg in late November. Participation by Institute personnel in media coverage of these events was at a level unprecedented since the Institute was established.

NATIONAL EMERGENCY PLAN FOR NUCLEAR ACCIDENTS

Early in 2001 the Department of Public Enterprise commissioned a firm of international consultants to devise and conduct a major exercise of the National Emergency Plan in the later part of the year. As it transpired, when the exercise eventually took place in November, the events of 11th September had caused it to attract a degree of media and public attention which had not been anticipated when the exercise was first envisaged.

The consultants in their report on the exercise deemed it to have been "a successful and testing experience" for the principal participants. For the Institute it highlighted some important issues. The consultants recommended that the existing arrangement, whereby the control centre for emergency response is located at the RPII offices at Clonskeagh, should be reviewed. They also found that current arrangements for providing information to the public and the media place potentially unmanageable burdens on the Institute, and should be reviewed to spread these burdens among other agencies.

Other important recommendations were that provision should be made for monitoring the movement of a radioactive plume over the Irish Sea, and that some addition to the existing network of fixed radiation monitoring stations may be needed. Planning should also take into account resources which might be made available in an emergency by international bodies or by neighbouring countries.

GOVERNMENT LEGAL ACTIONS

The Institute has necessarily had a key role in support of the intensified political and legal measures undertaken in 2001 by the Government in opposition to activities at Sellafield, particularly the commissioning of the MOX Plant. Senior Institute staff have had a substantial involvement in preparing the scientific and technical foundation for legal actions taken under both the United Nations

Convention on the Law of the Sea (UNCLOS) and the OSPAR Convention. This has involved the co-ordination of the work of consultants in Ireland and overseas as well as the Institute's own staff, and is likely to constitute a significant part of the Institute's work until the proceedings are concluded.

NATURAL RADIOACTIVITY

Under legislation introduced in 2000 to implement an EU Directive, the Institute's regulatory responsibilities in the area of natural radioactivity have expanded considerably. Work following from this legislation developed substantially during 2001, notably in putting into effect the requirement that owners of workplaces measure radon concentrations in their workplaces, and, where necessary, carry out remedial work to reduce these concentrations. Initial pilot programmes in high-radon areas involved some 1300 workplaces in Ennis, Co. Clare, and 1800 in Tralee, Co. Kerry.

Work also got under way on regulation of the exposure of air crew to cosmic radiation, while the Institute's three-year programme, commissioned by the Department of Education and Science, to carry out radon measurements in all the country's schools was brought to a successful conclusion. In the course of the programme measurements were made in 3433 schools, of which 26% were found to have one or more rooms with radon concentrations above the Reference Level of 200 becquerels per cubic metre (Bq/m³). Remedial work is being carried out progressively on the affected schools, and has so far proved highly effective in reducing radon levels.

REGULATORY SERVICE

Work continued towards the full implementation of the recommendations of the International Atomic Energy Agency team, which carried out a Peer Review of the Institute's Regulatory Service in late 2000. Progress was hampered to some extent by difficulties in recruiting staff with suitable experience, but every effort is being made to overcome these difficulties.

As in other years the Institute dealt with a number of instances of non-compliance with regulations governing the custody and use of radioactive substances and irradiating apparatus. The most serious of these involved the exposure of a person assisting a veterinary surgeon resulting in a dose of 15.9 mSv. While the dose did not exceed the annual dose limit of 20 mSv for exposed workers, it could have been avoided if the correct procedures had been followed. This incident highlights the importance for licensees of developing and maintaining appropriate written radiation safety procedures and of ensuring that these procedures are observed by all staff members directly involved in the use of sources of ionising radiation.

Ann McGarry
Chief Executive



Collecting off-shore water and sediment samples in the Irish Sea



STAFF AND RESOURCES

STAFF

A major development was the retirement in August 2001 of the Institute's Deputy Chief Executive, Mr John D. Cunningham, who had played a key role in senior management in the Institute, and its forerunner the Nuclear Energy Board, for a quarter of a century. While the post of Deputy Chief Executive was not immediately filled, Mr Christopher Hone was appointed to the senior management post left vacant by Mr Cunningham's retirement.

Consequential vacancies at Senior Scientific Officer and Scientific Officer grades were also filled. Two additional Scientific Officers were also recruited, one to fill a vacancy and the other a new post created to cater for the Institute's responsibilities for implementation of legislation on exposure of workers to naturally-occurring radioactivity. A new Technician post relating to the same work was also filled.

The sanction which had been sought at the end of 2000 to recruit an experienced medical physicist at Principal Scientific Officer grade to the staff of the Regulatory Service was refused, but a position at Senior Scientific Officer grade was approved. Efforts to recruit an experienced medical physicist at this grade were unsuccessful and consequently sanction was sought to upgrade this newly created post to Principal Scientific Officer.

EQUALITY

The Institute is committed to a policy of equal opportunity in all aspects of its activities. Particular attention is given to equality in recruitment, conditions of employment and access to promotion, training and career development. The Institute recognises that flexible working arrangements are an important component of equality policies and operates such schemes as flexitime, study leave, career breaks and job-sharing. Its job-sharing scheme has been broadened to encompass the wider concepts of work sharing as provided for under new principles set out for the public service in a Department of Finance Circular in 2001.

PARTNERSHIP AND PARTICIPATION

The Institute's Participation Forum, established under the terms of the Worker Participation (State Enterprises) Act, 1988, provides a sub-Board mechanism for consultation with staff at all levels in the Institute about matters affecting the operation and effectiveness of the Institute. Within this framework the Institute has put in place arrangements to meet the requirements of the Modernisation Programme, which is provided for under the Programme for Prosperity and Fairness.

CUSTOMER SERVICE

In 2001 the Institute adopted a charter for Customer Service setting out its commitment to a high quality of service to its clients and to the general public.

SAFETY HEALTH AND WELFARE

The Institute is committed to complying fully with the requirements of the legislation relating to safety, health and welfare at work. In accordance with the provisions of the Safety, Health and Welfare Act, 1989, a safety committee is in place and a safety representative

is elected by staff members. A safety statement has been prepared and is kept under continuing review.

FINANCE

The Institute's income in 2001 was €3.484 million made up of grant-in-aid of €2.641 million and €0.843 million in earnings from dosimetry, product certification and other services, licence charges, research and consultancy contracts. Capital expenditure, principally on information technology and on equipment for monitoring of radioactivity in the environment, was €288,877. Income for the year exceeded expenditure by €168,289.

The Institute complies with all appropriate procurement procedures.

ACCOMMODATION

Newly acquired office accommodation in 1 Clonskeagh Square, adjacent to the Institute's main building at No. 3, was fitted out and occupied by the Regulatory Service. The space thus made available at No. 3 provides significant relief from overcrowding of work areas in other sections of the Institute's work.

ENERGY AND EFFICIENCY

Following a Government decision in July 2001 that all State bodies should report annually on measures to reduce energy use in buildings occupied by them, a staff-working group was established to consider how efficiency of energy use in the Institute's premises might be improved. The initial recommendations of the group focussed on economies in electricity use by powering off computer systems when not in use, switching off lighting in unoccupied rooms and use of energy-saving light fittings. In addition, economies have been effected in water heating, and the cost effectiveness of more sophisticated control of temperature in buildings is being examined.

INFORMATION TECHNOLOGY

During 2001 the Institute completed its implementation of all of the recommendations of a review of its information systems undertaken by Price Waterhouse in 1997. These included the migration to a central data server and a single database application platform, and the development of the physical topology to a more resilient system. In particular, the provision of a fibre-optic link between the Institute's three offices in Clonskeagh Square greatly improved data transfer between sections and the performance of database systems at the remote locations. Where necessary, systems were upgraded or modified in preparation for the introduction of the Euro in January 2002.

CUR CHUN CINN NA GAELIGE

Deineann an Institiúid iarracht an Ghaeilge a úsáid a mhéid is féidir. Í bhfógraíocht, baintear úsáid go rialta as an leagan Gaeilge d'ainm heagraíochta taobh leis an ainm Béarla. Chomh maith leis sin, glactar le beagnach gach cuireadh a thugtar chun bheith páirteach i gcláracha Gaeilge ar na meáin chumarsaide.



Placing an alpha particle source in a detector for measurement



ENVIRONMENTAL MONITORING AND RESEARCH

The safety of the food chain and the protection of the environment are prime concerns of the Irish public. The Institute responds to these concerns and to its legislative responsibilities in this area by undertaking monitoring programmes of radioactivity in foodstuffs and in the environment. The primary objectives of these programmes are to assess the level of exposure of the Irish public to radioactive contamination and to monitor the distribution and evolution of levels in the environment with time.

The results of these monitoring programmes are available in two series of reports published by the Institute namely the *Marine* and *Environmental Surveillance* monitoring series. These reports are made available on the Institute's Website. Furthermore, marine monitoring results are uploaded onto the Institute's Website each quarter. The numbers and types of samples tested during 2001 are given in Table 1.

The Institute is the nominated national centre for the measurement of radioactivity in foodstuffs and substantial resources are devoted to the maintenance of an effective, high quality service in this area. As part of that commitment, the techniques and procedures relevant to the testing of foodstuffs and environmental materials employed by the laboratory are accredited by the National Accreditation Board (NAB) to international standards. In 2001, the Environmental Laboratory commenced the process of converting its current quality system to become compliant with the new international standard - ISO17025.

Table 1: Radioactivity testing on environmental samples and foodstuffs, 2001

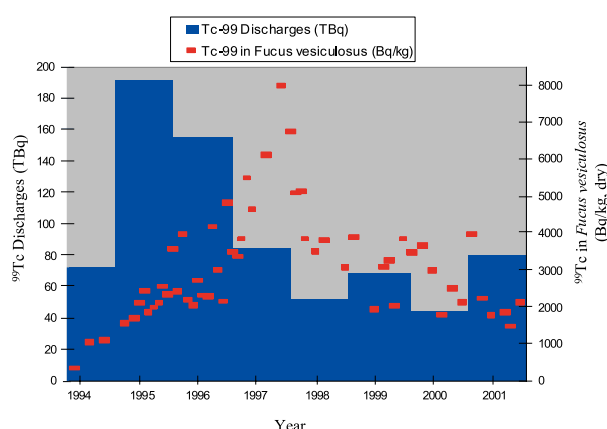
SAMPLE TYPE	NUMBERS
Air	468
Beef	54
Lamb	82
Pork/Poultry	30
Drinking water	303
Fish and shellfish	149
Seawater, sediments and seaweed	198
Milk and dairy products	402
Miscellaneous	465
TOTAL	2151

MARINE ENVIRONMENT

In recent decades Irish coastal waters have been influenced by a number of artificial sources of radioactive contamination. These include discharges from nuclear installations, fall-out from the Chernobyl accident in 1986, atmospheric nuclear weapons testing during the 1950s and 1960s and discharges to sewage from some hospitals of radionuclides used for medical purposes. The most significant of these sources is the discharge of low-level radioactive waste from the British Nuclear Fuels plc (BNFL) nuclear fuel reprocessing plant situated at Sellafield in Cumbria in the north-west of England.

Since 1994 the commissioning and operation of new facilities at Sellafield have resulted in an increase in the discharges of technetium-99 to the Irish Sea. This has been reflected in an increase in the activity concentrations of this radionuclide at all east coast sampling sites between 1994 and 2001. In 2001 the discharges of technetium-99 from Sellafield increased to 79.4 terabecquerels (TBq) compared with 44.4 TBq in 2000. The discharges of technetium-99 from Sellafield between 1994 and 2001 together with the activity concentration of technetium-99 in seaweed on the Irish coast is shown below in Figure 1.

Figure 1: Technetium-99 discharges and measured concentrations in seaweed 1994-2001



The consumption of seafood remains the most important exposure pathway for the Irish public. Samples of cod, plaice, whiting, ray, herring, mackerel, prawns, oysters and mussels were collected from major landing ports. Seawater, seaweed and sediment were also collected from coastline locations and from the western Irish Sea using the Commissioners of Irish Lights vessel, ILV Granuaile. The sampling programme, which is carried out by Institute staff and by Fishery Quality Officers of the Department of the Marine and Natural Resources, is kept under constant review to take account of changes in catch, consumption patterns and maritime activities.

The dose to consumers who eat substantial quantities of seafood each day (20g shellfish, 200g of fish) was estimated to be less than 2 microsieverts (μSv) which is similar to that in both 2000 and 1999. A small additional dose is incurred through recreational activities such as swimming, walking on beaches or fishing. The size of these doses may be put into context by comparing them to the annual dose to a member of the Irish public from all sources of radiation which can range from about 2000 μSv to 20,000 μSv , or even higher in cases of exceptional exposure to radon gas.

The doses incurred by people living in Ireland today as a result of the routine operations at Sellafield are now very small and do not constitute a significant health risk. The Institute therefore advises that from a radiological perspective it is safe to eat seafood landed at Irish fishing ports and to enjoy the amenities of the Irish maritime area.



Seaweed sampling on Bull Island



However the Institute takes the view that these small doses are undesirable and there are legitimate grounds for objection to the practices at Sellafield. As a signatory to the OSPAR Strategy for Radioactive Substances, the United Kingdom is committed to progressive and substantial reductions in radioactive discharges from its nuclear operations. Full implementation of the OSPAR Strategy should ensure that the radioactive discharges attributable to the operations at Sellafield are even further reduced in future years.



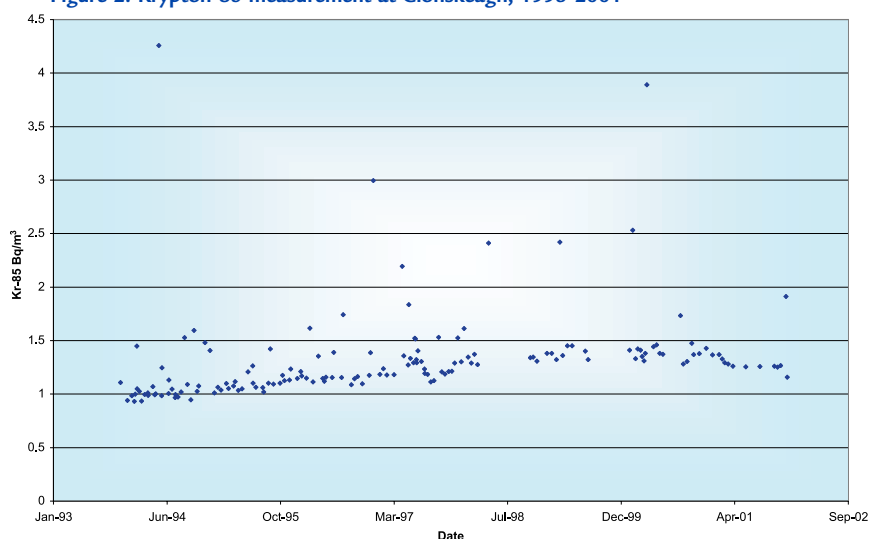
TERRESTRIAL ENVIRONMENT

During the routine operation of nuclear installations such as nuclear power plants and reprocessing plants in the UK and elsewhere, radioactive material is released to the environment under the authorisation of national authorities. Typical releases include krypton-85, which is a gas and can be detected in Ireland. Other radionuclides from these sources are generally not detectable in the terrestrial environment. However, following a major accident such as occurred in Chernobyl in 1986, a range of radionuclides may be detectable. For example, caesium-137 still persists in the Irish environment following the Chernobyl accident as does the contamination resulting from the atmospheric weapons testing programmes of the 1950s and 60s.

Krypton-85 is a radioactive noble gas produced during the operation of nuclear reactors and is released into the atmosphere primarily during the reprocessing of nuclear fuel. Because of its low capacity to react with other materials, krypton-85 distributes uniformly throughout the earth's atmosphere within a few years after release. Significant contributions to the global inventory of krypton-85 arise from the two major nuclear fuel reprocessing plants in Western Europe located at Sellafield on the northwest coast of England and at Cap de La Hague on the northwest coast of France. Reprocessing is also carried out in Russia.

In 2001, the mean activity concentration of the krypton-85 in air as measured at Clonskeagh in Dublin was 1.3 becquerels per cubic metre (Bq/m³). Because of the very low radiotoxicity of krypton-85, the corresponding radiation doses do not represent a significant health hazard. The activity concentrations in air between 1993 and 2001 at Clonskeagh are presented in Figure 2.

Figure 2: Krypton-85 measurement at Clonskeagh, 1993-2001



The radioactivity levels in air, drinking water and foodstuffs such as dairy produce, beef, sheepmeat and vegetables are measured as part of the Institute's terrestrial monitoring programme. In addition the *in-vivo* testing of sheep in certain uplands areas is also carried out. These programmes are undertaken in close co-operation with the Department of Agriculture, Food and Rural Development, Met Éireann, local authorities, health boards and commercial producers.

The monitoring of upland sheep during the months of summer grazing and at the time of slaughter was commenced in 1987 in the aftermath of the Chernobyl accident and has continued annually ever since. During 2001 the on-farm monitoring of sheep was severely restricted due to the foot-and-mouth outbreak. Monitoring at slaughterhouses serving the home market was unaffected.

A small number of sheep were found to have levels higher than has been recorded previously during the monitoring programme. The reasons for this were not immediately obvious and further work is being undertaken in an effort to understand the results. The radiological implications of the levels recorded were negligible and did not raise any concerns about the consumption of Irish lamb.

Throughout 2001, milk was sampled monthly at ten milk-processing plants and analysed primarily for strontium-90 and caesium-137. Furthermore drinking water samples were taken from supplies in 11 counties as part of a cycle in which supplies from each county are tested at least once every 4 years.

The measurements carried out during 2001 show that the levels of artificial radioactivity in air, water and foodstuffs remain low and are well within accepted international standards.

RADIOACTIVITY IN EXPORTED PRODUCE

The Institute continued its testing and certification services to exporters of Irish food products and other goods. In 2001, the Institute issued 4273 certificates compared to 5600 in 2000 and 5810 in 1999. The significant decrease in the number of certificates issued in 2001 may well reflect the export restrictions implemented during the foot and mouth crisis.

DEPLETED URANIUM

Uranium, which is found in abundance in the environment, is a mixture of three isotopes namely uranium-238, uranium-235 and uranium-234. Uranium-235 is used in the manufacture of fuel for nuclear reactors and as the reaction material in some nuclear weapons. When uranium-235 is extracted from ore or is burned up in a reactor and reprocessed, the waste product, with a reduced percentage of uranium-235, is called depleted uranium. It is about 1.7 times as dense as lead and ignites when in powder form reaching high temperatures. Depleted uranium has found application as a counter weight in aeroplanes and as a shielding material for medical and industrial sources. In recent times depleted uranium has come to public attention because of its military applications in anti-tank munitions particularly as used by NATO forces in the Balkans conflict.

In 2001, concern was expressed about Irish civil and military personnel serving in the region and the RPII provided advice and reassurance testing of food and water samples for those potentially affected.

RADON IN DRINKING WATER

Radon is a naturally-occurring radioactive gas found throughout the environment. It is produced from uranium, which is present in all rocks and soil. Because it is a gas, radon can move freely through porous material such as soil or fragmented rock. Where water is present underground, radon dissolves in the water and is transported with it. The most likely source of drinking water with high radon concentrations is a private supply serving one household directly from a borehole where the groundwater is in contact with rocks with high uranium levels.

When water containing radon enters the home, there are two principal pathways by which individuals can be exposed to radiation. The first is the direct consumption of water containing radon. Secondly, the radon can be released into the indoor air and inhaled directly by the occupants.

Recent attention has been focused on the issue of radon in drinking water by a draft European Commission recommendation proposing that surveys should be undertaken in Member States to determine the scale and nature of exposures caused by radon in domestic drinking water supplies. The Commission recommends 1000 becquerels per litre (Bq/l) as the radon concentration in drinking water above which remedial action to reduce the concentration should be taken.

In 2001, the Institute commenced a pilot study of radon in drinking water in Co. Wicklow in cooperation with Wicklow County Council. Wicklow was chosen primarily on the basis that parts of the county are known to have high instances of radon in air in homes and many residents use private supplies for their drinking water. Initial results indicate that a small percentage of houses have radon in water concentrations above 1000 Bq/l.

Normally radon which enters dwellings directly from the underlying soil remains the principal source of indoor radon. The Institute confirms its advice that all householders in high radon areas should have radon measurements carried out in their homes.

MARINE RADIOECOLOGY RESEARCH

When radionuclides such as the isotopes of plutonium, caesium and technetium are discharged from nuclear facilities to the marine environment, each radionuclide behaves differently. The more soluble radionuclides such as technetium-99 and caesium-137 are transported with the water circulation to the Irish coast as well as northwards out of the Irish Sea and have been detected along the Norwegian coast and in Arctic waters. Radionuclides such as plutonium-239 tend to react with particles in the water column and are transported to the sediments of the seafloor. Once deposited on the seafloor these radionuclides may be subject to remobilisation that results in their re-introduction to the water column. The processes involved in such remobilisation are the focus of an international research project entitled 'REMOTRANS' in which the Institute is participating.

The project is partially funded by the European Union and involves 12 laboratories in eight countries. It is anticipated that the results and conclusions of the project will provide a more precise

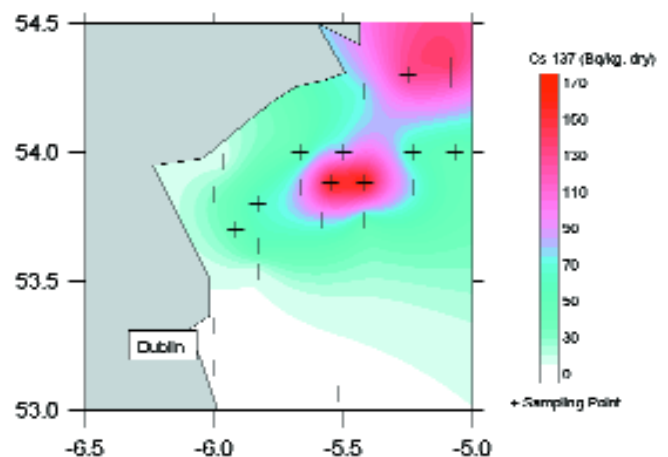
description of the long-term effects of past and present radioactive discharges on the environment and man. The results will be particularly valuable in providing an improved understanding of the consequences of the past discharges from Sellafield to the Irish Sea, a significant proportion of which have accumulated on seabed sediments and are now being slowly released back into the water. Those radionuclides which are primarily associated with sediments are americium-241 and plutonium while caesium-137, which is soluble in seawater, also attaches itself to marine sediments. Preliminary data on the distribution of caesium-137 in the sediments of the western Irish Sea are shown in Figure 3.

COMMUNITY INITIATIVE INTERREG II C

In 2001, the Institute completed work on a marine research project partially funded by European Union structural funds under the inter-regional provisions. The project title was Atlantic Hydrology Modelling and Radionuclide Tracer Network. The principal objective of the project was to network a number of groups with individual skills and expertise and with an interest in the patterns of water circulation and radionuclide distribution in the Irish Sea, Celtic Sea, western Channel and the adjacent Atlantic. The Network consisted of a modelling group from IRSN in France, an oceanographic group from NUI Galway and the Institute's environmental laboratory. The project achieved its objectives through formal meetings, data transfer and scientific exchanges.



Figure 3: Cs-137 activity concentration in surface sediments (0-2cm) of the Western Irish Sea



NATURAL RADIOACTIVITY

The past year has seen a number of significant landmarks for the Natural Radioactivity group including the completion of the national survey of radon levels in Irish schools and the commencement of new regulatory programmes covering work activities involving exposure to natural radiation sources. These workplace programmes, which give effect to Part 6 of the Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000 (Statutory Instrument No. 125 of 2000) cover exposure of air crew to increased levels of cosmic radiation, exposure to radon gas in workplaces and work activities involving the use or handling of materials containing enhanced levels of natural radioactivity.

The Institute's radon laboratory continues to provide a radon measurement service to domestic and commercial customers. The Laboratory is committed to maintaining a high quality of service consistent with client and regulatory requirements and since 2000 radon measurements carried out by the Institute are accredited by the National Accreditation Board to international standards. During 2001 the laboratory updated its Quality System to comply with the new quality standard ISO 17025.

The Institute provides information on radon directly to the public through its freephone number, which typically handles 30 to 40 calls per week, its Website and participation in public events such as the Cork Ideal Homes Exhibition, which took place in May 2001. The Website continues to be the most important means of making the Institute's radon maps available to both the public and building professionals; during 2001 there were 13,332 hits on the radon maps on the Website, an increase of 64% over 2000.

RADON IN HOMES

At the request of members of the public, the Institute's radon measurement service completed 772 radon measurements in domestic dwellings during the year. Since the commencement of the radon programme, a total of 2411 dwellings have been identified with radon concentrations in excess of 200 Bq/m³, the domestic Reference Level. This corresponds to 2.7% of the dwellings predicted to be above the Reference Level on the basis of the National Radon Survey. Because of the large amount of time people spend in the home, lowering indoor domestic radon levels is seen as vital to reducing the overall health risk posed by radon. It is crucial, therefore, that householders be given every encouragement to test their houses and, where high radon levels are identified, to implement remedial measures.

During 2001 the Institute, with the assistance of Clare County Council, completed a pilot survey in the Ennis area of radon levels in houses built since the introduction of the new Building Regulations in 1997. These Regulations require that radon preventive measures be incorporated into houses at the time of construction. Of the houses measured in the survey, 12% were found to have radon levels in excess of the Reference Level for houses. The results of this pilot survey indicate some improvement due to the introduction of the 1997 Building Regulations, but it is clear that the Regulations alone do not ensure that all houses will have radon concentrations below the Reference Level. The Guidance document supporting the Regulations provides for the installation

of a secondary radon preventive measure (passive sump) in High Radon Areas to be activated if the primary measure did not prove effective. The results of this survey highlight the importance of testing all new houses for radon, once occupied, to determine if the passive sump needs to be activated.

Data from a questionnaire distributed as part of the survey also showed that householders' level of awareness of the radon preventive measures included in their house was low - 45% did not know if they had a sump installed in their house, while 36% were unaware if a radon barrier had been installed in their house at the time of construction.

RADON IN SCHOOLS

In November 2001 the Institute issued radon measurement results to the 1646 schools participating in the final phase of its three-year national survey of radon levels in Irish schools. This phase of the survey covered schools in counties Clare, Cork, Galway, Kerry, Limerick, Tipperary and Waterford, together with a small number of schools from other counties which had not previously completed measurements. Of the schools measured during this phase, 493 were identified as having one or more rooms above 200 becquerels per cubic metre (Bq/m³), the level above which the Institute has advised that remedial measures should be taken in schools.

During the three years of the survey 33,517 individual radon measurements were made in 3432 schools. Of these schools, 26% were found to have one or more rooms with radon concentrations above 200 Bq/m³. The number of schools measured per county and the percentage of these with radon levels in at least one classroom above 200 Bq/m³ are summarised in Table 2.

The Department of Education and Science is currently implementing a programme of remedial action to reduce radon levels in schools identified as having high radon levels. Following the completion of remedial work, schools are retested by the Institute in order to verify that the work has been effective. The retests completed to date indicate that the remedial work has been very successful in reducing indoor radon concentrations in schools below the Reference Level.

RADON IN ABOVEGROUND WORKPLACES

In 2001 the Institute initiated a programme to direct employers responsible for aboveground workplaces in high radon areas to measure radon in accordance with Article 30 (1) of S.I. No. 125 of 2000. In order to prioritise workplaces with the highest risk, the Institute is, in the first instance, targeting workplaces located in Grid Squares where the National Radon Survey predicted that more than 10% of dwellings have radon concentrations in excess of 400 Bq/m³, the national Reference Level for workplaces.

In July the RPII wrote to 1305 workplaces in the National Grid square containing the town of Ennis, Co. Clare, directing the employers concerned to measure radon. Following this in November letters were sent to 1800 addresses in Tralee, Co. Kerry. The direction letter set out employers' obligations under the new legislation and directed them to measure radon and to submit the



Real-time radon monitoring equipment is used to measure short variations in indoor radon



results of those measurements to the Institute within six months. The issue of the direction letters was accompanied by local press releases and briefing meetings in Ennis and Tralee organised for local employers with the assistance of the Irish Business and Employers Confederation (IBEC).

UNDERGROUND WORKPLACES

During 2001, the Institute issued directions to measure radon to employers responsible for a range of underground workplace types including working mines, show-caves, underground heritage centres and a caving training centre which runs caving courses in non-commercial caves. From earlier work it was known that some show-caves have radon levels considerably in excess of the Reference Level, radon concentrations as high as 20,000 Bq/m³ having been measured. By contrast, measurements completed up to the end of 2001 in the working areas of operational mines indicate radon concentrations in the range of a few tens to 280 Bq/m³. The relatively low radon concentrations in mines are not surprising given the high ventilation rates typical of these workplaces.

Assessing radon exposure of staff in show-caves on the basis of area monitoring is sometimes difficult because of the seasonal nature of the work, intra-cave variation in radon concentrations and differences in the amount of time spent in different parts of the cave system when conducting tours. Consequently in January 2001 the Institute advised employers responsible for two of the show-caves and the caving training centre to implement a programme of personal monitoring covering one full season in order to assess the extent of radon exposure of staff. Measurements completed by the end of December 2001 indicate that in both show-caves some staff may be liable to receive an annual exposure in excess 6 mSv and, as such, must be subject to more stringent protection measures.

COSMIC RADIATION

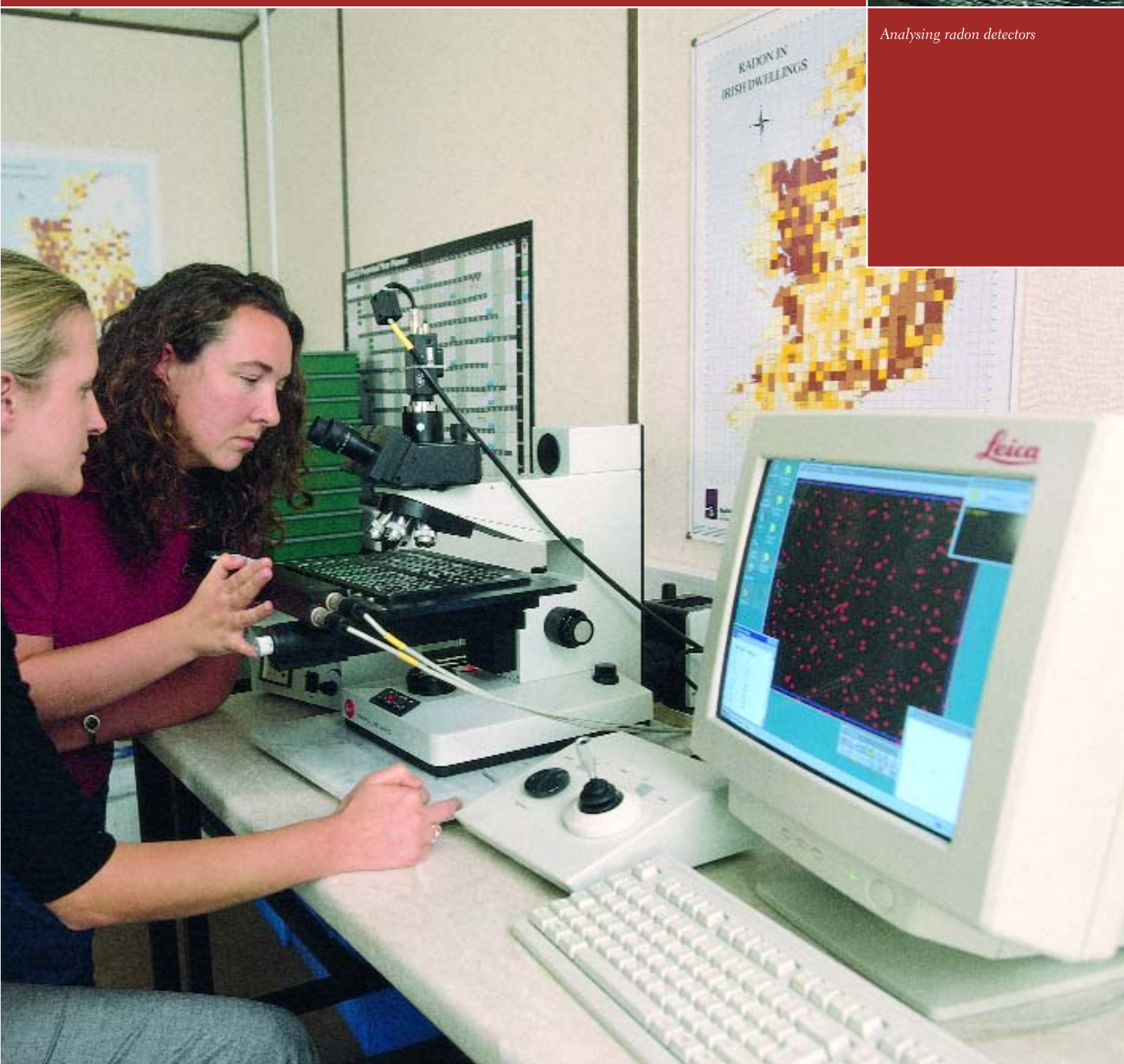
In January 2001 the Institute published its guidance document "Protection of Air Crew from Cosmic Radiation". This document sets out practical steps to be followed by aircraft operators in order to comply with S.I. No. 125 of 2000. In line with current legislation, Irish airlines are continuing to evaluate the doses received by aircrew in order to determine whether or not additional measures to control exposure to cosmic radiation will need to be put in place.

Table 2: Radon in Schools: Percentage of schools with radon concentrations in at least one classroom above 200 Bq/m³

COUNTY	NUMBER OF SCHOOLS MEASURED	% OF SCHOOLS
Carlow	51	35 %
Cavan	87	6 %
Clare	116	18 %
Cork	389	38 %
Donegal	166	23 %
Dublin	496	22 %
Galway	251	43 %
Kerry	158	22 %
Kildare	114	18 %
Kilkenny	91	31 %
Laois	61	10 %
Leitrim	42	5 %
Limerick	148	19 %
Longford	48	21 %
Louth	83	22 %
Mayo	178	29 %
Meath	113	24 %
Monaghan	67	10 %
Offaly	67	22 %
Roscommon	84	27 %
Sligo	73	19 %
Tipperary	168	20 %
Waterford	88	38 %
Westmeath	82	20 %
Wexford	111	37 %
Wicklow	100	39 %



Analysing radon detectors



EMERGENCY PLANNING

The increased concern, following September 11th, regarding the vulnerability of nuclear installations to terrorist attack has focused attention worldwide on the need for comprehensive nuclear emergency plans.

A programme of review of the National Emergency Plan for Nuclear Accidents culminated in two exercises of the Plan. The first, a table-top exercise, took place on the 4th of July, and was designed to be a learning opportunity in preparation for the second exercise. The second exercise, which was held on the 10th of November, was a more comprehensive and realistic emergency simulation based on a major release from a nuclear reactor in North Wales as a result of earthquake damage. The exercises were organised by Environmental Resources Management (ERM), a consultancy firm engaged for the purpose by the Department of Public Enterprise.

Both exercises were hosted by the Institute at its offices in Clonskeagh. There were 36 participants in the November exercise, including 20 Institute staff members and 11 representatives of other departments and agencies which are represented on the Emergency Response Co-ordination Committee (ERCC), which is the core nuclear emergency management committee.

The Institute, under the plan, has various roles in the event of a nuclear emergency. Over the course of the two exercise days most of these functions were simulated including: emergency notification procedures and activation of the Plan; participation in the ERCC; technical assessment of the nuclear accident scenario and prediction of the potential impact in Ireland; advice to the Government and information to the media and the public.

Both exercises, but especially the second, were realistic and rigorous. The accident scenarios tested the capacity of the Plan and the competence of the participants. In addition, the demands placed on the participants by the exercise organisers gave a sense of the physical and mental pressure that would be encountered in a real emergency situation.

The exercises provided a valuable learning opportunity for all participants as well as a platform for evaluating the procedures that make up the emergency response. A number of areas requiring review were identified. These include the location of the control centre for emergency response and the arrangements for providing information to the public. A significant conclusion of the exercises was the recognition, by ERM, of the strength of the Institute's expertise and the competence of its staff. The report on the exercises will provide an important basis upon which to continue to develop the role of the Institute in the National Emergency Plan.

Regular testing of the two international notification systems for early notification of nuclear accidents took place throughout the year. These notification systems are operated by the International Atomic Energy Agency and by the European Union respectively. The testing was fully successful in that all messages sent were received and dealt with promptly in accordance with pre-defined protocols.

The Institute continued to exchange summarised national gamma dose rate data with EU and non-EU States through the EU Joint Research Centre at Ispra. In the event of a nuclear accident abroad such data will be exchanged every two hours, thereby providing an early indication of the magnitude and extent of the radioactive release.

These data will also be entered into the Institute's computer decision support system ARGOS (Accident Reporting and Guiding Operational System) to provide estimates of the potential impact on Ireland, thereby making available to decision-makers the information they require in planning the national response to the accident.



*A gamma dose rate detector - part of
the National Radiation
Monitoring Network*



REGULATORY SERVICE

Throughout 2001, the Regulatory Service of the Institute continued its efforts to ensure that all practices involving the use of ionising radiation are carried out in a safe manner.

LICENSING AND INSPECTION

The number of licence holders at the end of 2001 was 1319, which compares with 1313 at the end of 2000. Eighty-four inspections of licensees were carried out. The breakdown of licences and inspections by licence category is given in Table 3.

Table 3: Licence categories and inspections, 2001

LICENCE	LICENCES	INSPECTIONS
Process Irradiation Facilities and Cyclotron	4	3
Industrial Radiography	27	5
Industrial Gauges	128	33
Lightning Preventors	10	6
Industrial Instruments	84	5
Miscellaneous	16	7
Hospitals/Medical	113	15
Laboratories	33	7
Distributors	55	0
Dental Surgeons	722	3
Veterinary Surgeons	121	0
Chiropractors	6	0
TOTAL	1319	84

INCIDENTS

A number of incidents requiring investigation by the Institute occurred during the year.

The most serious of these involved a significant dose to a person. In this incident, which occurred in December, a person who was assisting a veterinary surgeon while performing X-ray examinations of horses on a stud farm, received a dose of 15.9 mSv. It appears, from information provided by the management of the stud farm, that the dose was received as a result of holding the film cassettes. This constitutes a clear violation of the Institute's Code of Practice in Veterinary Radiology which stipulates that, where it is necessary to hold X-ray cassettes, a device shall be used which allows the holder to stand outside the X-ray beam. The Regulatory Service has written to the veterinary surgeon and the stud farm, advising them of the importance of complying with the Code of Practice so as to avoid exposure to the X-ray beam. All other veterinary surgeons who are licensed to hold X-ray equipment, have also been advised of the occurrence of this incident and of the precautions necessary to prevent a recurrence.

In January, the Institute was notified that a soil-testing laboratory, in which a nuclear moisture density gauge was housed, had been vandalised. The laboratory was not in use at the time. An inspector visited the site and found that the gauge had been removed from its transport case. The inspector confirmed that the sources within the gauge were undamaged, although the transport case was

missing. The gauge was removed to a safe location. Following this incident, the specific conditions pertaining to disused sources were strengthened, requiring licensees to put in place enhanced measures to prevent unauthorised access to such sources.

Also in January, the Institute was notified by the company Radiological Protection Officer (RPO) of a fire at the Irish Ispat plant in Cork. The RPO indicated that the fire had not affected any of the licensed sources, but that a number of check sources, below licensable activity, had been in a room adjacent to the fire. An inspector visited the site to evaluate the radiological consequences of the fire. He established that the fire had not affected the licensed radioactive sources, but that one of the five low-activity check sources was missing. The missing source was recovered some weeks later.

In February, The Institute was notified by a hospital's Radiological Protection Adviser (RPA) of a fault in a diagnostic X-ray machine in which the exposure failed to terminate at the pre-set time. On noticing the fault, the radiographer reacted quickly to shut the unit down manually. From the X-ray film it was clear that overexposure of the patient had occurred but that, fortunately, it was not significant. The Institute notified hospitals using similar equipment of the incident. The investigation carried out by the manufacturer, which involved operating the equipment in different modes, failed to demonstrate a recurrence of the fault. It did find, however, that under certain circumstances, the X-ray

warning light could remain on and the warning sound continue, after the exposure terminated. The manufacturer fitted a modification to all such X-ray units to prevent the occurrence of this fault.

Also in February, an inspector visited a licensed industrial user to investigate a reported dose of 212 mSv to a member of staff. The inspector found nothing to suggest that the staff member had actually received the dose. He concluded that the staff member's dosimeter had been deliberately placed on the X-ray machine and that the dosimeter, and not the staff member, had received the dose.

In a similar incident in March, a dose of 14 mSv was reported to have been received by a person working in a dental surgery. Following a visit to the surgery, the inspector concluded that the person did not, in fact, receive the dose. During the visit, however, the inspector found that the three X-ray units at the surgery were unlicensed. A prosecution on the matter is pending.

In April, in two separate incidents, radioactive material was discovered in consignments of scrap metal entering the Irish Ispat steel plant. In both cases, the dose rates from the consignments were low enough to permit their return to the originating suppliers. In the first incident, an inspector found the source to be a damaged lightning preventor containing radium-226. The Institute contacted all licensees holding lightning preventors in an attempt to determine the origin of the preventor, but this could not be



RPII inspectors checking radioactive sources



established. The source is now held under licence at a scrap merchant's yard. In the second incident, the material was identified as low activity naturally occurring radioactive material not requiring a licence.

In May, the Institute became aware of the concerns of staff in a large hospital that they had been exposed to radiation through the incorrect use of mobile X-ray equipment in the hospital. The X-ray unit in question was operated under licence by a company external to the hospital. The company had failed to consult the hospital's RPA before using the equipment and this had resulted in the equipment being used in a theatre that was not designated for such use. The Institute's investigation concluded that doses to staff in the theatre area were very low for the period in question, but an enquiry into other aspects of the matter is continuing.

Also in May, the Institute was notified of an incident at a factory where industrial radiography was being carried out. In order to avoid unnecessary exposure of individuals, it is a requirement that an area, surrounding the area in which radiography is taking place, is delineated and that access to it is controlled. In this case, a person working late in an office had remained in the controlled area while radiography was underway. An inspector visited the factory and reconstructed the circumstances of the exposure. Measurements indicated that the dose received by the person would have been very low, of the order of 0.25 microsieverts (μSv). Nonetheless the company was instructed to ensure that its procedures were adequate and to purchase louder alarms, which would warn those in the area that radiography was being undertaken.

In June, an inspector visited an industrial licensee after several anomalous readings were recorded on the dosimeters assigned to one particular X-ray machine. The investigation concluded that the unit was operating safely. The possibility that someone had deliberately placed the dosimeter in the X-ray machine seemed the most likely explanation for the readings.

In December, a dental surgery was inspected following a complaint from a patient who had received X-rays at the surgery. The patient was unwell and suggested that the X-rays may have caused this condition. The inspection determined that the performance of the X-ray machine in question complied fully with the standards outlined in the Institute's Code of Practice for Radiological Protection in Dentistry, and was satisfied that the patient's symptoms were not linked to the X-ray machine. The X-ray unit was, however, unlicensed and a prosecution in relation to this matter is pending.

PROSECUTIONS

During the year the Institute obtained convictions against two licensees for breaches of the licensing regulations.

In the first case, a private medical clinic was convicted and fined for the unlicensed custody of an X-ray machine.

The second arose from an incident, reported in the 2000 Annual

Report, in which a licensed industrial company, inadvertently disposed of three industrial gauge systems each containing 1.65 gigabecquerels (GBq) of americium-241. The company was convicted and the maximum fine was imposed.

RADIOACTIVE WASTE

The Regulatory Service continued to encourage holders of disused radioactive sources to return them to the supplier in the country of origin. During the year, a very positive development was the agreement reached by a licensee with a UK-based company for the decommissioning and removal of a disused irradiator containing 12 terabecquerels (TBq) of caesium-137, which was held at a location in Dublin.

The operation involved the dismantling of the irradiator and transfer of the source to an approved transport container. The Regulatory Service issued the necessary licence only after it had critically evaluated and approved the safety of the operation, as detailed in a comprehensive submission prepared by the UK contractors.

The Regulatory Service also took a lead role in coordinating the return of lighting preventors from four licensees to the UK.

The use of very low activity sources in post-primary schools has been declining in recent years. Many of these radioactive sources have become disused and are no longer required. During the year the Regulatory Service collaborated with the Department of Education and Science in a survey of the number and types of radioactive material in post-primary schools. Accurate information will permit the evaluation of the suitability of disposal options that might be considered for these sources.

LECTURES AND PRESENTATIONS

As in previous years, staff of the Institute were invited to address the Radiological Protection Course at University College Galway, as well as the Diploma in Safety, Health & Welfare at Work (Occupational Hygiene) at University College Dublin. Two participants taking the diploma subsequently accompanied Regulatory staff undertaking inspections, as part of a course placement, as well as touring the Institute's laboratories.

Presentations were also given to non-radiology hospital doctors at Cork University Hospital and to staff at Trinity College, Dublin. In addition, staff were invited to lecture at in-house Radiation Protection Seminars organised by Becton Dickinson Ltd and the Institute.

These presentations provide the Regulatory Service with excellent opportunities to communicate with a range of users of ionising radiation in industry, education and medicine and also with safety officers and other personnel who, while not directly involved with the use of such sources, require a basic knowledge of the principles of radiological protection.



Calibration of a radiation monitor

DOSIMETRY SERVICE

The Institute provides a range of personal dosimetry services for assessing occupational exposure to ionising radiation in Ireland. The Service is accredited for individual dose monitoring by the Irish National Accreditation Board (NAB). Some 6500 workers were monitored in 2001.

The dosimeter types available include whole-body dosimeters capable of determining the dose from X- or gamma rays or neutrons, and extremity dosimeters that measure the dose from X-, gamma or beta rays. During 2001, a total of 60,245 whole-body thermoluminescent dosimeters (TLDs), 3503 extremity dosimeters and 702 neutron dosimeters were issued. These may be compared with the figures for 2000 when 56,720 whole-body TLDs, 3086 extremity dosimeters and 948 neutron dosimeters were issued.

The highest monthly whole-body dose recorded in 2001 was 15.9 mSv. This was received by a veterinary assistant and was a result of his work on a stud farm. This may be compared with the annual whole-body dose limit of 20 mSv for radiation workers.

Measurable extremity doses were recorded by personnel working in research and in the cardiology, radiotherapy and nuclear medicine departments of hospitals. A hospital physicist received the highest annual extremity dose of 81 mSv. This value may be compared with the annual dose limit of 500 mSv for the hands, forearms, feet and ankles of radiation workers.

Mindful of the benefits of sharing experiences in running dosimetry laboratories, the Service continued to participate in the European Radiation Dosimetry Group (EURADOS), which stimulates collaboration between European laboratories in the field of dosimetry.

INSTRUMENT CALIBRATION SERVICE

The Institute offers a calibration service for ionising radiation dose/dose-rate meters, surface contamination monitors and personal monitors/alarms used to give a direct reading of radiation dose. During 2001, 322 instruments were tested, of which 12 failed to meet the manufacturer's specification.

Licensees holding sealed radioactive sources are required to have them tested every two years for leakage. Testing is carried out by wiping the source or source housing and analysing the radioactivity content of the wipe. In 2001 a total of 631 sources were checked. None of the wipes contained greater than the allowable quantity of radioactivity specified in licence conditions.

During the year the Calibration Laboratory also participated in an International Atomic Energy Agency (IAEA) intercomparison for TLDs used to assess exposure to a specified dose from a caesium-137 source. Evaluation of the results showed no significant deviation between those reported by the Institute and those of the IAEA.

INTERNATIONAL LIAISON

Institute staff continued to be active in the key international organisations that develop standards and guidance on safety in the use of ionising radiation and nuclear power. These organisations include the European Union, the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD) as well as those associated with the international conventions such as the Nuclear Safety Convention, the OSPAR Convention, the London Dumping Convention and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. It is important that the Institute participates in the work of these bodies to ensure an Irish input into their work.

The Institute continued its formal exchange of information on nuclear licensing and safety issues with the Nuclear Installations Inspectorate of the UK Health and Safety Executive. It also joined the Department of Public Enterprise in formal meetings with the UK Department of the Environment, Transport and the Regions and other UK government agencies to exchange information on nuclear safety issues generally. Meetings for the exchange of information also took place with the Northern Ireland Office and with Heritage Service of the Northern Ireland Department of the Environment.

OSPAR CONVENTION ON THE PROTECTION OF THE MARINE ENVIRONMENT OF THE NORTH-EAST ATLANTIC

The Institute acts as scientific advisor to the Government on the implementation of those aspects of the Convention dealing with radioactive pollution. During 2001 particular attention was given to the OSPAR Strategy for Radioactive Substances which requires Contracting Parties to effect progressive and substantial reductions in radioactive discharges with the ultimate objective of reaching a situation whereby concentrations in the marine environment are close to zero by the year 2020. Scientists from the Institute sit on the Radioactive Substances Committee of OSPAR where scientific and technical issues related to the implementation of the Sintra Strategy are identified and discussed.

In Ireland, the discharge to the environment of radioactive materials used in medicine and research falls within the remit of OSPAR. Based on licences issued to the users of these materials, the total amount of radioactivity potentially discharged to the Irish Sea on an annual basis has been estimated as a first step towards meeting Ireland's commitments under the OSPAR Strategy.

BRITISH-IRISH COUNCIL

Jointly with the Department of Public Enterprise and the Government of the Isle of Man, the Institute prepared a Discussion paper on the operations at and radioactive discharges from Sellafield. The paper was submitted to the Environment Sectoral Group of the British-Irish Council for consideration.

UNITED NATIONS CONVENTION ON THE LAW OF THE SEA (UNCLOS)

On 25th October 2001 the Irish Government initiated legal proceedings against the UK to prevent the full commissioning of

the Sellafield MOX Plant (SMP). An international tribunal of 21 judges was convened to hear Ireland's request for an injunction pending a full hearing at a later date. These hearings took place at the UNCLOS headquarters in Hamburg on 19–20th November and a decision was handed down two weeks later on 3rd December.

Institute staff were directly involved in the Hamburg hearings and in the preparation of Ireland's case. This included reviewing the relevant sections of Ireland's Statement of Case, providing scientific briefing to Ireland's legal team and critically evaluating the UK arguments in relation to the operation of the SMP. While Ireland was unsuccessful in preventing the commissioning and operation of the SMP, the Tribunal did rule that the UK had failed to adequately consult with and take into account Ireland's views.

EUROPEAN UNION

A matter of particular concern to the EU is nuclear safety in Eastern Europe, especially in Applicant States. The Institute represents Ireland on a Working Party on Nuclear Safety (WPNS) which was established in 2000 and which is made up of representatives from both nuclear and non-nuclear member states. It held a number of meetings during 2001, which culminated in a report on the status of nuclear safety in each Applicant State. The report, which covers both nuclear installations and the regulatory infrastructure, paints a picture of a somewhat variable level of nuclear safety among Applicant States. However in the case of those States which are due to join the Union first, the report indicates that if commitments made, to carry out certain improvements, and to close those nuclear power plants which cannot be upgraded, are honoured, their standards of nuclear safety should be acceptable to the EU.

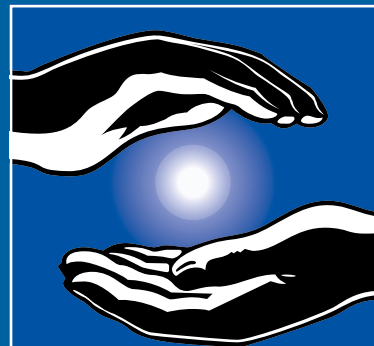
This report also includes an assessment of the standard of radiological safety in non-nuclear Applicant States, which was made by the Council Working Party on Atomic Questions. While the report identifies the need for a number of improvements in the regulatory infrastructure in non-nuclear Applicant States, no situations were identified in which the regulatory system is fundamentally flawed.

POTENTIAL TERRORIST ATTACKS ON NUCLEAR INSTALLATIONS

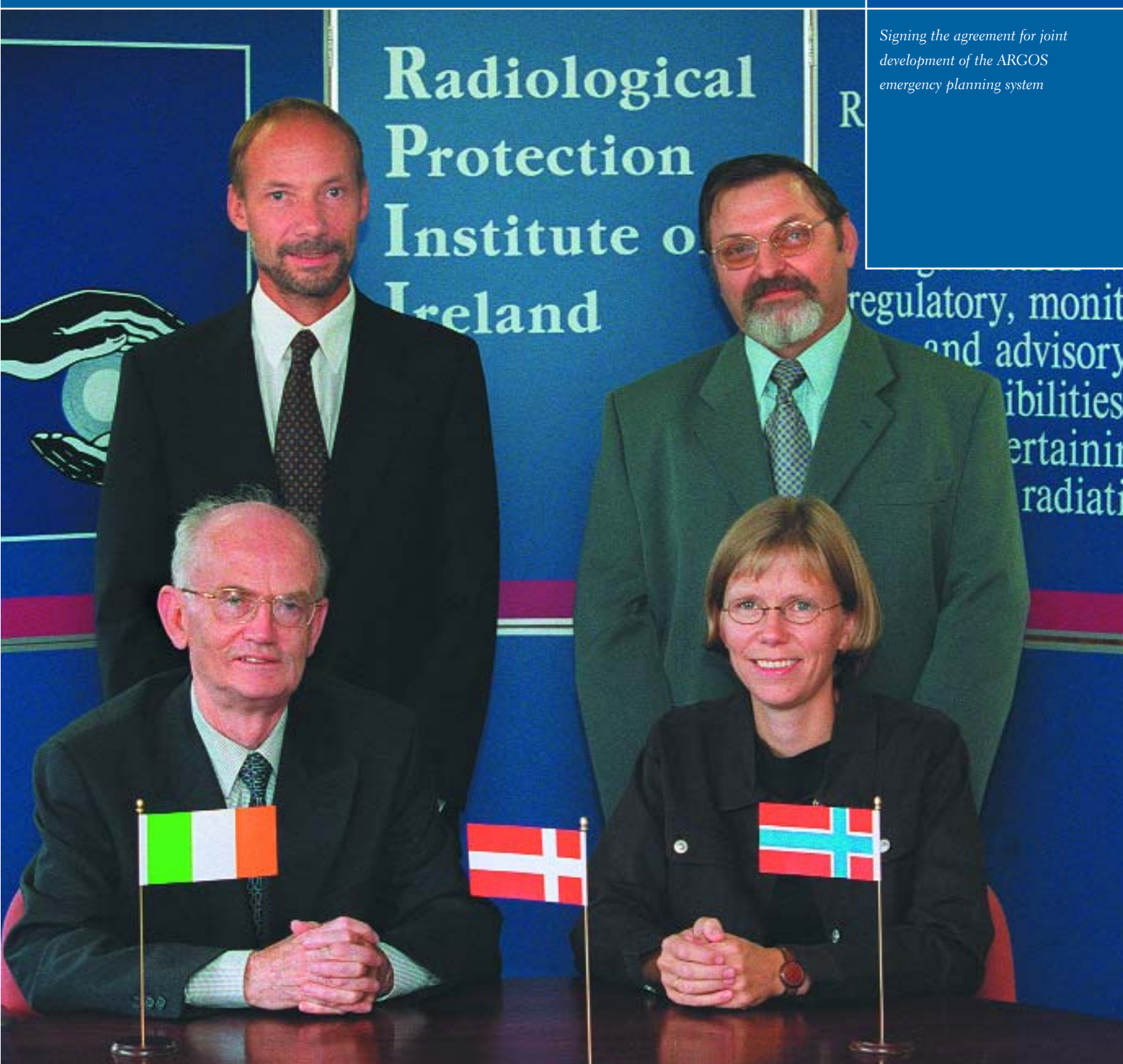
The events of September 11th have led to increased concerns regarding the vulnerability of nuclear installations in the case of terrorist attack. In Ireland the concern has focused on the storage tanks for highly active liquid radioactive waste at Sellafield and on the four Calder Hall reactors on the same site.

The heat generated by the radioactive decay of the contents of some of the tanks is so high that boiling and, ultimately, release of their contents would occur if they were not continuously cooled. The Institute is concerned that the severe fire that would be expected following a large aircraft crash could make it impossible to restore cooling before the tanks started to boil and release their contents.

In the case of the Calder Hall reactors the concern centres on the fact that the reactors are readily identifiable from the air and,



Signing the agreement for joint development of the ARGOS emergency planning system



unlike more modern reactors, have cooling circuits that are essentially unprotected from external physical assault.

The potential threat of terrorist attack only serves to reinforce the Institute's existing view that the current high level waste storage arrangements are intrinsically unsatisfactory and that the Calder Hall reactors should be closed down.

CONVENTION ON NUCLEAR SAFETY

Each country, which is a signatory to the Convention, is obliged to report on the national situation in regard to nuclear safety and radiological protection. The Institute assisted the Department of Public Enterprise in preparing Ireland's National Report that was submitted to the IAEA for presentation at the Review Meeting in April 2002.

JOINT CONVENTION ON THE SAFETY OF SPENT FUEL MANAGEMENT AND ON THE SAFETY OF RADIOACTIVE WASTE MANAGEMENT

In March 2001 Ireland ratified the IAEA Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. The Convention provides a mechanism for enhancing standards of protection of man and the environment, in the management of spent fuel and radioactive waste. Its main area of concern is the nuclear industry but nonetheless it places certain obligations on non-nuclear countries like Ireland. The Irish legislative and regulatory framework, as implemented by the Institute, satisfies Ireland's obligations, in respect of ionising radiation, under the Convention. However, the Convention also places obligations on contracting parties to make appropriate provision for the safe management of radioactive waste including, in particular, the provision of a storage facility.

INTERNATIONAL ATOMIC ENERGY AGENCY

During the year the Institute provided experts for IAEA radiological missions to Mexico, Malta and Ghana. One staff member also acted as a consultant to the Agency in preparing a training module for regulators on radiation safety in research and industrial reactors.

INCIDENTS

The Institute was informed, through the IAEA Information Service, of 34 incidents around the world in 2001, of which 13 were in the UK. The majority of the incidents occurred at nuclear installations, while a few involved the transport or mishandling of radioactive material. In the case of incidents in the UK, reports were also received from the UK authorities and from the plant operators themselves. None of the incidents had consequences directly affecting Ireland.

Two incidents which were of particular concern were a temporary blockage in the ventilation system of the storage tanks for the highly active liquid radioactive waste at Sellafield, and the dropping of some fuel elements during a defuelling operation at the Magnox nuclear power plant at Chapelcross in Scotland. While neither incident led to a release of radioactivity off-site, they increase the level of concern about the storage of highly active radioactive waste at Sellafield, and about the safety of Magnox reactors.



*Preparation of sample for
radioactivity measurement*



LIBRARY AND INFORMATION SERVICE

During 2001 the RPII continued to give priority to the promotion of its activities and to encouraging public interest in its work. The Institute continues to disseminate information through its Website, which can be found at www.rpii.ie. Work continued to develop and upgrade the Website, which provides access to a wide range of information of interest to the general public. The Institute's publications are made available in full text on its Website. Comments from member of the public on the Website have been very positive and the site continues to attract an increasing number of visitors.

During the year the Institute issued press releases on a variety of issues, including radon surveys in workplace and Institute publications, and resulting press coverage was extensive. The Radiation Safety Review newsletter was published and circulated to a wide readership. The Institute keenly co-operates with the media in reporting on issues of public concern and over 160 requests for information from the news media were met. Staff participated in radio and television programmes on over 55 occasions throughout the year.

The library at the Institute contains a specialised collection of books, reports and journals on radiological protection and nuclear safety. It services the needs of Institute staff and of researchers, students and members of the public (by appointment). When requested the Institute provided speakers for public meetings, and for specialist courses at third-level institutions, hospitals and elsewhere. Tours of the Institute's facilities were also given to interested groups of visitors.

The IAEA's International Nuclear Information System (INIS) is an information system set up by the IAEA and its Member States for the purpose of identifying publications related to nuclear science and its peaceful applications. The Institute provides the Irish Liaison Officer for the INIS system and relevant items are input to the system using software supplied by the IAEA.

PUBLICATIONS

SCIENTIFIC PAPERS

Bartlett, D.T., Ambrosi, P., Back, C., Bordy, J.M., Christensen, P., Colgan, P.A.*, De Carvalho, A.F., Delgado, A., Van Dijk, J.W., Fantuzzi, E., Hyvonen, H., Lindborg, L., Stadtmann, H., Vanhavere, F., Wernli, C. Zamani-Valasiadou, M., 2001. Harmonisation and dosimetric quality assurance in individual monitoring for external radiation.

Radiation Protection Dosimetry, **96**, p. 27-34.

Bordy, J.M., Stadtmann, H., Ambrosi, P., Bartlett, D.T., Christensen, P., Colgan, P.A.*, Hyvonen, H., 2001.

EURADOS trial performance for photon dosimetry.

Radiation Protection Dosimetry, **96**, p. 159-166.

Bordy, J.M., Stadtmann, H., Ambrosi, P., Bartlett, D.T., Christensen, P., Colgan, P.A.*, Hyvonen, H., 2001.

EURADOS trial performance for neutron personal dosimetry.

Radiation Protection Dosimetry, **96**, p. 167-174.

Bordy, J.M., Stadtmann, H., Ambrosi, P., Bartlett, D.T., Christensen, P., Colgan, P.A.*, Hyvonen, H., 2001.

EURADOS trial performance for personal dosimeters for external beta radiation.

Radiation Protection Dosimetry, **96**, p. 175-182.

Curryvan, L., Donnelly, H., Dawson, D., Spain, D., Colgan, P.A., 2001.

Analysis of whole-body doses received by occupationally exposed workers in Ireland (1996-1999).

Radiation Protection Dosimetry, **96**, (1-3), p. 53-56.

Curryvan, L., Spain, D., Donnelly, H., Colgan, P.A., 2001.

A thermoluminescence dosimetry system for personal monitoring in Ireland.

Radiation Protection Dosimetry, **96**, (1-3), p. 209-212.

Dahlgard, H., Erikson, M., Ilus, E., Ryan, T.*, McMahon, C. A., Nielsen, S. P., 2001. Plutonium in the marine environment at Thule, NW-Greenland after a nuclear weapons accident.

In **Plutonium in the Environment**. Edited Proceedings of the Second Invited International Symposium, Osaka, Japan. 9-12 November 1999. Elsevier.

McGarry, A.T., Fenton, D., O'Flaherty, T., 2001.

Regulatory Control of Radiation Sources and Radioactive Materials in Ireland. In **National Regulatory Authorities with Competence in the Safety of Radiation Sources and the Security of Radioactive Materials**. Proceedings of an International Conference held in Buenos Aires, Argentina, 11-15 December 2000. International Atomic Energy Agency, p. 265-270.

Rafferty, B., 2001.

FORIA: Forest Impact Analysis - An interactive decision support software providing information on the secondary effects of radiological countermeasures applied in forests.

Journal of Environmental Radioactivity, **56**, (1-2), p. 209-214.

Salt, C.A., Rafferty, B.*, 2001.

Assessing potential secondary effects of countermeasures in agricultural systems: a review.

Journal of Environmental Radioactivity, **56**, (1-2), p. 99-114.

Smith, V., Fegan, M., Pollard, D., Long, S., Hayden, E., Ryan, T.P., 2001.

Technetium-99 in the Irish marine environment

Journal of Environmental Radioactivity, **56**, (3), p. 269-284.

*RPII staff in conjunction with other authors

GENERAL ARTICLES

Dowdall, A., Ryan, T., 2001.

Radionuclide remobilization from sediments.

The Irish Scientist 2001 Yearbook (9), p. 72.

O'Flaherty, T., 2001.

Well-organised response could limit damage if Sellafield nightmare comes true.

The Irish Times, 6 November 2001, p.12.

NEWSLETTERS

Radiation Safety Review, Issue 5, 2001.

BROCHURES

The RPII Dosimetry Service: how it operates.

Radon: radiation in workplaces.

radiation safety review

A Radiological Protection Institute of Ireland Newsletter Issue 5 2001

Welcome to the fifth issue of *Radiation Safety Review*, the newsletter of the Radiological Protection Institute of Ireland. Since the last issue, the terms of office of a number of RPII Board members expired. The current Board members are as follows: Dr Francis J. Mulligan (Chairman), Dr William Blumie, Mr Gregory Burke, Ms Mary Coffey, Dr Patrick Connolly, Ms Anita Dowling, Dr Edward Fitzgerald, Mr James Gibney, Dr Lesley Malone, Ms Darina Mackian, Mr Francis Turvey. The Institute expresses its gratitude to Dr George Duffy and Ms Adi Roche, who have retired from the Board.

John D. Cunningham, Deputy Chief Executive, retired from the RPII on 15th August, after 25 years dedicated service to the Institute and its predecessor the Nuclear Energy Board. We are sure all our readers will join with the Board and staff of the Institute in wishing John and

his wife Joy a long and happy retirement.

This issue of *Radiation Safety Review* highlights recent legislation, which governs the regulation of radon sources, and Ann McGarry draws attention to resulting licensing requirements. The same legislation brings natural radon sources into the area of regulatory control and David Pollard introduces the subject of protection of air crew from exposure to cosmic radiation.



Lorraine Carrigan and Alison Dowdall and Tom Ryan report on the Institute's involvement in the marine radioecology research project, REMOTRANS.

In another article Christopher Hone highlights concerns in regard to nuclear safety in a number of candidate countries to the European Union and discusses the measures being taken to address the situation.

Radiation doses received by workers in Ireland are discussed in an article by

We welcome your views and comments on the newsletter, which should be addressed to Marie Kelly, Radiological Protection Institute of Ireland, 3 Clonsilla Square, Dublin 14. mkelly@rpii.ie

REMOTRANS

The RPII is participating with 12 laboratories from eight European countries in a marine radioecology project called REMOTRANS. The acronym stands for Processes Regulating Remobilization, Bio-availability and Trans-location in Marine Sediments. This project is partially funded by the European Union under its fifth framework research programme in the area of "Fission Safety".

The principal aim of the project is to study the exchange of radionuclides between contaminated marine sediments and seawater in different marine environments. The fundamental mechanisms of such remobilisation will be examined and the long-term radiological consequences will be evaluated. It is anticipated that the results and conclusions of the project will provide a more precise description of the

long-term effects of past and present radioactive discharges on the environment and on man. It is further anticipated that the results and conclusions will contribute to radioactive waste management and the control of discharges of radioactive material into the marine environment.

An important starting point for the project is to assess the existing inventories of radionuclides in the sediments of contaminated regions. The RPII's role within the project is to provide an improved estimate of the inventory of plutonium in the sediments of the Irish Sea which are a potential long-term source of radionuclides. It is well established that radionuclides such as the isotopes of plutonium discharged from Sellafield react with particles in the water column and are transported to the fine grain sediments on the sea floor. Consequently much of the discharges of these radionuclides have remained in the muddy sediments off the English coast. However accumulation of these radionuclides has also been observed

in the muddy sediments in the Irish Sea and it is this fraction RPII will quantify.

Sediment samples from two using the Marine Instrumented, the Celtic Voyager, and research vessel, the Gaois, being analysed in RPII's involves sectioning the analysing the sections and calculating the content of each core. Elements will also be determined in biota samples to determine isotopes in Ireland in order to study the dynamics of the long-range transport of remobilised radionuclides.

The project commenced in November 2000 and the duration of the project is three years.

Alison Dowdall and Tom Ryan
adowdall@rpii.ie tryan@rpii.ie



radon

RADIATION IN HOMES

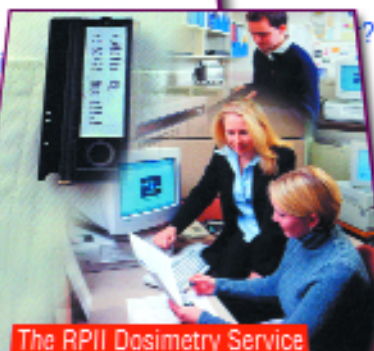
What is it?
What harm can it do?
What can be done about it?

Recent RPII publications

radon

RADIATION IN WORKPLACES

What is it?
What harm can it do?
What are an employer's responsibilities?



The RPII Dosimetry Service
How it Operates



Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raidheolaíoch

ADVISORY COMMITTEES

ENVIRONMENTAL RADIATION

This Committee provides advice on radioactivity in the environment and on the co-ordination with other bodies of joint work programmes in this area.

Chairman	Gregory Burke Tony Colgan John D. Cunningham (retired 2001) Dermot Howett (appointed 2002) Ian R. McAulay Ann McGarry James P. McLaughlin Peter I. Mitchell Darina Muckian Tom O'Flaherty (retired 2002) Geraldine O'Reilly David Pollard Wil van der Putten Barbara Rafferty (appointed 2002) William Reville Adi Roche Philip Walton
Scientific Secretary	Tom Ryan

MEDICAL RADIATION

This Committee advises the Board on the uses of ionising radiation in medicine and dentistry.

Chairman	George Duffy Fionnuala Barker David Clarke Mary Coffey John D. Cunningham (retired 2001) Edward Fitzgerald Christopher Hone Lynn Johnston Pat Kenny Brendan McClean Ann McGarry Lesley Malone James Masterson Kate Matthews Michael Moriarty Dan Murphy Liam Murray Tom O'Flaherty (retired 2002) Geraldine O'Reilly Wil van der Putten Stephanie Ryan (appointed 2002)
Scientific Secretary	David Fenton

REPORT OF THE COMPTROLLER AND AUDITOR GENERAL

I have audited the financial statements on pages 35 to 39 under Section 16 of the Radiological Protection Act, 1991.

Respective Responsibilities of the Institute and the Comptroller and Auditor General

The accounting responsibilities of the Institute are set out in the Statement of Responsibilities of the Institute on page 34. It is my responsibility, based on my audit, to form an independent opinion on the financial statements presented to me by the Institute and to report on them.

Basis of Audit Opinion

In the exercise of my function as Comptroller and Auditor General, I conducted my audit of the financial statements in accordance with auditing standards issued by the Auditing Practices Board and by reference to the special considerations which attach to State bodies in relation to their management and operation.

An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgements made in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Institute's circumstances, consistently applied and adequately disclosed.

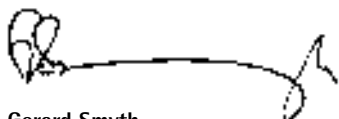
I planned and performed my audit so as to obtain all the information and explanations that I considered necessary to provide me with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement whether caused by fraud or other irregularity or error. In forming my opinion I also evaluated the overall adequacy of the presentation of information in the financial statements.

Pension Costs

Without qualifying my opinion, I draw attention to accounting policy 4 on page 35 of the financial statements which explains why the Institute was unable to comply with the disclosure requirements of FRS 17.

Opinion

In my opinion, proper books of account have been kept by the Institute and the financial statements, which are in agreement with them, give a true and fair view of the state of affairs of the Radiological Protection Institute of Ireland at 31 December 2001 and of its income and expenditure for the year then ended.



Gerard Smyth
For and on behalf of the
Comptroller and Auditor General


4 November 2002

STATEMENT OF RESPONSIBILITIES OF THE INSTITUTE

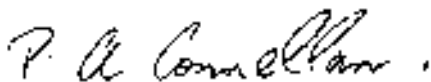
Section 16(1) of the Radiological Protection Act, 1991, requires the Institute to prepare financial statements in such form as may be approved by the Minister with the concurrence of the Minister for Finance. In preparing these financial statements, the Institute is required to:

- Select suitable accounting policies and then apply them consistently
- Make judgments and estimates that are reasonable and prudent
- Prepare financial statements on the going concern basis unless it is inappropriate to presume that the Institute will continue in operation
- State whether applicable accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements.

The Institute is responsible for keeping proper books of accounts which disclose with reasonable accuracy at any time the financial position of the Institute and which enable it to ensure that the financial statements comply with section 16(1) of the Act. The Institute is also responsible for safeguarding the assets of the Radiological Protection Institute of Ireland and for taking reasonable steps for the prevention and detection of fraud and other irregularities.



Francis J Mulligan
Chairman



PA Connellan
Board Member

STATEMENT OF ACCOUNTING POLICIES

1. Basis of Accounting

The Financial Statements are prepared on an accruals basis, except as stated below, and under the historical cost convention, in accordance with generally accepted practice. Financial reporting standards recommended by the recognised accountancy bodies are adopted as they become applicable. The unit of currency in which the financial statements are denominated is Euro.

2. Income

Income shown in the Financial Statements under Oireachtas grants represent actual cash receipts in the year.

3. Fixed Assets

Fixed Assets are stated at cost less accumulated depreciation. Depreciation is calculated on a straight line basis by reference to the expected useful lives of the assets concerned. The rates used are as follows:

Office & Laboratory, Furniture & Equipment: 20%

Motor Vehicles: 20%

Leasehold improvements are depreciated over the life of the lease.

4. Superannuation

A Superannuation Scheme under Section 14 of the Nuclear Energy (An Bord Fuinnimh Nuicleigh) Act 1971 was in operation up to 31st March 1992. A new scheme has been drawn up in accordance with the provisions of Section 13 of the Radiological Protection Act, 1991 and is awaiting final approval. Contributions of 98,048 euro in 2001 were credited against salaries. No provision has been made in the Financial Statements in respect of future superannuation liability. Superannuation benefits are met from revenue as they arise.

The Institute operates a defined benefit superannuation scheme for its employees. Superannuation entitlements arising under the scheme are paid out of current income and are charged to the Income and Expenditure Account in the year in which they become payable. No provision is made in the financial statements in respect of future benefits. Salaries and Wages are charged in the financial statements net of employee superannuation contributions.

The above accounting treatment is not in accordance with the requirements of Financial Reporting Standard 17. For accounting periods ending on or after 22 June 2003 the Standard will require financial statements to reflect at fair value the assets and liabilities arising from an employer's superannuation obligations and any related funding and to recognise the costs of providing superannuation benefits in the accounting periods in which they are earned by employees. As a transitional measure the Standard requires that the present value of scheme liabilities be disclosed in the notes to the 2001 financial statements. In 2001 the Institute was not in a position to comply with the requirements of FRS 17 as it did not obtain an actuarial valuation of the scheme's liabilities.

5. Capital Account

The Capital Account represents the unamortised amount of income used to purchase fixed assets.

6. Contract Income

Contract Income includes amounts received from the European Community under contracts for fixed periods. Amounts received under these contracts have been treated as deferred credits, and released as income proportionately over the lives of the related contracts.

7. Income in Advance

Income in advance relates to licence fee income paid in advance by licensees in respect of future periods.

8. Stocks

These relate to the Dosimetry Service, and are stated at the lower of cost or net realisable value.

INCOME AND EXPENDITURE ACCOUNT

FOR THE YEAR ENDED 31 DECEMBER 2001

2000 £	2000 €		2001 €
		INCOME	
1,746,000	2,216,963	Oireactas Grant in Aid	2,641,055
18,619	23,641	Transfer (to)/from Capital Account (Note 2)	(9,778)
<u>1,764,619</u>	<u>2,240,604</u>		<u>2,631,277</u>
196,334	249,293	Dosimetry	238,325
177,545	225,436	Product Certification	234,633
224,183	284,654	Contract Income	166,233
1,707	2,167	Interest Income	768
35,405	44,955	Other Income	78,720
93,606	118,855	Licence Fees	124,319
<u>728,780</u>	<u>925,360</u>		<u>842,998</u>
<u>2,493,399</u>	<u>3,165,964</u>		<u>3,474,275</u>
		EXPENDITURE	
1,374,079	1,744,720	Salaries and Pensions (Note 3)	1,828,618
108,247	137,445	Dosimetry Service	144,995
51,465	65,347	Library and Information Service	69,434
66,583	84,543	Radon and Radioecology	53,231
32,775	41,616	Emergency Plan	29,469
80,762	102,547	Environmental Monitoring	97,285
308,999	392,348	Accommodation and Insurance (Note 4)	403,755
87,667	111,314	Travel and Subsistence	118,284
95,431	121,172	Telephone, Postage and Office Supplies	127,374
28,705	36,448	Recruitment and Training	94,067
14,372	18,247	Miscellaneous including Professional Fees	50,625
5,500	6,985	Audit Fees	9,750
210,069	266,733	Depreciation (Note 1)	279,099
<u>2,464,654</u>	<u>3,129,465</u>		<u>3,305,986</u>
28,745	36,499	SURPLUS FOR YEAR	168,289
<u>224,220</u>	<u>284,700</u>	Balance at 1 January	<u>321,203</u>
<u>252,965</u>	<u>321,199</u>	Balance at 31 December	<u>489,492</u>

The Institute had no gains or losses in the financial year or the preceding financial year other than those dealt with in the Income and Expenditure Account. The results of the year relate to continuing operations.

The Statement of Accounting Policies and Notes 1 to 6 form part of these Financial Statements.

Chairman:



Date: 23 October 2002

Board Member:



Date: 23 October 2002

BALANCE SHEET

AS AT 31ST DECEMBER 2001

2000 £	2000 €		NOTES	2001 €
784,237	995,777	FIXED ASSETS	1	1,005,153
		CURRENT ASSETS		
299,470	380,248	Cash on Hand & at Bank		597,603
161,502	205,065	Debtors and Prepayments		262,718
40,823	51,835	Stocks		-
<u>501,795</u>	<u>637,148</u>			<u>860,321</u>
		CREDITORS - amounts falling due within one year		
(208,830)	(265,159)	Creditors & Accruals		(217,475)
(40,000)	(50,790)	Income in Advance		(152,952)
<u>(248,830)</u>	<u>(315,949)</u>			<u>(370,427)</u>
252,965	321,199	NET CURRENT ASSETS		489,894
<u>1,037,202</u>	<u>1,316,976</u>	NET ASSETS		<u>1,495,047</u>
		Financed By:		
252,965	321,199	INCOME & EXPENDITURE ACCOUNT		489,492
784,237	995,777	CAPITAL ACCOUNT	2	1,005,555
<u>1,037,202</u>	<u>1,316,976</u>			<u>1,495,047</u>

The Statement of Accounting Policies and notes 1 to 6 form part of these Financial Statements.

Chairman: 

Date: 23 October 2002

Board Member: 

Date: 23 October 2002

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31ST DECEMBER 2001

1 TANGIBLE FIXED ASSETS

	LEASEHOLD IMPROVEMENTS IR£	OFFICE AND LABORATORY FURNITURE AND EQUIPMENT IR£	MOTOR VEHICLES IR£	TOTAL IR£
Cost:				
At 1st January 2001	620,837	3,249,602	17,415	3,887,854
Additions	—	227,194	—	227,194
Disposals	—	—	—	—
At 31 December 2001	<u>620,837</u>	<u>3,476,796</u>	<u>17,415</u>	<u>4,115,048</u>
Depreciation:				
At 1st January 2001	257,713	2,838,939	6,966	3,103,618
Charge for year	20,175	196,151	3,483	219,809
On disposals	—	—	—	—
At 31 December 2001	<u>277,888</u>	<u>3,035,090</u>	<u>10,449</u>	<u>3,323,427</u>
Net Book Value at				
31 December 2000	<u>363,126</u>	<u>410,663</u>	<u>10,449</u>	<u>784,238</u>
Net Book Value at				
31 December 2001	<u>342,949</u>	<u>441,707</u>	<u>6,966</u>	<u>791,622</u>

1 TANGIBLE FIXED ASSETS

	LEASEHOLD IMPROVEMENTS €	OFFICE AND LABORATORY FURNITURE AND EQUIPMENT €	MOTOR VEHICLES €	TOTAL €
Cost:				
At 1st January 2001	788,301	4,126,144	22,112	4,936,557
Additions	—	288,477	—	288,477
Disposals	—	—	—	—
At 31 December 2001	<u>788,301</u>	<u>4,414,621</u>	<u>22,112</u>	<u>5,225,034</u>
Depreciation:				
At 1st January 2001	327,228	3,604,709	8,845	3,940,782
Charge for year	25,617	249,060	4,422	279,099
On disposals	—	—	—	—
At 31 December 2001	<u>352,845</u>	<u>3,853,769</u>	<u>13,267</u>	<u>4,219,881</u>
Net Book Value at				
31 December 2000	<u>461,075</u>	<u>521,435</u>	<u>13,267</u>	<u>995,777</u>
Net Book Value at				
31 December 2001	<u>435,456</u>	<u>560,852</u>	<u>8,845</u>	<u>1,005,153</u>

NOTES ON THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31ST DECEMBER 2001 (continued)

2 CAPITAL ACCOUNT		2001
		€
Balance at 1 January 2001		995,777
Transfer from Income and Expenditure Account:		
Grants allocated for Capital Purposes	288,877	
Grants amortised in year	<u>(279,099)</u>	
	9,778	
Balance at 31st December 2001		<u><u>1,005,555</u></u>

3 SALARIES AND PENSIONS	2000	2001
	€	€
Gross Salaries	1,793,731	1,866,347
Employers PRSI	51,597	60,319
Pension Deductions	<u>(100,608)</u>	<u>(98,048)</u>
	<u>1,744,720</u>	<u>1,828,618</u>
Breakdown of Salaries and Pensions		
Administration	283,424	381,907
Regulation/Dosimetry/Licensing	432,167	441,306
Environmental Monitoring	384,518	374,563
Information/Radon/Radioecology	433,419	401,186
Emergency Plan	157,605	175,642
Nuclear Safety	<u>53,587</u>	<u>54,014</u>
Charged to Income and Expenditure Account	<u>1,744,720</u>	<u>1,828,618</u>

The average number of full-time permanent persons employed, excluding Board members, in the financial year was 45 (2000 – 42)

4 COMMITMENTS & LEASE OBLIGATIONS – OPERATING LEASES

3 Clonskeagh Square

Lease commitments payable in the next twelve months amount to 247,599 euro on the basis of current rental rates and comprise rental payments on a leasehold interest, the term of which expires on 1 October 2018. The rental is subject to review at five-yearly intervals. The last such review was at 1 October 1998.

Floor 1, Block 1, 1 Clonskeagh Square

Lease commitments payable in the next twelve months amount to 12,697 euro on the basis of current rental rates and comprise rental payments on a leasehold interest, the term of which expires on 11 January 2002.

5 BOARD MEMBERS' INTERESTS

The Board adopted procedures in accordance with guidelines issued by the Department of Finance in relation to the disclosure of interests by Board members and these procedures have been adhered to in the year. There were no transactions of any significance in the year in relation to the Board's activities in which the board members had any beneficial interest.

6 APPROVAL OF FINANCIAL STATEMENTS

The financial statements were approved by the Board on 23 of October 2002.

