

ANNUAL REPORT & |

ACCOUNTS 2000



Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raideolaíoch

Radiological Protection Institute of Ireland
An Institiúid Éireannach um Chosaint Raideolaíoch

ANNUAL REPORT AND ACCOUNTS 2000

Radiological Protection Institute of Ireland

To the Minister for Public Enterprise

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 2000.

Francis J Mulligan, Chairman

CONTENTS

Chairman's Statement	2
Members of the Board	5
Staff Structure	6
Objectives of the Institute	7
Main Developments	8
Staff and Resources	10
Environmental Monitoring	12
Natural Radioactivity	16
Emergency Planning	20
Regulatory Service	22
Dosimetry Service/Instrument Calibration Service	25
Research	26
International Liaison	28
Information Service and Publications	30
Advisory Committee	32
Financial Statements	33

CHAIRMAN'S STATEMENT

I am pleased to introduce the Annual Report and Accounts of the Radiological Protection Institute of Ireland for 2000, the year in which I had the honour to be appointed Chairman. I believe the Institute can claim to have made significant progress on a number of fronts during the year.

A notable first was its report on the safety of the assembly of tanks holding liquid high-level radioactive waste at Sellafield. This report was based on scrutiny by Institute personnel of detailed safety documentation, to which only BNFL personnel and UK regulatory officials otherwise have access. The Institute's capacity to carry out an independent critical review of this type enables it to play a valuable watchdog role in respect of the risks to Ireland from nuclear plants such as Sellafield.

Side by side with this role the Institute remains keenly conscious of its responsibility as regulator of uses of ionising radiation within Ireland, a function which is crucial to the safety of workers, patients and members of the public who might be put at risk by any departure from safe procedures in such areas. To provide assurance of its own effectiveness in this sphere, the Institute invited the International Atomic Energy Agency (IAEA) to review the operation of its Regulatory Service. This proved a most valuable exercise, and the Institute is greatly indebted to the IAEA, and to the distinguished members of the Review Team, for the expertise and dedication with which they undertook the task. The Review Team reported in positive terms, while making certain specific recommendations which the Institute is taking active steps to implement.

Legislation introduced in 2000, to implement a recent EU Directive, broke new ground in extending regulatory control for the first time to exposure of workers to natural radioactivity, from such sources as high levels of radon gas in workplaces, or cosmic radiation in the case of air crew. The Institute is devoting a major effort to the bringing into force of this legislation, and I am pleased that sanction has been granted for the recruitment of two extra staff members to work in this area.

It is a matter for concern that a companion EU Directive, relating to the protection of medical and dental patients who are exposed to ionising radiation in the course of their diagnosis or treatment, has still

not been transposed into Irish law more than a year after the date stipulated in the Directive by which this was to be done. As well as leaving patients with a lower level of protection than they are entitled to, this failure by Ireland to fulfil its responsibility as an EU Member State in the area of radiological protection must diminish this country's credibility when we demand high standards of others in the area of nuclear safety and radioactive contamination of the environment. I would ask the Minister for Health and Children to act without further delay to put the necessary legislation in place.

Still in the context of legislation, the Institute drew attention some time ago to a legal anomaly whereby it had been obliged to grant licences for the use of X-ray apparatus solely on the basis of adequacy of equipment and facilities, and without any regard for whether the applicant for a licence was deemed by a relevant qualifying body to be a suitable person to hold such a licence. This issue has been of particular significance in respect of chiropractors.

The Institute therefore welcomed a provision of the Radiological Protection (Amendment) Bill, 1998, which would release the Institute from the obligation to issue a licence in these circumstances. This Bill has not yet completed its passage through the Oireachtas, and since it was published it has emerged that the requirement to have the approval of a qualifying body, particularly in the case of chiropractors, is not watertight under the law as it currently stands. The Institute therefore considers it essential that this weakness in the law also be corrected, by legislation which would have to be introduced by the Minister for Health and Children, before the 1998 Amendment Bill becomes law. Failure to do this could have the effect, when the Bill becomes law, of compelling the Institute to withdraw licences from people who ought properly to have them.

In other areas, the Institute's work on radon in buildings has continued to progress well. In particular, the "Radon in Schools" programme has almost completed the substantial task of measuring radon levels in all of the country's 4000 schools. This should ensure, following the implementation of remedial measures where they are required, the elimination of a health risk to the significant minority of children whose schools have been found to have high radon levels. Allied to this, I welcome again the

forthcoming availability of grants to assist private homeowners with the cost of radon remediation in houses where high radon levels have been found.

I wish to record my own thanks and that of the Institute to two people who retired from the Board on 31st March, 2001. Dr. George Duffy had an unparalleled record of service to the Nuclear Energy Board and the Institute. Having joined the Board of the NEB in 1983 he served as its Chairman from 1985 until its replacement by the RPII in 1992, and continued from then until this year as a Board member of the Institute. Dr. Geraldine O'Reilly was also a member of the Board of the Institute since its establishment in 1992, since 1997 as the nominee of the Association of Physical Scientists in Medicine. To both the Institute is deeply indebted for their invaluable contributions to its work.

I welcome to the Board in their place Mr. Francis J Turvey and Ms. Anita Dowling, the latter as nominee of the APSM. I welcome also the re-appointment to the Board of Ms. Darina Muckian and Ms. Adi Roche, and in doing so thank them and all the other members of the Board for their generous service to the Institute.

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.

Finally, I wish to record the Institute's appreciation for the support received from the Minister for Public Enterprise, Ms. Mary O'Rourke, TD. The Institute is particularly indebted to the Minister of State with responsibility for Nuclear Safety, Mr. Joe Jacob, TD, for his active encouragement for the Institute's work. I must also acknowledge the co-operation received at all times from the officials of the Department of Public Enterprise and other Government Departments, as well as the assistance received from other national organisations and from third-level educational institutions.

Francis J Mulligan
Chairman



"I wish to record my appreciation of the dedication and expertise which has at all times characterised the work of the Institute's staff".

RÁITEAS AN CHATHAOIRLIGH

Tá an áthas orm Tuairisc Bhliantúil agus Cuntais An Institiúid Éireannach um Chosaint Raideolaíoch a chur i láthair an bhliain inár ceapadh mise mar Chathaoirleach. Sílim gur féidir a rá go ndearna an Institiúid dul chun cinn suntasach maidir le roinnt rudaí le linn na bliana.

An chéad cheann, ná a tuairisc ar an tsábháilteacht a bhaineann le bailiúchán tancanna i Sellafield ina bhfuil fuíoll le leibhéal ard raidaighníomhach i bhfoirm leachta iontu. Bhí an tuairisc seo bunaithe ar scrúdú grinn phearsanra na hInstitiúide ar cháispéisí sábháilteachta sonracha nach bhfuil rochtain ach ag pearsanra BNFL agus oifigigh rialacháin sa RA orthu. De bharr go raibh an Institiúid ábalta athbhreithniú criticiúil neamhspleách den chineál seo a dhéanamh cuireann sé ar a cumas ról faire luachmhar maidir leis na baoil atá ann d'Éirinn ó ghléasraí núicléacha mar Sellafield.

Taobh leis an ról sin, tuigeanann an Institiúid go maith go bhfuil freagracht uirthi mar rialaitheoir ar úsáid radaíoch íanaíoch laistigh d'Éirinn, feidhm atá riachtanach do shábháilteacht oibrithe, othar agus bhaill den phobal a d'fhéadfadh a bheith i mbaol dá n-imeofaí ó nósanna imeachta sábháilteachta i réimsí den chineál sin. Chun cinnteacht a thabhairt maidir le chomh héifeachtach is atá an Institiúid sa réimse sin thug sí cuireadh don Ghníomhaireacht Idirnáisiúnta Fuinnimh Adamhaí (IAEA) oibriocht a Seirbhís Rialacháin a athbhreithniú. Ba cheacht luachmhar a bhí anseo agus tá an Institiúid faoi chomaoín ag an IAEA agus ag baill iontacha na Foirne Athbhreithnithe as a saineolas, a ndúthracht is iad ag tabhairt faoin tasc. Bhí tuairiscí na Foirne Athbhreithnithe dearfach agus rinneadh moltaí sonracha ar leith agus tá an Institiúid ag glacadh céimeanna gníomhacha chun iad a chur i bhfeidhm.

Dul chun cinn mór i dtaobh rialú rialtachta don chéad uair i measc oibrithe a bheadh nochtaithe do raidaighníomach nádúrtha ó fhoinsí mar leibhéil arda gáis radóin i láithreacha oibre nó radaíocht chosmach i gcás criú air é an reachtaíocht a tugadh isteach i 2000 chun Treoir AE a fheidhmiú. Tá an Institiúid ag déanamh iarracht mhór chun an reachtaíocht seo a thabhairt i bhfeidhm agus tá áthas orm a rá go bhfuil earcú bheirt bhall foirne bhreise chun oibriú sa réimse seo ceadaithe.

Is cúis inné ná nach bhfuil Comhthreoir ón AE a bhaineann le cosaint othar leighis agus fiacla a

bheadh nochtaithe do radaíoch íanaíoch le linn cóireála nó fáthmheasa, curtha i bhfeidhm i ndlí na hÉireann fós bliain tar éis an dáta a raibh sé ráite sa Treoir go raibh sé le déanamh. Chomh maith le hothair a fhágáil le leibhéal níos ísle cosanta ná mar atá siad ina theideal, mar nár éirigh le hÉirinn a freagracht a chomhlíonadh mar bhallstát AE i réimse chosaint raideolaíoch laghdóidh sé seo inchreideacht na tíre nuair a éileoimid ardchaighdeán i réimse sábháilteachta núicléach agus truailliú raidaighníomhach sa chomhshaol. Iarraim ar an Aire Sláinte agus Leanaí gníomhú gan a thuilleadh moille agus an reachtaíocht chuí a chur i bhfeidhm.

Fós i gcomhthéacs reachtaíochta, tamall ó shin tharraing an Institiúid aird ar an neamhréireacht dlíthúil faoina bhfuil sé d'oibleagáid ceadúnais a cheadú i gcomhair ghléasra X-ghatha ar bhunús leordhóthaineacht trealaimh agus saoráidí amháin cibé an duine cuí chun ceadúnas den sórt sin a bheith ina sheibh an t-iarratasóir ceadúnais de réir comhlachta cáilitheach cuí. Tá tábhacht faoi leith leis an tsaincheist sin i gcás círicheachtóirí.

Mar sin d'fháiltigh an Institiúid roimh fhoráil an Bhille um Chosaint Raideolaíoch (Leasú), 1998 a chuirfeadh deireadh le hoibleagáid na hInstitiúide ceadúnais mar sin a eisiúint faoi na coinníolacha sin. Níl an bille baileach imithe tríd an Oireachtas fós agus ó foilsíodh é tá sé tagtha chun cinn nach bhfuil an riachtanas atá ann, mar atá sé faoi láthair, maidir le ceadúnú a fháil ó chomhlacht cáilitheach, go háirithe i gcás círicheachtóirí, docht daingean ó thaobh an dlí de fós. Dar leis an Institiúid tá sé riachtanach go gcuirfí ina cheart an lúb ar lár seo sa dlí trí reachtaíocht ón Aire Sláinte agus Leanaí a thabhairt isteach sula mbeadh Bille Leasaithe 1998 ina dhlí. Mura ndéanfar sin d'fhéadfadh go mbeadh iallach ar an Institiúid ceandúnais a aistharraingt ó dhaoine ar chóir go mbeadh siad acu ó cheart nuair bheidh an bille ina dhlí.

Tá dul chun cinn mór déanta ag an Institiúid i réimsí eile ach go háirithe ar radón i bhfoirgnimh. Tá an tasc ollmhór leibhéal radóin a thomhas i 4000 scoil na tíre beagnach críochnaithe ag an clár 'Radón i Scoileanna'. Ba chóir go gcinnteadh sé seo, tar éis fheidhmiú na mbearta reachtais nuair is gá, go gcuirfeadh deireadh leis an mbaol sláinte atá ann don mhionlach gasúr a bhfuarthas leibhéil arda radóin ina gcuid scoileanna. In éineacht leis seo, fáiltímis arís roimh dheontais chun cuidiú le húnéirí

tithe príobháideacha in aghaidh chostas feabhsúcháin radóin i dtithe in áiteanna a bhfuarthas leibhéil arda radóin.

Ba mhaith liom buíochas a ghlacadh thar ceann na hInstitiúide le beirt a d'éirigh as obair an Bhoird an 31 Márta, 2001. Tá seirbhís mhór tugtha ag an Dr. George Duffy don Bhord Fuinnimh Núicléach agus don Institiúid. Bhí sé ar Bhord an NEB ó 1983 agus bhí sé ina Chathaoirleach air ó 1985 nó gur tháinig an RPII ina áit i 1992. Bhí sé ina bhall de bhord na hInstitiúide go dtí i mbliana. Bhí an Dr. Geraldine O'Reilly freisin ina ball de Bhord na hInstitiúide ó bunaíodh é i 1992 agus ó 1997 agus é ainmnithe ag Cumann na nEolaithe Físiciúla i Leigheas. Tá an Institiúid faoi chomaoín ag an mbeirt as a n-obair luachmhar.

Fáiltímis roimh an Uasal Francis J. Turvey agus freisin roimh Anita Dowling Uasal atá ainmnithe ag an APSM. Fáiltímis freisin roimh athcheapadh Darina Muckian agus Adi Roche ar an mbord agus glacaim buíochas leo agus le gach ball eile de chuid an Bhoird as an tseirbhís ghnaíúil a thugann siad don Institiúid.

Ba mhaith liom buíochas a ghlacadh le foireann na hInstitiúide as a dtiomantas agus a saineolas a mbíonn a rian le feiceáil ar obair na hInstitiúide. Ba mhaith liom aitheantas a thabhairt don obair ar fad a rinne baill Choistí Comhairleoireachta na hInstitiúide a roinneann a gcuid ama go deonach ar shon obair na hInstitiúide.

Ar deireadh, thar ceann na hInstitiúide, ba mhaith liom buíochas a ghlacadh leis an Aire Fiontar Poiblí, Mary O'Rourke Uasal as a cuid tacaíochta. Tá an Institiúid faoin chomaoín ag an Aire Stáit le freagracht speisialta do Shábháilteacht Núicléach, An tUasal Joe Jacob TD as a spreagadh gníomhach. Tá aitheantas freisin le tabhairt don chomhoibriú a fhaighimid i gcónaí ó Roinn Fiontar Poiblí agus ó Ranna Rialtais eile chomh maith leis an gcúnamh ó heagraíochtaí náisiúnta eile agus ó institiúidí oideachais tríú leibhéal.

Francis J. Mulligan
Cathaoirleach

MEMBERS OF THE BOARD

On 22nd February 2000 Dr. Francis J Mulligan was appointed Chairman of the Institute, and Ms. Mary Coffey was appointed to a vacancy on the Board. The terms of office of Dr. James Carr, Dr. Patrick Connellan and Dr. Edward Fitzgerald expired on 31st March. Later in the year Dr. William Blunnie was appointed to the Board on the nomination of the Medical Council in place of Dr. Carr, while Dr. Connellan and Dr. Fitzgerald were re-appointed on the nomination of the Dental Council and the RCSI Faculty of Radiologists, respectively.

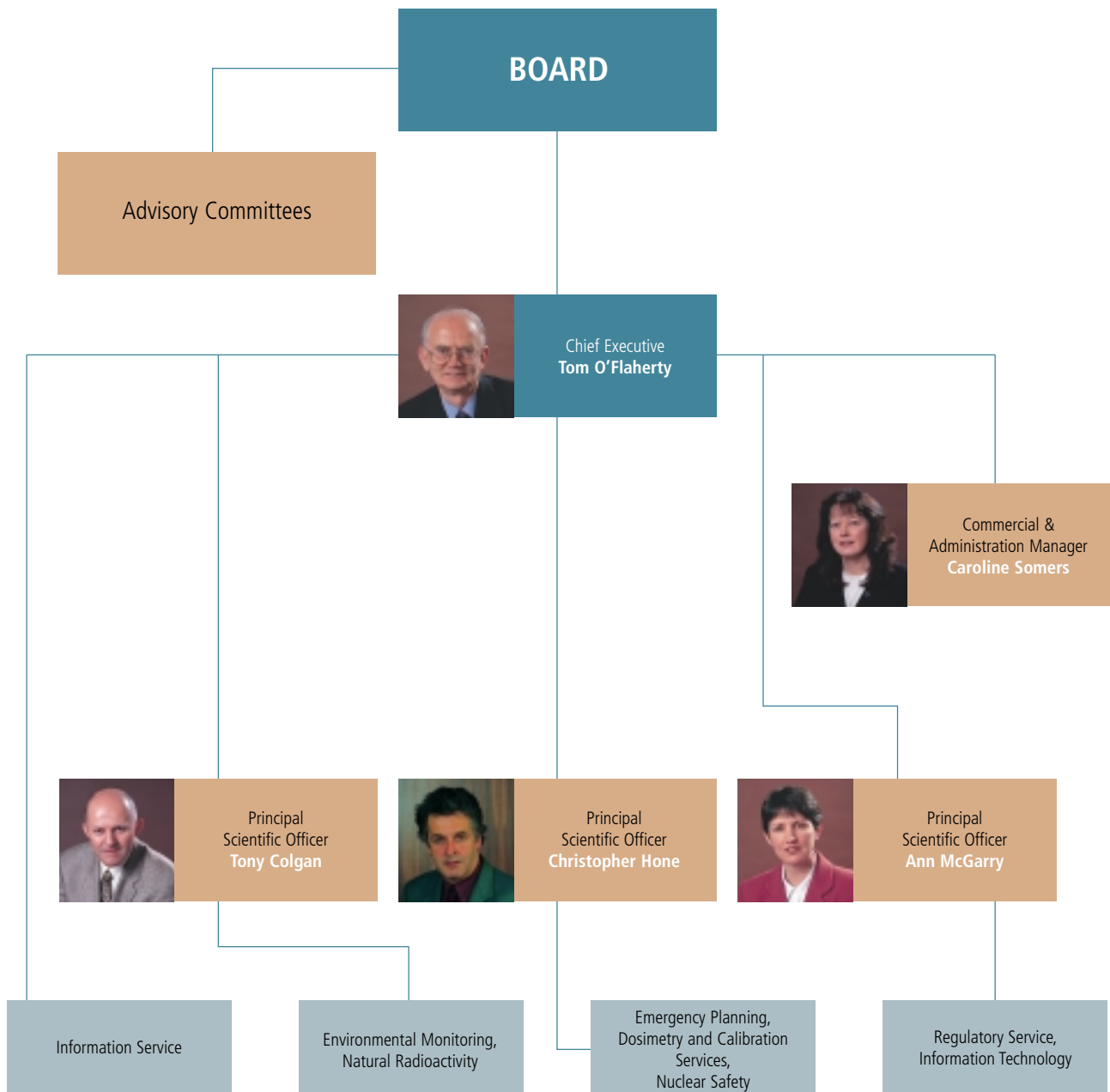
The Board met eight times during the year. The number of meetings attended by each Board member is shown below, the number in brackets indicating the number of meetings the member in question was eligible to attend. Also shown, in the case of the six members who were nominated for appointment to the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

Chairman	Francis J Mulligan	8(8)
	William Blunnie Medical Council	1(2)
	Gregory Burke Institute of Food Science and Technology of Ireland	6(8)
	James Carr Medical Council	0(2)
	Mary Coffey	6(7)
	Patrick Connellan Dental Council	4(6)
	George Duffy	5(8)
	Edward Fitzgerald Faculty of Radiologists RCSI	4(7)
	James Gibney	5(8)
	Lesley Malone Irish Nuclear Medicine Association	5(8)
	Darina Muckian	7(8)
	Geraldine O'Reilly Association of Physical Scientists in Medicine	7(8)
	Adi Roche	4(8)

On 31st March 2001 the terms of office of Dr. George Duffy, Ms. Darina Muckian and Dr. Geraldine O'Reilly expired. Ms. 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.

STAFF STRUCTURE



Mr. John D Cunningham, Deputy Chief Executive, retired from the RPII on 15th August 2001

OBJECTIVES OF THE INSTITUTE

The Institute's principal objectives are:

- To provide advice to the Government, the Minister for Public Enterprise 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.

MAIN DEVELOPMENTS

Radon in Buildings

The Institute in 2000 completed the second phase of its three-year programme, commissioned by the Minister for Education and Science, of measurement of radon concentration in all primary and second-level schools in the country. By the end of 2000 results had been issued to 1763 schools, and in 402 of these one or more classrooms were found to have radon concentrations exceeding the Reference Level. Following the carrying out of remedial work in the most severely affected schools identified in the first phase of the programme, post-remediation measurements showed that the remedial measures had been highly effective in reducing radon concentrations in the schools to below the Reference Level. This is very encouraging evidence of the real benefits of the programme.

The Institute also took initial steps towards implementing new legislation, arising from a recent EU Directive, which extends regulatory control to such areas as exposure to radon in the workplace, hazards to workers from naturally-occurring radioactive materials other than radon, and exposure of air crew to cosmic radiation.

Sellafield

The Institute published its report on an examination it carried out in February 2000 of safety documentation relating to the tanks holding liquid high-level radioactive waste at Sellafield. The Institute was given unprecedented access to the documentation relating to these tanks, which are recognised as the potential location for an accident which could have major off-site consequences. The Institute's study found that while the likelihood of such an accident was low, there were a number of actions which BNFL could take to further lessen the risk. BNFL accepted the Institute's findings, and since the publication of the report have indicated that they are implementing the recommendations made.

In the Institute's continuing surveillance of radioactive contamination in the Irish Sea resulting

from the discharge of low-level liquid radioactive waste from Sellafield, the central focus remained on levels of technetium-99. Concentrations of this radionuclide in the Irish Sea increased steeply from 1994 onward. Levels in 1999 and 2000 show some decrease from the peak reached in 1998, reflecting a reduction in discharge rates, but much greater reduction and the passage of considerable time will be needed before concentrations will come down to anything approaching pre-1994 levels. Such further reductions are called for under the commitments made by the UK in the 1998 Sintra Agreement within the framework of the OSPAR Convention.

Emergency Planning

In furtherance of the Institute's discharge of its responsibilities under the National Emergency Plan for Nuclear Accidents, work continued on the development of the decision support system ARGOS, as a means of assessing the consequences for Ireland of nuclear accidents occurring in other countries. An important feature of this development will be a new module for predicting radioactivity concentrations in foodstuffs in a post-accident situation.

Review of Regulatory Service

A major event during 2000 was the carrying out, at the request of the Institute, of a review of the efficiency and effectiveness of the Institute's Regulatory Service by a Peer Review Team from the International Atomic Energy Agency. The review encompassed a wide-ranging assessment of relevant legislation and of licensing, inspection and enforcement procedures.

The principal findings of the review were that the essential legal infrastructure for radiation protection is well established in Ireland, that the regulatory programme is effective and that the Institute is well placed to implement the regulatory infrastructure. The review did, however, identify a need to re-examine the work priorities of the Regulatory Service in licensing, inspection and related areas, and a need for increased expertise, particularly in the area of

medical uses of radiation. In the light of the latter recommendation the Institute is seeking sanction to recruit an experienced medical physicist to the staff of the Regulatory Service.

Incidents and Prosecutions

The Regulatory Service dealt during the year with a substantial number of reported incidents and abnormal occurrences in the use and handling of licensable radioactive substances. While most involved only sources of relatively low activity, and none resulted in anybody being exposed to a significant radiation dose, the variety of the incidents clearly illustrates the range of potential risks associated with the custody, use and transportation of radioactive substances in their many industrial, medical and other applications. In two instances the Institute successfully prosecuted commercial companies for breaches of licensing regulations.

Accreditation

It was a matter of considerable satisfaction that two of the Institute's technical services were awarded ILAB Accreditation by the National Accreditation Board during the year. The Institute's Dosimetry Service was accredited previously when its principal monitoring services used film dosimeters. Now that it has converted its systems to thermoluminescent dosimeters (TLDs), ILAB Accreditation has been secured afresh for the new system. The other service which gained ILAB Accreditation during 2000 is the Radon Measurement Service. These add to the accreditations already held by the Environmental Laboratory and the Calibration Service, and underline the Institute's commitment to achieving and maintaining the highest standards in its scientific work. The accreditation of the Environmental Laboratory is particularly crucial for the Institute's role as the nominated national centre for the measurement of radioactivity in foodstuffs.

Tom O'Flaherty
Chief Executive



"It was a matter of considerable satisfaction that two of the Institute's technical services were awarded ILAB Accreditation by the National Accreditation Board during the year".

STAFF AND RESOURCES

Staff

An important development in 2000 was the filling of the Institute's first two posts of Senior Technician. Resulting from the upgrading of two of the Institute's six Technician posts, these posts provide a much-needed career structure for Technicians in the Institute.

Sanction was obtained in early 2001 for two additional permanent posts, a Scientific Officer and a Technician, to cater for the Institute's additional responsibilities for the implementation of new legislation governing exposure of workers and the public to natural radioactivity, and these posts have been filled.

The Institute seconded a member of the scientific staff to work as an Assistant Principal Officer in the Nuclear Safety Division of the Department of Public Enterprise for a twelve-month period. This arrangement is designed to broaden the staff member's experience and to foster a closer working relationship between the Institute and the Department.

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 has for many years operated such schemes as flexitime, study leave, career breaks, job-sharing and more recently parental leave.

Participation Forum

The Institute's Participation Forum, established under the terms of the Worker Participation (State Enterprises) Act, 1988, provides a representative mechanism for consultation between staff at the various levels in the organisation about all matters, other than industrial relations issues, affecting the operation and effectiveness of the Institute.

Safety, Health and Welfare

The Institute is committed to complying fully with the requirements of legislation relating to safety, health and welfare at work. In accordance with the provisions of the Safety, Health and Welfare at Work 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 2000 was £2.475 million made up of grant-in-aid of £1.746 million and £0.729 million in earnings from dosimetry, product certification and other services, licence charges, and research and consultancy contracts. Capital expenditure, principally on information technology and on equipment for monitoring of radioactivity in the environment, was £191,000. Income for the year exceeded expenditure by £29,000.

The Institute complies with all appropriate procurement procedures.

Accommodation

For some time pressure on space in the Institute's main building at 3 Clonskeagh Square has been acute, while the necessity to house some staff at a separate location was also detrimental to efficiency. Therefore it is a cause of considerable satisfaction that late in 2000 the Office of Public Works acquired an additional area of office space in 1 Clonskeagh Square for the use of the Institute. In consequence the Institute can now look forward to having all of its staff housed in accommodation of adequate size in two adjacent buildings in Clonskeagh Square.

Information Technology

As part of its Year 2000 (Y2K) programme, the Institute's computer facilities were fully reviewed, upgraded and standardised during 1999. These facilities were further evaluated in 2000 to identify any remaining weaknesses in both hardware and software. With Y2K non-compliance still a potential threat, all

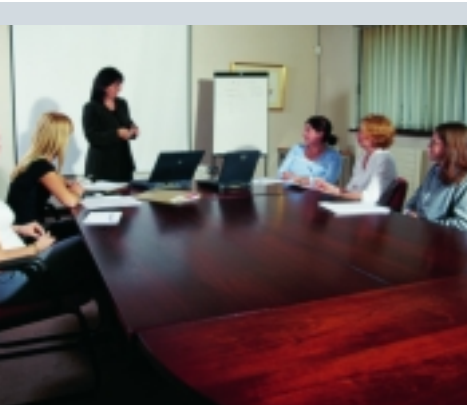
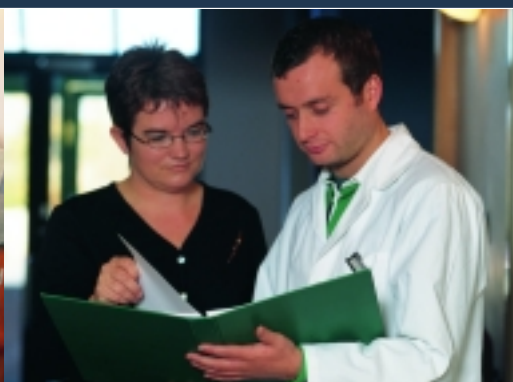
systems were closely monitored to identify and deal with any dormant issues.

As in most other organisations, electronic forms of communication are now becoming more popular within the Institute and a review was undertaken to identify possible security weaknesses in these systems. This review identified two areas of concern, namely the threat from computer viruses and the security implications of Internet connectivity. A comprehensive virus protection system was put in place and a firewall installed to protect the computer network from intruders. Both these initiatives have significantly reduced the amount of routine maintenance work required to keep the computer systems operational.

All core hardware systems were reviewed and maintenance contracts were put in place for all equipment critical to the day-to-day running of the Institute. A policy has been adopted whereby, provided competence is not compromised and financial resources are used wisely, the number of maintenance companies servicing the Institute has been kept to a minimum.

Cur chun cinn na Gaeilge

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



"The Institute is committed to complying fully with the requirements of legislation relating to safety, health and welfare at work".

ENVIRONMENTAL MONITORING

The Institute implements programmes of monitoring of radioactivity in foodstuffs and in the environment in accordance with national legislation and in fulfilment of international obligations entered into under the Euratom Treaty. 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 of contamination levels in the environment and their evolution with time.

As the Institute is the nominated national centre for the measurement of radioactivity in foodstuffs, strong emphasis and substantial resources are devoted to the maintenance of an effective quality system. As part of that commitment, the techniques and procedures relevant to the testing of foodstuffs employed by the Institute are accredited by the National Accreditation Board (NAB) to international standards. In 2000, a new computerised laboratory management system was commissioned to strengthen the management of samples through the laboratory and to improve data storage and retrieval.

The results of all monitoring programmes are published by the Institute. A report covering the marine monitoring programmes for 1998 and 1999 was published in 2000. These reports are also made available on the Institute's Website. In addition, more recent marine monitoring results are available on the Institute's Website each quarter. The numbers and types of samples tested during 2000 are given in Table 1.

Table 1: Radioactivity Testing on Environmental Samples and Foodstuffs, 2000

Air	495
Beef	115
Lamb	72
Pork and Poultry	56
Drinking water	27
Fish and shellfish	163
Seaweed, sediments and seawater	103
Milk and dairy products	474
Miscellaneous	586
Total	2091

Marine Environment

The discharge of radioactive waste from the British Nuclear Fuels' reprocessing plant at Sellafield into the north-east Irish Sea remains the dominant source of contamination in the Irish marine environment. The most radiologically significant radionuclides discharged from Sellafield are caesium-137, technetium-99, plutonium-239 and americium-241. In 2000 the discharges of caesium-137 and

technetium-99 from Sellafield were 6.91 terabecquerels (TBq) and 44.4 TBq respectively, compared to 9.1 TBq and 68.8 TBq in 1999. The more soluble radionuclides such as caesium-137 and technetium-99 are mostly transported across the Irish Sea to the Irish coast, as well as out of the Irish Sea, and have been detected along the Norwegian coast and in Arctic waters. Radionuclides such as plutonium-239 and americium-241 tend to react with particles in the seawater column and are deposited on the sediments of the Irish Sea, particularly those close to Sellafield. Once deposited on the seabed radionuclides are subject to remobilization. Radionuclides thus released from the seabed have become important contributors to the contamination observed in the western Irish Sea.

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 Marine Institute's research vessel, the Celtic Voyager. The sampling programme is carried out by Institute staff and by Fishery Quality Officers of the Department of the Marine and Natural Resources.

Discharges of technetium-99 from Sellafield remain a particular barometer of the United Kingdom's compliance with its obligation under the OSPAR Convention to prevent pollution of the maritime area from ionising radiation through progressive and substantial reductions of discharges. The Institute devotes significant resources to monitoring the levels of technetium-99 in the Irish marine environment and in particular in Irish seafood produce. In 2000, the highest level of technetium in seawater was 30 millibecquerels per litre (mBq/l) compared with 28 mBq/l in 1999. The highest activity in seaweed was 988 becquerels per kilogram (Bq/kg) (wet) in 2000 compared with 850 Bq/kg (wet) in 1999. These values are lower than the level of 1675 Bq/kg (wet) recorded in 1998. The technetium-99 activities in seaweed from the south and west coasts were some 150 times lower than in seaweed from the north-east coast. Activities in fish and shellfish continued to be very low.

The dose to consumers who eat substantial quantities of seafood each day (20 g shellfish, 200 g of fish) was estimated to be less than 2 microsieverts (μ Sv), similar to that in both 1999 and 1998. A small additional dose would be 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 μ Sv to 20,000 μ Sv, 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 very small and do not constitute a significant health risk. The Institute 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.

However, the Institute takes the view that any contamination of the Irish Sea arising out of practices at Sellafield is highly objectionable from an Irish viewpoint. People living in Ireland derive no benefit from these practices and these discharges should be reduced substantially in line with commitments made under the OSPAR Convention.

Terrestrial Environment

The radioactivity levels in air, drinking water supplies and foodstuffs such as milk, cheese, butter, other dairy products, beef, sheepmeat and vegetables are measured as part of the Institute's terrestrial monitoring programme. In addition, the testing of live sheep in certain upland areas and local slaughterhouses is also carried out. These programmes are supported by the Department of Agriculture, Food and Rural Development, Met Éireann, local authorities, health boards and commercial producers.

Live sheep were monitored in those upland areas where the residual effects of the radiocaesium deposition from Chernobyl are still of considerable interest. The upland areas monitored included parts of Louth, Donegal, Cavan, Sligo, Mayo, Galway, Kerry, Cork, Tipperary and Waterford. The results showed that sheep grazing certain upland areas in these counties continued to have radiocaesium activity concentrations close to that considered unsuitable for marketing, i.e. above 500 Bq/kg. However, in sheep arriving for slaughter in local abattoirs the activity concentrations were below 100 Bq/kg, the lower level of detection of the monitoring method used to measure radiocaesium in live sheep. Sheepmeat samples from retail outlets tested in the laboratory had activity concentrations below 10 Bq/kg. These results show that regular consumption of sheepmeat does not constitute a significant health hazard.



"As the Institute is the nominated national centre for the measurement of radioactivity in foodstuffs, strong emphasis and substantial resources are devoted to the maintenance of an effective quality system".

Krypton-85 is a radioactive gas discharged to the atmosphere as a result of the reprocessing of spent nuclear fuel at Sellafield in England, La Hague in France and in Russia. In 2000, the Institute continued its programme of monitoring of krypton-85 activity concentrations in the air at Clonskeagh. The mean activity concentration of krypton-85 was found to be 1.59 becquerels per cubic metre (Bq/m³) in 2000. This compares with 1.50 Bq/m³ in 1999 and 1.46 Bq/m³ in 1998 i.e. there is a small but continuing upward trend of krypton-85 in air at Clonskeagh. This is likely to be reflected in the northern hemisphere generally as the discharged krypton-85 disperses around the northern hemisphere. The Institute will continue to monitor krypton-85 activity concentrations in the light of the continued and possibly increased operation of the Magnox and Thorp reprocessing plants at Sellafield. The radiation doses due to krypton-85 in the air are very small and do not represent a health hazard.

Airborne particulate radioactivity was continuously sampled and monitored at ten locations of which nine are equipped with low-volume particulate samplers and one with a high-volume sampler. The samples from the low-volume samplers were assessed for total beta activity and the samples from the high-volume sampler were analysed for gamma emitting radionuclides by high-resolution gamma spectrometry. The activity levels observed were insignificant from a radiological viewpoint.

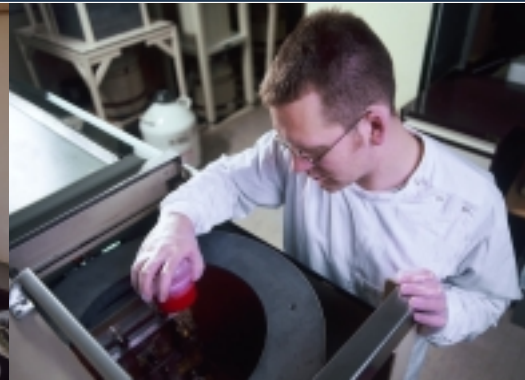
Public drinking water supplies were sampled in accordance with a county-based programme, with at least one supply from each county being sampled every four years. In 2000, public water supplies from 11 counties were tested. The results showed that the supplies were within the World Health Organization (WHO) Guidelines for Drinking Water Quality.

One of the more important features of the Institute's monitoring programme is the monitoring of contamination levels in milk, which is one of Ireland's most important foodstuffs and the one which responds most rapidly to ground contamination. Milk was sampled monthly at ten major milk processing plants around Ireland and analysed for strontium-90 and gamma emitting radionuclides such as caesium-137. In addition, dairy products, babyfoods, cheeses, butter, etc., from many production centres were sampled and analysed. In all cases, the radioactivity levels were very low and not a cause for concern.

The measurements carried out during 2000 show that the levels of artificial radioactivity in air, water and foodstuffs remain low and do not give rise to a public health concern.

Radioactivity in Export Products

The Institute continued its testing and certification services to exporters of Irish food products and other goods. In 2000, the Institute issued 5600 certificates compared to 5810 in 1999, 4862 in 1998 and 5815 in 1997.



"The measurements carried out during 2000 show that the levels of artificial radioactivity in air, water and foodstuffs remain low and do not give rise to a public health concern".

NATURAL RADIOACTIVITY

The Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000 (S.I. No. 125 of 2000), which came into force in May, marked a new phase in the Institute's work on radon and other sources of natural radioactivity. The Order differs from previous ionising radiation regulations in that it covers explicitly work activities where the presence of natural radiation sources leads to a significant increase in the exposure of workers or of members of the public. For the Institute, this means a change in its role with respect to natural radiation sources from one primarily concerned with monitoring to one of regulator. The Order identifies three broad categories of work activity where natural radiation sources may lead to significant exposure of workers or of the public. These are:

1. work activities which take place in an environment with high radon concentrations;
2. work activities which take place in an environment where increased levels of natural radionuclides may be present, such as in the oil or gas industries, metal smelting or in sectors involving the manufacture or use of thoriated products;
3. the operation of aircraft leading to exposure of crew members to enhanced levels of cosmic radiation.

Another significant development during the year was the achievement of ILAB Accreditation by the Institute's Radon Measurement Service. This award was made following a comprehensive assessment of the Service's technical competence and quality system by the National Accreditation Board. Accreditation brings with it increased confidence in the Service's results for consumers. It is important in the context of the Ionising Radiation Order, as an employer's legal obligations may depend on the results of workplace radon measurements.

During the year the Institute issued 20,881 detectors to houses, schools and workplaces. Figure 1 shows the number of radon detectors issued annually between 1991 and 2000. In 2000, the Radon in Schools Survey accounted for the major part of the work of the Measurement Service, with approximately 90% of all detectors issued during the year going to schools. During the year 652 requests for domestic radon measurements were received.

The Institute introduced free post-remediation measurements for householders who have completed remedial work. Demand for this scheme was disappointing and is indicative of the low

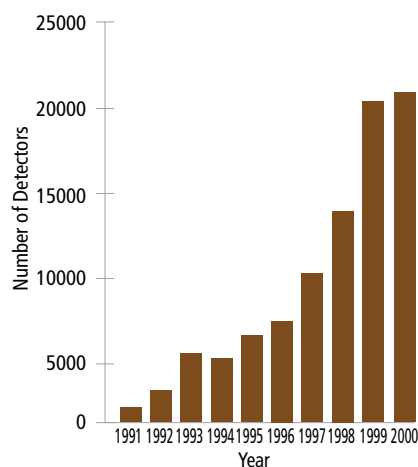
numbers of householders with high radon levels who actually undertake remedial work. The low rate of remediation for domestic dwellings remains an issue of major concern to the Institute. It is hoped that the grant scheme being introduced by the Government will greatly increase the number of houses remediated.

Radon in Schools

Detectors for Phase II of the survey of Radon in Schools were returned to the Institute during May and June. This phase of the survey covered 1057 schools in counties Donegal, Dublin, Laois, Leitrim, Longford, Mayo, Offaly, Roscommon and Sligo. In 229 of the schools measured, one or more of the rooms were found to have a radon concentration above the Reference Level of 200 Bq/m³. The Institute has recommended to the Department of Education and Science that measures to reduce the radon concentrations in these schools be taken as soon as practicable. From the 229 schools found to be above the Reference Level, the Institute identified a priority list of 23 schools requiring most immediate attention.

25,956 individual radon measurements have been made since the survey commenced in 1998 and results have been issued to 1763 schools. A summary of the combined results for Phase I and Phase II is given Table 2. In 402 schools, or 23% of those surveyed to date, one or more classrooms were found to have radon concentrations exceeding the Reference Level. The highest radon level measured in any individual classroom was 2688 Bq/m³ in a school in County Cavan.

Figure 1: Number of Radon Detectors Issued, 1991 to 2000



Detectors were issued to schools in September for Phase III of the survey, which covers counties Clare, Cork, Galway, Kerry, Limerick, Tipperary and Waterford. Schools from Phase I and II counties, which had not already participated, were re-invited to take part during Phase III. In total 19,081 detectors were issued to 1805 schools. With this, 88% of schools have now completed a survey or currently have measurements underway.

The Institute completed initial post-remediation measurements in 12 schools where remedial work had been undertaken during the summer of 2000. Table 3 summarises both survey and post remediation measurements for these schools. The results indicate that the remedial measures put in place have been effective

Radon in Houses

During 2000 the Ordnance Survey of Ireland, together with An Post, released a new database GeoDirectory, which includes validated grid references for every postal delivery point in the country. The availability of this database allowed the Institute to derive, from the results of its National Survey of Radon in Dwellings, an estimate of the number of houses exceeding the domestic Reference Level of 200 Bq/m³ and the population-weighted average indoor radon concentration. The number of houses exceeding the Reference Level was predicted to be 91,000, or 7% of the national housing stock. To date only 2300 high houses have been identified by measurement, which corresponds to approximately 2.5% of the houses predicted to have high radon levels.

Since the launch of the Institute's Website in 1999, the radon department has steadily increased its use of this medium to make information on radon available to the public. The Website, for example, is now the most common way in which the map "Radon in Irish Dwellings" is accessed. This development has been especially useful for members of the public who require a designation for a particular area. An analysis of the web statistics shows that individual radon map pages were accessed 8587 times during the year.



"The low rate of remediation for domestic dwellings remains an issue of major concern to the Institute".

Radon in Workplaces

The Ionising Radiation Order requires that employers or persons responsible for workplaces measure radon concentrations in the workplace on being directed to do so by the Institute. Furthermore the Order sets down a Reference Level for radon in workplaces of 400 Bq/m³ averaged over three months. Where it is shown that the Reference Level is exceeded the employer must take measures to protect the health of workers. In the second half of the year, the Institute began a phased programme to direct employers to measure radon in the workplace, beginning with employers responsible for underground workplaces such as mines, underground heritage centres and commercial show caves.

During 2000 the Institute continued to provide workplace radon measurements at the request of employers. Radon concentrations in excess of the Reference Level were found in 5 of the 17 workplaces surveyed during the year. In these cases the Institute advised that remedial measures should be taken in line with the terms of the Ionising Radiation Order.

Cosmic Radiation

Cosmic radiation reaches the Earth at a fairly constant rate from outer space. It is absorbed by the Earth's atmosphere with the result that the cosmic radiation intensity increases with altitude. As a result air crew, during the course of their work, are exposed to enhanced levels of this radiation. It is estimated that for air crew on commercial jet airliners the annual exposure to cosmic radiation is typically in the range 2 to 4 millisieverts (mSv) and in certain cases may exceed 6 mSv. Consequently, air crew are one of the most highly exposed occupational groups and the Ionising Radiation Order sets out measures for the protection of air crew from this source of radiation.

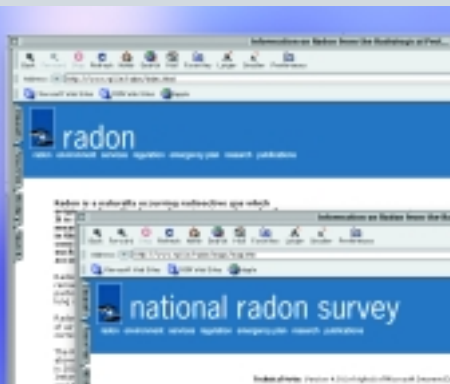
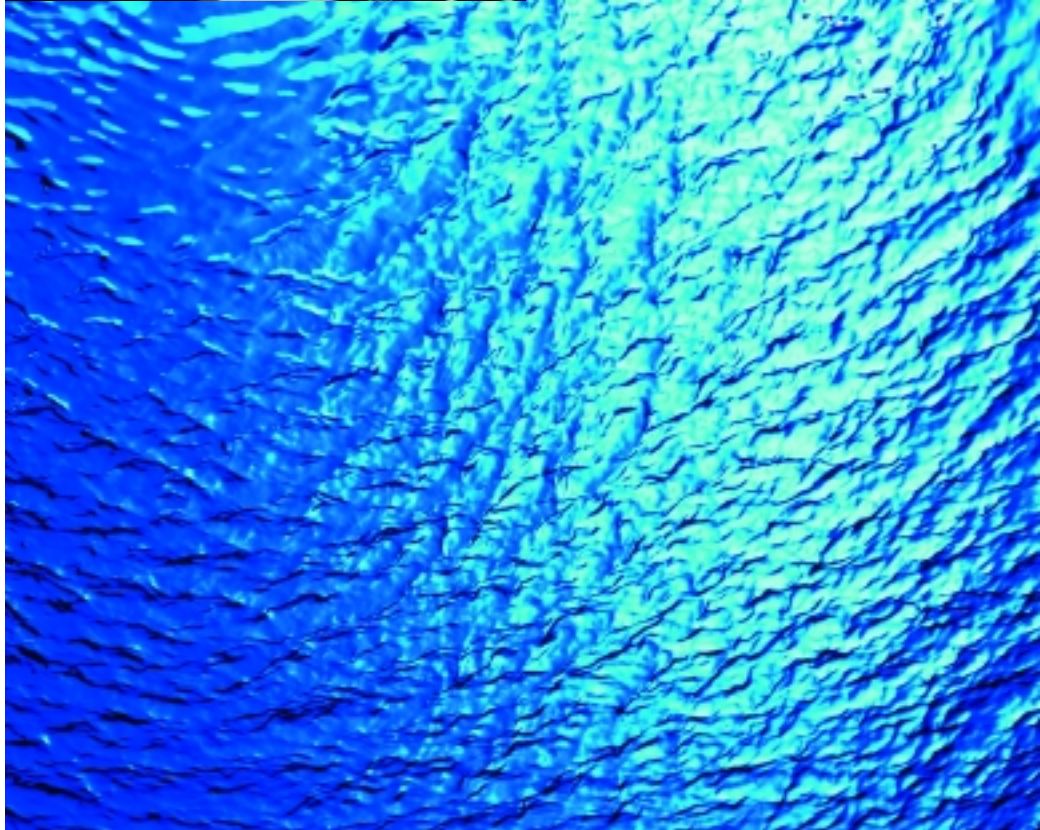
Following the introduction of the Order, the Institute initiated a broadly based consultation process on the implementation of the new regulations relating to exposure from cosmic radiation. All Irish air operators, the Irish Aviation Authority, and other interested parties were consulted. Following this process the Institute issued guidance notes on the protection of air crew from cosmic radiation. These notes set out for air operators practical steps to be followed in order to comply with each of the requirements set out in the Ionising Radiation Order.

Table 2: Summary of Radon in Schools Results for Phase I and II Counties

County	No. of Schools Measured	% of Schools above the Reference Level
Carlow	44	39%
Cavan	64	8%
Donegal	152	23%
Dublin	429	20%
Kildare	85	18%
Kilkenny	64	33%
Laois	54	9%
Leitrim	37	5%
Longford	45	22%
Louth	61	23%
Mayo	147	30%
Meath	91	23%
Monaghan	61	10%
Offaly	54	24%
Roscommon	74	30%
Sligo	65	18%
Westmeath	62	23%
Wexford	83	30%
Wicklow	86	41%
Miscellaneous schools in other counties	5	0 %

Table 3: Summary of Survey and Post Remediation Measurements for Schools in which Remedial Work was Undertaken During the Summer of 2000

School No	Initial Survey Measurements		Post Remediation Measurements	
	No. of rooms >200	Maximum Reading	No. of rooms >200	Maximum Reading
1	16	2688	0	148
2	6	1512	0	77
3	6	1262	0	119
4	5	799	0	65
5	12	900	0	85
6	5	863	0	31
7	14	828	0	61
8	4	758	0	65
9	5	729	1	252
10	4	704	0	50
11	4	696	0	58
12	3	624	1	200



“Since the launch of the Institute’s Website in 1999, the radon department has steadily increased its use of this medium to make information on radon available to the public”.

EMERGENCY PLANNING

In 1999 the Institute adopted the Danish decision support system ARGOS (Accident Reporting and Guiding Operational System) for use in assessing the consequences for Ireland of nuclear accidents occurring abroad. The Institute has now entered into an Agreement with the Danish Emergency Management Agency for the use and further development of the ARGOS software. As part of the Agreement, one member of staff is working closely with Danish and German researchers on the testing of ARGOS and the development of a new module for predicting radioactivity concentrations in foodstuffs.

ARGOS can currently be used to predict the trajectory of a release of radioactivity to the environment as well as contamination levels and dose rates along its path. The system is also of considerable benefit in assessing the potential consequences of various nuclear accident scenarios and as a training tool for emergency preparedness. The addition of the new module for foodstuffs will significantly improve the usefulness of ARGOS for decision-makers and those responsible for policy implementation at both local and national level.

During the year, the Institute, in consultation with the Department of Public Enterprise, prepared a revised booklet on the National Emergency Plan for Nuclear Accidents for publication by the Department. The booklet outlines, in simple terms, the operational aspects of the Plan and the steps that may need to be taken in order to minimise the radiation exposure to the public in the event of a nuclear accident affecting Ireland.

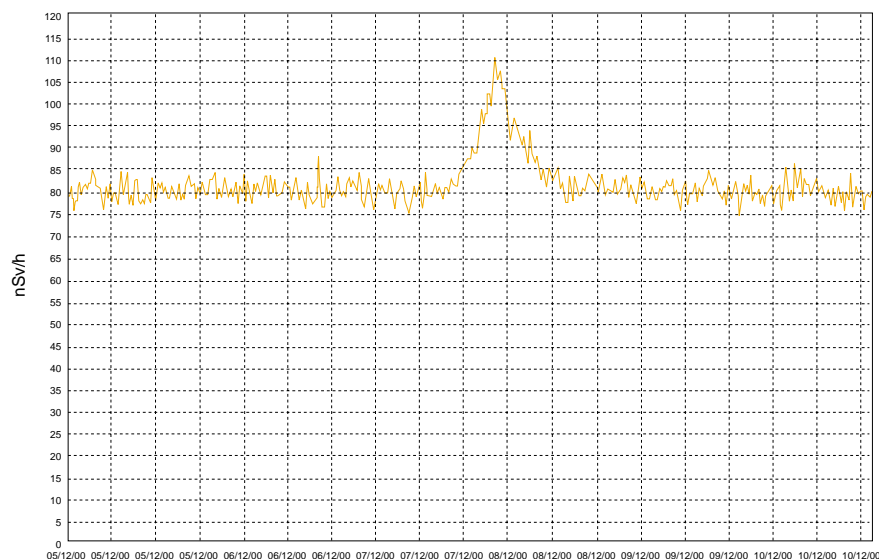
Regular testing of the two international notification systems for early notification of nuclear accidents took place throughout the year. These notification systems are operated by the International Atomic Energy Agency and by the European Union respectively. The testing was fully successful in that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

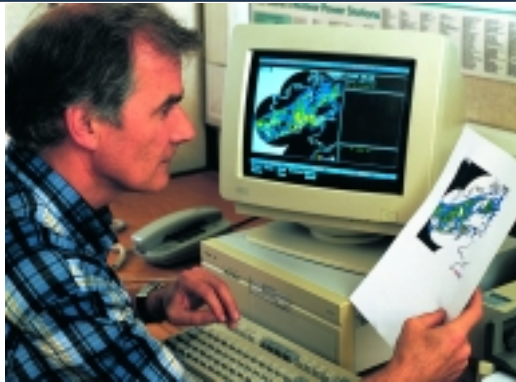
The Institute continued to exchange summarised national gamma dose rate data with EU and non-EU States through the EU Joint Research Centre at Ispra. In the event of a nuclear accident abroad such data will be exchanged every two hours, thereby providing

an early indication of the magnitude and extent of the radioactive release. These data will also be inputted into ARGOS 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.

National monitoring systems for the measurement of gamma dose rates and radioactivity levels in air and rainfall are in routine operation. No abnormal increases were observed during 2000. Elevated gamma dose rates sometimes occur during periods of heavy rainfall which can result in increases in the concentration of naturally-occurring radon gas at ground level. A good example of such an occurrence, where the gamma dose rate increased by approximately 30% in the period 7th to 8th December, is shown in Figure 2.

Figure 2: Peak in gamma dose rate due to increased levels of radon





"ARGOS can currently be used to predict the trajectory of a release of radioactivity to the environment as well as contamination levels and dose rates along its path".

REGULATORY SERVICE

The regulation of the uses of ionising radiation in medicine, research and industry continues to be one of the principal responsibilities of the Institute. Throughout 2000, the Regulatory Service continued its efforts to ensure that all activities involving the use of ionising radiation are carried out in a safe manner. This aspect of the Institute's work underwent an important change in 2000 with the introduction, in May, of new legislation governing the licensing of practices involving ionising radiation.

Licensing and Inspection

The number of current licences at the end of 2000 was 1313, which compares with 1264 at the end of 1999. One hundred and thirty-seven inspections of licensees were carried out during 2000. The breakdown of licences and inspections by licence category is given in Table 4.

Table 4: Licence Categories and Inspections, 2000

Category	Licences	Inspections
Dental Surgeons	746	10
Hospitals/Medical	108	24
Veterinary Surgeons	121	4
Industrial Gauges	101	39
Laboratory Instruments	88	11
Distributors	58	15
Laboratories	27	5
Industrial Radiography	23	12
Lightning Preventors	14	4
Process Irradiation Facilities and Cyclotron	4	4
Chiropractors	6	5
Miscellaneous	17	4
TOTAL	1313	137

Incidents

Eleven incidents which required the intervention of the Regulatory Service were reported to the Institute during the year. Fortunately, none of the incidents resulted in a significant exposure of a worker or member of the public.

The most serious incident was notified to the Institute in December by a licensed industrial user of radioactive substances. The company reported that three identical industrial gauges each containing 1.65 gigabecquerels (GBq) of americium-241 were inadvertently removed from its premises and disposed of as refuse in October 1999. The sources had not been in use for several years and were held in storage under licence.

Although, in this case, the housing of each source would have provided effective shielding against the emission of radiation, there is always a risk with the inadvertent disposal of a radiation source that it might by mischance come into the hands of an unsuspecting member of the public who might force open the housing and thereby expose themselves, and others, to the risk of serious injury. For this reason, the Institute is concerned that all radiation sources should be accounted for. Following a protracted investigation, however, it was not possible to establish with certainty in which landfill site the refuse containing the sources was disposed of. A prosecution on the matter is pending.

In March, the Regulatory Service was notified of an incident whereby a female patient had undergone an X-ray examination, in a clinic not attached to a hospital, while in the first weeks of pregnancy. A subsequent investigation by an Institute inspector confirmed that the dose to the foetus was not significant. Nonetheless, the Institute insisted that the licensee put in place tighter measures to prevent the recurrence of a similar incident.

Also in March, a package containing radioactive material was discovered by a member of the public on a passenger baggage conveyer belt at Dublin Airport. The package contained 57 megabecquerels (MBq) of phosphorus-32 and was en route to a licensee in this country. The dose rate from the surface of the package was very low.

The incident occurred because the package was loaded with passenger baggage at Heathrow Airport. Although Dublin Airport had been notified of the package, the ground crew did not read a message from Heathrow Airport and staff unloading the aircraft did not notice the dangerous goods label when loading the baggage onto the conveyer belt. Following an inspection, new procedures have been put in place to improve communications between the ground operations staff and baggage handlers. In addition, baggage handlers were given further training on the labelling and appropriate handling of dangerous goods.

Later in the same month, a licensee reported that a batch of recently-delivered vials containing iodine-125 labelled tracer appeared to have been damaged. The consignment consisted of 150 vials, each containing an activity of 370 kBq. One of the vials had broken and had contaminated 38 other vials in the

batch. Inspectors visited the plant and were satisfied that the vials had been monitored, decontaminated and segregated, in accordance with the licensee's radiation safety procedures. In addition, the inspectors were satisfied that no contamination of staff had occurred. Prompt action by the licensee and thoroughness in the decontamination process meant that a potentially hazardous incident was quickly brought to a successful conclusion.

Each year, since it was first installed in 1990, equipment used to screen scrap metal at the Irish Ispat steel manufacturing plant in Co. Cork has been activated by material entering the plant. During 2000, inspectors were called to investigate two separate incidents where radioactive material was detected in consignments of scrap metal. In both cases the source was found to be naturally-occurring radioactive material within the scrap metal. In the first case, the material, which was below licensable activity, was placed in secure storage at the plant, while in the second case the material was returned to the originating scrap yard where it is currently held under licence.

In June, the Institute learned of two separate incidents whereby a sealed source had been lost from a hospital. The sources were of low activity and were used as markers in nuclear medicine examinations. In both cases, the sources had not been returned to their storage containers following use and had gone missing. The Institute was satisfied that a comprehensive search for the sources was carried out at both hospitals and that measures were put in place to prevent further loss of such sources. As the radiological significance of both incidents was low, the Institute decided that no further action was warranted.

In July, the Regulatory Service was informed that a package containing tritium gas lights (1332 GBq of tritium) had been detained in London (Heathrow Airport) while en route from South Africa to Dublin. Subsequent enquiries by an inspector revealed that the lights were part of a larger consignment and were to be used to illuminate seat and row numbers in a cinema complex in Dublin. The Regulatory Service questioned the justification of the use of tritium gas lights for non-emergency lighting. A survey of the use of seat and row illumination in other Irish cinemas found that most cinemas did not have such illumination and that those that did use electricity as the source of power. The survey supported the Institute's opinion that the use of



"The regulation of the uses of ionising radiation in medicine, research and industry continues to be one of the principal responsibilities of the Institute".

tritium gas lights for this purpose was not justified. The tritium lights were subsequently removed from the cinema complex and returned to South Africa.

In October, the Institute was notified that a package containing six sealed radioactive sources was stolen from an office in a university. A search of the campus failed to uncover the package. Although the sources were of low activity, the Institute was keen that they be recovered. For this reason, it instructed the licensee to issue a press statement describing the package and advising anyone finding it to return it to the university or to hand it into the nearest Garda station. The package was not located.

Also in October, the Regulatory Service was notified of an incident involving industrial radiography which resulted in exposure of an employee. In this case, a visiting team of industrial radiographers failed to completely cordon off the area in which they were working, allowing an employee of the company to enter the area. The maximum dose that might have been received by the employee was estimated to be 0.18 mSv. While this incident did not result in a significant exposure, it was potentially serious. The Regulatory Service instructed the industrial radiography company in question to tighten its procedures regarding evacuation and demarcation of areas during radiographic work.

Prosecutions

During the year the Institute brought successful prosecutions against two companies in the industrial sector for breaches of licensing legislation. In the first case, the company was prosecuted for the unlicensed distribution of dental X-ray equipment. The Institute became aware of the company when a dentist applied for a licence declaring that she had purchased the machine from the company in question. In the second case, the company had failed to renew its licence, despite several reminders to do so.

New Legislation

In May, the Radiological Protection Act, 1991 (Ionising Radiation) Order, 2000 (S.I. No. 125 of 2000), was enacted giving effect to Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation.

The new statutory instrument replaces the Radiological Protection Act, 1991 (General Control of Radioactive Substances, Nuclear Devices and Irradiating Apparatus) Order, 1993 (S.I. No. 151 of 1993) under which licences were previously issued by the Institute. It also replaces the European Communities (Ionising Radiation) Regulations, 1991 (S.I. No. 43 of 1991) which gave effect to the previous Basic Safety Standards Directive and the European Communities (Protection of Outside Workers from Ionising Radiation) Regulations, 1994 which gave effect to Council Directive 90/641/Euratom.

The main changes concerning regulatory matters contained in the new Order involve the stricter application of the principles of radiation protection, including the use of dose constraints in keeping doses as low as reasonably achievable, and a more rigorous application of the justification principle. In addition, the new Order introduces a statutory requirement for all licensees to set down (and periodically review) radiation safety procedures and risk assessments. The exemption values (exemption from licensing) which apply to certain radionuclides have also been changed, so that some items, which previously did not require a licence, must now be licensed. Licensees are also required to consult a Radiation Protection Adviser (RPA) with regard to certain requirements of the Order.

During the year, the Regulatory Service reviewed and modified its licensing procedures to bring them into line with the new legislation. This involved the modification of licence application forms, as well as the production of guidance material on risk assessment and dose constraints.

In the area of transport regulation, the Regulatory Service participated in the drafting of new regulations covering the carriage of dangerous goods by both road and rail.

Peer Review Mission by the International Atomic Energy Agency (IAEA)

Early in the year the Institute requested the IAEA to carry out a peer review of the effectiveness and efficiency of the regulatory infrastructure in Ireland. The review, which took place in November, was conducted by experts from the IAEA, Germany and the

United States. The review comprised a comprehensive assessment of the relevant legislation and of licensing, inspection and enforcement procedures.

The review team concluded that the essential legal infrastructure for radiation protection was well established in Ireland and that the Institute was well placed to implement the regulatory infrastructure. They made specific recommendations with regard to licensing and inspection procedures, and advised that work priorities be reviewed to ensure that the activities of the Regulatory Service remain well focused.

Lectures and Presentations

The staff of the Regulatory Service gave eight presentations during the year on various aspects of the regulation of uses of ionising radiation. As in previous years, staff addressed the Radiological Protection Course at NUI Galway as well as the Diploma in Safety, Health & Welfare at Work (Occupational Hygiene) course at University College Dublin. Two participants taking the diploma course subsequently accompanied Regulatory Service inspectors in the course of their work as part of the course placement.

Presentations on the regulations governing the use of ionising radiation in Ireland were given to non-radiology hospital doctors at Cork University Hospital and St James's Hospital, to users of radioactive materials at Trinity College Dublin, to dentists working for the Eastern Regional Health Authority and to industrial radiographers attending a general radiation safety course organised by the Institute for Welders.

These presentations provide the Regulatory Service with excellent opportunities to communicate with a wide range of users of ionising radiation in medicine, industry and education. They were particularly useful in 2000 as a means of highlighting and clarifying the changes brought about by the new legislation.

Staff of the Regulatory Service were also joint authors of a paper presented at an IAEA International Conference on "Safety of Radiation Sources and Security of Radioactive Materials" at Buenos Aires, Argentina, on 11-15 December, 2000 ("Regulatory Control of Radiation Sources and Radioactive Materials in Ireland", A.T. McGarry, D. Fenton, T. O'Flaherty).

DOSIMETRY SERVICE/ INSTRUMENT CALIBRATION SERVICE

The Institute continues to provide a comprehensive range of personnel dosimetry services for assessing occupational exposure to ionising radiation. The highlight of the past year has been the awarding of accreditation by the National Accreditation Board. The Dosimetry Service was previously accredited for the use of film badges for whole-body monitoring and thermoluminescent dosimeters (TLDs) for extremity monitoring. Over the period 1994 to 1997 the use of film badges was gradually phased out and replaced by TLDs. The new accreditation covers both the new TLD whole-body monitoring and the existing extremity monitoring services offered by the Institute. Accreditation is required under recent radiological protection legislation (Statutory Instrument No. 125 of 2000) and extensive quality control procedures are in place so that all customers can have full confidence in the work carried out on their behalf.

The dosimeter types available include whole-body dosimeters capable of determining the dose from X- or gamma rays, beta rays or neutrons, and extremity dosimeters that measure the dose from X-, gamma or beta rays. During 2000 a total of 56,720 whole-body TLDs, 3086 extremity dosimeters and 948 neutron dosimeters were issued. The number of workers monitored was in excess of 6000.

The highest annual whole-body dose recorded in 2000 was 9.2 mSv received by an industrial radiographer. This dose compares with the legal annual dose limit for a radiation worker of 20 mSv.

Personnel undertaking research and working in the cardiology, radiotherapy and nuclear medicine departments of hospitals recorded measurable extremity doses. A hospital physicist working with unsealed sources recorded the highest annual extremity dose of 90.2 mSv. The same individual also recorded the highest extremity dose in 1999. Of the 29 extremity doses above 10 mSv, 27 were recorded by hospital employees. These doses compare with the legal limit for extremity doses of 500 mSv.

Instrument Calibration Service

The Institute offers a calibration service for ionising radiation dose/dose-rate meters used to measure ambient radiation intensity, surface contamination monitors and personal monitors/alarms used to give a direct reading of radiation dose. During 2000, 298

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 2000 a total of 533 sources were checked. None of the wipes contained greater than the allowable quantity of radioactivity specified in licence conditions.

As part of its ongoing quality assurance programme, the Calibration Laboratory took part in an international intercomparison organised by the Italian radiological protection organisation ENEA. The work programme involves the evaluation of the performance of the same electronic dosimeter by a total of 15 different calibration laboratories throughout Europe. Final results are not expected before mid-2002.

RESEARCH

Marine Radioecology

During 2000 the Institute commenced participation in a marine radioecology project called Processes Regulating Remobilization, Bioavailability and Translocation of Radionuclides in Marine Sediments, (REMOTRANS). The project is partially funded by the European Union under its fifth Euratom framework research programme in the area of Nuclear Fission Safety, and involves 12 laboratories in eight countries.

The principal aim of the project is to study the remobilization of radionuclides from contaminated marine sediments of different characteristics in different European marine environments. The fundamental mechanisms of remobilization will be examined and the long-term radiological consequences of such remobilization 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. The results will be of particular value in providing an improved understanding of the consequences of the past discharges from Sellafield to the Irish Sea, a significant proportion of which were deposited on sediments on the seabed and are now being released slowly.

An important starting point for the project is to assess the existing inventories of radionuclides in the sediments of contaminated regions. The Institute's role within the project is to provide an improved estimate of the inventory of plutonium in the sediments of the western Irish Sea, based on

currently available information and on the analyses of sediments collected from the bed of the Irish Sea. 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 western Irish Sea and it is this fraction that the Institute has begun to quantify.

In 2000 the Institute also commenced a two year marine research project partially funded by European Union structural funds under their regional provisions. The participants are an oceanographic group from the National University of Ireland in Galway, a modelling group from the French Institut de Protection et de Sûreté Nucléaire, and the Institute. The title of the project is Atlantic Modelling and Radionuclide Tracer Network and it brings together groups with expertise in the patterns of water circulation and radionuclide distribution in the Irish Sea, the Celtic Sea, the western Channel and the adjacent Atlantic Ocean. The objective is to produce a clearer description of sea water circulation in these areas. The project will also quantify the extent to which radionuclides discharged from the nuclear fuel reprocessing plant at Sellafield are transported southwards towards France and around the south coast of Ireland. It will also describe the dispersion of radionuclides discharged from the nuclear fuel reprocessing plant at La Hague in north-west France.

Terrestrial Radioecology

The Institute completed during 2000 a two year research project investigating the effectiveness and environmental impact of the field application of ammonium-ferric-hexacyano-ferrate (AFCF) as an agricultural countermeasure in the aftermath of a nuclear accident. AFCF is a compound that binds with radiocaesium and inhibits its transfer from soil to vegetation, thereby reducing its ingestion by grazing animals. Field studies were conducted on peatland sites in Cavan and Antrim and complemented by laboratory studies.

The project was funded by the European Union Special Support Programme for Peace and Reconciliation in Northern Ireland and was carried out jointly with the Food Science Division of the Department of Agriculture and Rural Development in Northern Ireland. The results showed that application of AFCF had little or no effect on the growth of plants either early or late in their growth seasons. It was also found that plant biodiversity, vegetation biomass and soil microbial processes were generally not adversely affected by AFCF applications.

It was concluded that AFCF may be safely used on peatland ecosystems as an agricultural countermeasure without any significant detrimental impact on the key environmental factors of plant growth, plant bio-diversity and biomass, soil microbial activity or invertebrate fauna.



“In 2000 the Institute also commenced a two year marine research project partially funded by European Union structural funds under their regional provisions”.

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 the Heritage Service of the Northern Ireland Department of the Environment.

Sellafield

The Institute provided continuing advice to Government on issues relating to Sellafield. The

storage of high-level liquid radioactive waste in tanks has been identified as representing possibly the greatest risk of an accident at Sellafield which could have serious consequences for Ireland. In 1998 BNFL agreed to give Institute personnel access, under certain conditions, to safety documentation relating to these tanks. A preliminary visit, during which plans for a longer visit were finalised, was made in 1999, and in 2000 Institute representatives spent two weeks at Sellafield undertaking a detailed examination of the documentation. They concluded that while the risk of an accident with serious off-site consequences was small, safety could be improved in a number of areas. Their report also called for an acceleration in the vitrification process which converts the liquid high-level radioactive waste into a safer solid form.

OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic

The Institute played a major part in the work of this Convention concerning radioactive discharges and related issues, in particular representing Ireland on the Convention's Radioactive Substances Committee. This Committee devoted considerable attention to progressing the OSPAR Strategy on Radioactive Substances with a view to achieving substantial and progressive reductions in discharges with the ultimate objective of their virtual elimination.

The Contracting Parties to the Convention decided at their annual meeting in June that the current authorisations for discharges or releases of

radioactive substances from nuclear reprocessing facilities should be reviewed as a matter of priority by their competent national authorities with a view to

- implementing the non-reprocessing option (for example dry storage) for spent nuclear fuel management at appropriate facilities;
- taking preventative measures to minimise the risk of pollution by accidents.

This Decision entered into force on 16th January 2001 and the Contracting Parties are requested to submit reports on their implementation of the Decision to the Radioactive Substances Committee in 2002/2003.

British-Irish Council

At the first meeting of the British-Irish Council (Environment Sectoral Group) held in London in October 2000, it was agreed that there were many areas of common interest in which work could be taken forward with added value to all participants on a co-operative basis. One of the areas identified was radioactive waste from Sellafield and the Institute is part of the Irish delegation dealing with this topic.

European Union

The Institute continued to provide the Irish delegates to a number of committees and working groups dealing with a wide range of nuclear safety, radiation protection, radioactive waste management and environmental issues at European Union level in

addition to providing advice for Irish delegates attending European Council and Council Working Group meetings.

Of particular interest during 2000 was the initiation of discussions about the multi-annual framework programme 2002-2006 of the European Atomic Energy Community (Euratom) for research and training activities aimed at contributing towards the creation of the European Research Area. This programme will embrace research into the treatment and storage of radioactive waste, controlled thermonuclear fusion, radiation protection, nuclear safety and safeguards and the activities of the EU Joint Research Centre (JRC).

A matter of particular concern to the EU is nuclear safety in Eastern Europe and particularly in those countries applying to join the EU. The EU Council decided that a high level of nuclear safety is a prerequisite for membership and established a Working Party on Nuclear Safety to assess the safety of nuclear power reactors in each of the candidate countries in relation to western safety standards. The Institute provides the Irish delegate to this Working Party.

In addition, the Council Working Party on Atomic Questions is assessing the safety of other types of nuclear installations including radioactive waste management facilities. Both Working Parties are also assessing the relevant national legal and regulatory infrastructures and the implementation of

commitments under the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. Both nuclear and non-nuclear Member States are involved in these assessments, and the Institute delegate to the Working Party on Nuclear Safety is responsible for coordinating the assessment of the safety of the nuclear power reactors in Romania and Slovakia.

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

Progress continued to be made during 2000 towards the entering into force of this Convention. By the end of the year 23 States had ratified it. The Institute assisted the Department of Public Enterprise in the preparation of the appropriate documentation to enable Ireland to ratify the Convention. Ireland's ratification process was completed early in 2001 and Ireland became the 25th country to ratify the Convention, thereby enabling it to come into force.

UK Strategy for Radioactive Discharges 2001-2020

The Institute carried out a detailed assessment of a report produced by the UK Department of the Environment, Transport and the Regions on its strategy for radioactive discharges, as well as of a closely related report entitled Statutory Guidance on the Regulation of Radioactive Discharges into the Environment from Nuclear Licensed Sites. These documents are intended to take account of the

requirements arising from the OSPAR Convention to reduce discharges such that concentrations of artificial radionuclides in the marine environment are "close to zero" by 2020.

It is the Institute's view that while the strategy report indicates that reductions will be made in the quantities of radionuclides being discharged to the marine environment, greater reductions could be achieved.

Incidents

The Institute was informed of 44 incidents at nuclear installations around the world in 2000, of which 15 were in the UK. The reports were received through the IAEA information service. In the case of incidents in the UK, reports were also received from the UK authorities and from the plant operators involved. None of these incidents had consequences directly affecting Ireland, but one involving the Magnox reactors at Wylfa in Anglesey, north Wales, was of particular concern in view of the proximity of this plant to Ireland. Cracks in welds in heat exchangers in the plant necessitated its closure for an extended period while remedial measures were put in place.

INFORMATION SERVICE AND PUBLICATIONS

The RPII is committed to disseminating information to the public about its activities. It does this through its Website, publications and reports and by co-operating with the news media in reporting on issues of public interest. The Website (www.rpii.ie) provides direct access to information on the work of the Institute and to electronic versions of its publications. The Website showed good usage during the year and the Institute is continuing to develop this facility.

During the year the Institute issued press releases on a variety of relevant issues, including results of radioactivity monitoring programmes and radon surveys in schools, and resulting press coverage was extensive. Over 160 requests for information from the news media were met with staff participating in radio and television programmes on 47 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. 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 with 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

Reports

Radioactivity monitoring of the Irish marine environment 1998 and 1999, RPII-00/1.

Guidelines on the implementation of radiation protection measures during diagnostic medical exposures of female patients of reproductive capacity, RPII-00/2.

Radioactivity of liquid high-level radioactive waste at Sellafield. An examination of safety documentation, RPII-00/3.

Scientific papers

Belli, M., Bunzl, K., Dawson, D.*, Delvaux, B., Gerzabek, M., Pasquale, A., Rafferty, B.*, Riesen, T., Shaw G., Strebl, F., Steiner, M., Wirth, E., 2000. Seminart Project: Derivation of parameters and modelling in semi-natural ecosystems.

In **Radiation Research, Volume 2 Congress Proceedings. Proceedings of Eleventh International Congress of Radiation Research Dublin, Ireland July 18-23 1999**. Volume 2 USA: IARR. p. 274-277.

Bordy, J.M., Stadmann, H., Ambrosi, P., Bartlett, D.T., Christensen, P., Colgan, T.*, Hyvönen, H., 2000. Performance test of dosimetric services in the EU Members States and Switzerland for the routine assessment of individual doses (photon, beta and neutron).

Radiation Protection Dosimetry, 89 (1-2) p. 107-154.

Fennell, S.G., Mackin, G.M., Madden, J.S., McGarry, A.T., 2000.

The national radon survey in Ireland.

In **Radon in the Living Environment**. Proceedings of a workshop organised by the EU Concerted Actions ERRICCA and RETRO and held in Athens, Greece 19-23 April 1999. CD-Rom.

Fennell, S.G.*, Pawitan, Y., Mackin, G.M.*, Madden, J.S.* and McGarry, A.T.*, 2000.

Radon risk mapping in Ireland.

In **Radon in the Living Environment**. Proceedings of a workshop organised by the EU Concerted Actions ERRICCA and RETRO and held in Athens, Greece 19-23 April 1999. CD-Rom.

Madden, J.S., McGarry, A.T., 2000.

Personal monitoring of workers in Irish workplaces.

In **Radon in the Living Environment**. Proceedings of a workshop organised by the EU Concerted Actions ERRICCA and RETRO and held in Athens, Greece 19-23 April 1999. CD-Rom.

McGee, E.J.*, Synnott, H.J.*, Johanson, K.J., Fawaris, B.H., Nielsen, S.P., Horrill, A.D., Kennedy, V.H., Barbayannis, N., Veresoglou, D.S., Dawson, D.E.*, Colgan, P.A.*, McGarry, A.T.*, 2000.

Chernobyl fallout in a Swedish spruce forest ecosystem.

Journal of Environmental Radioactivity, 48, (1), p. 59-78.

Rafferty, B.*, Brennan, M., Dawson, D.*, Dowding, P., 2000. Mechanisms of ¹³⁷Cs migration in coniferous forest soils.

Journal of Environmental Radioactivity 48, (2) p. 131-143.

Rafferty, B., Dawson, D., Synnott, H., 2000.

The fate and persistence of ¹³⁷Cs in forest ecosystems.

In **Radiation Research, Volume 2 Congress Proceedings. Proceedings of Eleventh International Congress of Radiation Research Dublin, Ireland, July 18-23, 1999**. Volume 2 USA: IARR. p. 288-291.

Ryan, T.P., Long, S., Smith, V., Dowdall, A.M., Pollard, D., Cunningham, J.D., 2000. Plutonium-241 and its progeny in Sellafield discharges to the Irish Sea and their impact on the Irish environment.

In **Radiation Research, Volume 2 Congress Proceedings. Proceedings of Eleventh International Congress of Radiation Research Dublin, Ireland, July 18-23, 1999**, Volume 2 USA: IARR. p. 306-309.

Synnott, H.J., McGee, E.J., Rafferty, B., Dawson, D., 2000. Long-term trends of radiocaesium activity concentrations in vegetation in Irish semi-natural ecosystems.

Health Physics, 79, (2), p. 154-161.

* RPII staff in conjunction with other authors.

General Articles

Fennell, S., 2000.

The national survey of radon in dwellings.

The Irish Scientist Millennium Year Book (8) p. 38.

Fenton, D.M., 2000.

Management of radioactive waste arising from medical establishments in the European Union: Ireland.

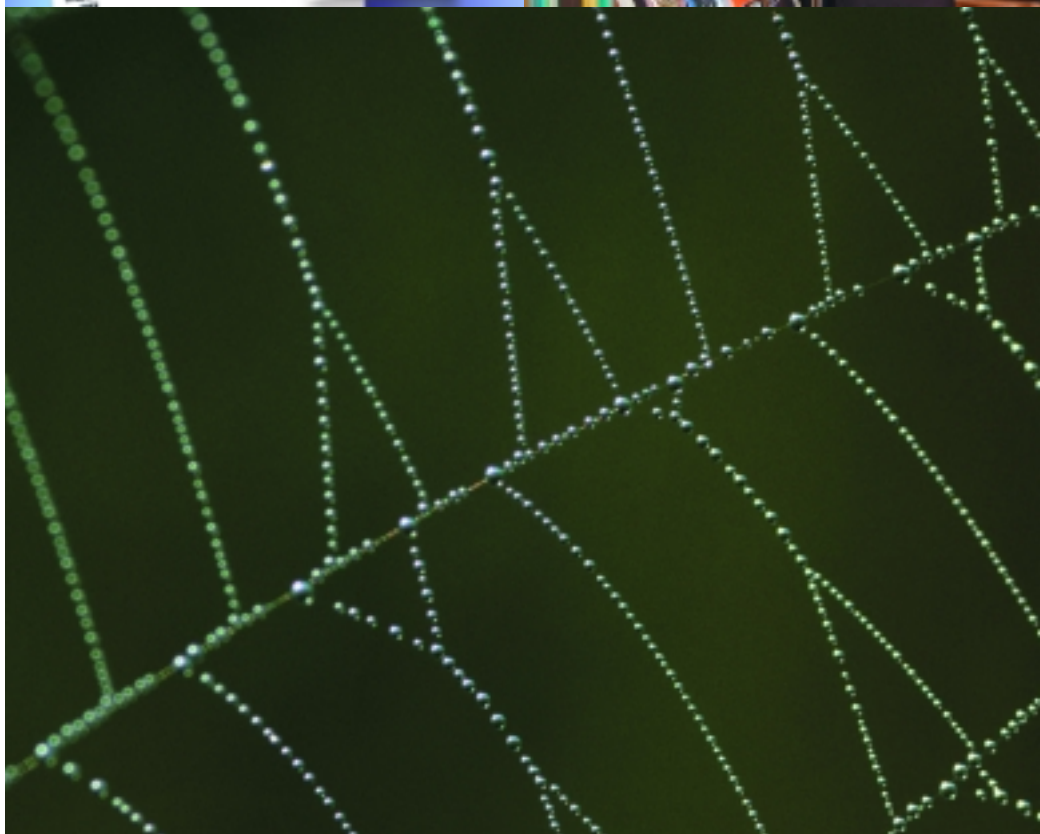
In **Proceedings of a workshop organised by the Directorate-General for the Environment, 16-17 February 1999, Brussels**. European Commission, p. 36-38.

Newsletters

Radiation Safety Review, Issue 4. 2000.

Brochures

Instrument Calibration Service for radiation monitors.
Radon: radiation in schools.



"The RPII is committed to disseminating information to the public about its activities."

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
Ian R. McAulay
Ann McGarry
James P. McLaughlin
Peter I. Mitchell
Darina Muckian
Tom O'Flaherty
Geraldine O'Reilly
David Pollard
Wil van der Putten
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
James Carr
David Clarke
Mary Coffey
John D. Cunningham
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
Geraldine O'Reilly
Wil van der Putten

Scientific Secretary

David Fenton

FINANCIAL STATEMENTS

Prompt Payment of Accounts Act 1997

The Prompt Payment of Accounts Act 1997 (the Act) came into operation on 2 January 1998. The Radiological Protection Institute of Ireland comes under the remit of the Act. The payment practices of the Radiological Protection Institute of Ireland are reported on below for the year ended 31 December 2000 in accordance with Section 12 of the Act.

(a) It is the policy of the Radiological Protection Institute of Ireland to ensure that all invoices are paid promptly. Specific procedures are in place to enable it to trace all invoices and ensure that payments are made before the due date. Invoices are registered daily and cheques are issued as required to ensure timely payment.

(b) The system of internal control incorporates such controls and procedures as are considered necessary to ensure compliance with the Act. The organisation's system of internal control includes accounting and computer controls designed to ensure the identification of invoices and contracts for payment within the prescribed payment dates defined by the Act. The accounts department produces a report that identifies unpaid outstanding invoices and this report is reviewed regularly.

(c) During the year the total number of late payments in excess of £250 (€317) was two with a total value of £4339 (€5509). These were on average 102 days over the due date. The total value of all late payments was £4522 (€5742), representing 0.4 per cent of total supplier payments. The penalty interest in respect of these payments was £126 (€160). Approximately 99.6 per cent of all payment demands were made within the prescribed timeframe.

Report of the Comptroller and Auditor

General pursuant to Section 13 of the Prompt Payment of Accounts Act, 1997

Responsibilities of the Institute and of the Comptroller and Auditor General

The Institute is obliged to comply with the Act and, in particular, is required to

- pay its suppliers by the appropriate payment date
- if payment to a supplier is late, include the appropriate penalty interest with the payment together with the information required by Section 6
- disclose its payment practices in the period in the appropriate way.

Under Section 13 of the Act, it is my responsibility, as auditor of the Radiological Protection Institute of Ireland, to report on whether, in all material respects, the Institute has complied with the provisions of the Act.

Basis of Opinion

My examination included a review of the payment systems and procedures in place and checking, on a test basis, evidence relating to the operation of the Act by the Institute during the year.

I obtained all the information and explanations which I considered necessary for the exercise of my function under Section 13 of the Act.

Opinion

As a result of my examination, it is my opinion that the Institute complied in all material respects with the provisions of the Act during the year ended 31 December 2000.

REPORT OF COMPTROLLER & AUDITOR GENERAL

I have audited the financial statements on pages 36 to 40.

Responsibilities of the Institute and of the Comptroller and Auditor General

The accounting responsibilities of the Institute are set out in the Statement of Responsibilities of the Institute on page 35. It is my responsibility, under Section 16 of the Radiological Protection Act, 1991, to audit the financial statements presented to me by the Institute and to report on them. As a result of my audit I form an independent opinion on the financial statements.

Basis of Opinion

In the exercise of my function as Comptroller and Auditor General, I plan and perform my audit in a way which takes account of 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, consistently applied and adequately disclosed.

My audit was conducted in accordance with auditing standards which embrace the standards issued by

the Auditing Practices Board, and in order to provide sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement whether caused by fraud or other irregularity or error. I obtained all the information and explanations that I required to enable me to fulfil my function as Comptroller and Auditor General and, in forming my opinion, I also evaluated the overall adequacy of the presentation of information in the financial statements.

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 2000 and of its income and expenditure for the year then ended.

John Purcell
Comptroller and Auditor General

5 November 2001

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 judgements 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

Francis J Turvey
Board Member

STATEMENT OF ACCOUNTING POLICIES

1. General

The Radiological Protection Institute was established in April 1992 in accordance with the provisions of the Radiological Protection Act, 1991.

Its functions include the provision of advice, the regulation of activities relating to the use of ionising radiation, the preparation of safety codes and the promotion of knowledge, proficiency and research in nuclear science and technology. Other functions are to monitor and measure levels of radioactivity in the environment, to assess their significance, to maintain a national laboratory for this purpose, and to assist in the development of national plans for emergencies arising from nuclear accidents.

The Radiological Protection Act, 1991 provided for the dissolution of the Nuclear Energy Board and the subsequent transfer of its functions and net assets to a new body to be known as the Radiological Protection Institute of Ireland. The Nuclear Energy Board was dissolved on 1st April 1992.

2. Accounting Convention

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 the Irish Pound. The Euro equivalents are shown for comparative purposes only.

3. Grants

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

4. Fixed Assets and Depreciation

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.

5. 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 £79,236 (€100,609) in 2000 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.

6. Capital Account

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

7. 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.

8. Income in Advance

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

9. Stocks

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

INCOME & EXPENDITURE ACCOUNT

FOR THE YEAR ENDED 31 DECEMBER 2000

1999 £		2000 £	2000 €
	Income		
1,704,000	Oireachtas Grant in Aid	1,746,000	2,216,963
(27,969)	Transfer (to)/from Capital Account (Note 2)	18,619	23,641
<u>1,676,031</u>		<u>1,764,619</u>	<u>2,240,604</u>
185,027	Dosimetry	196,334	249,293
184,474	Product Certification	177,545	225,436
230,314	Contract Income	224,183	284,654
804	Interest Income	1,707	2,167
69,122	Other Income	35,405	44,955
89,524	Licence Fees	93,606	118,855
<u>759,265</u>		<u>728,780</u>	<u>925,360</u>
<u>2,435,296</u>		<u>2,493,399</u>	<u>3,165,964</u>
	Expenditure		
1,291,147	Salaries and Pensions (Note 3)	1,374,079	1,744,720
102,063	Dosimetry Service	108,247	137,445
57,619	Library and Information Service	51,465	65,347
62,996	Radon and Radioecology	66,583	84,543
34,005	Emergency Plan	32,775	41,616
65,425	Environmental Monitoring	80,762	102,547
317,131	Accommodation and Insurance (Note 4)	308,999	392,348
88,334	Travel and Subsistence	87,667	111,314
101,376	Telephone, Postage and Office Supplies	95,431	121,172
29,333	Recruitment and Training	28,705	36,448
33,437	Miscellaneous including Professional Fees	14,372	18,247
4,524	Audit Fees	5,500	6,985
202,079	Depreciation (Note 1)	210,069	266,733
<u>2,389,469</u>		<u>2,464,654</u>	<u>3,129,465</u>
45,827	Surplus for year	28,745	36,499
178,393	Balance at 1 January	224,220	284,700
<u>224,220</u>	Balance at 31 December	<u>252,965</u>	<u>321,199</u>

The Institute has 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.

Francis J Mulligan
Chairman
Date: 23 October 2001

Francis J Turvey
Board Member
Date: 23 October 2001

BALANCE SHEET

AS AT 31 DECEMBER 2000

1999 £		Notes	2000 £	2000 €
802,856	Fixed Assets	1	784,237	995,777
	Current Assets			
251,741	Cash on Hand and at Bank		299,470	380,248
194,522	Debtors and Prepayments		161,502	205,065
	Stocks		40,823	51,835
<u>446,263</u>			<u>501,795</u>	<u>637,148</u>
	Creditors - amounts falling due within one year			
(134,336)	Creditors and Accruals		(208,830)	(265,159)
(87,707)	Income in Advance		(40,000)	(50,790)
<u>(222,043)</u>			<u>(248,830)</u>	<u>(315,949)</u>
224,220	Net Current Assets		252,965	321,199
<u>1,027,076</u>	Net Assets		<u>1,037,202</u>	<u>1,316,976</u>
	Financed by:			
224,220	Income and Expenditure Account		252,965	321,199
802,856	Capital Account	2	784,237	995,777
<u>1,027,076</u>			<u>1,037,202</u>	<u>1,316,976</u>

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

Francis J Mulligan
Chairman
Date: 23 October 2001

Francis J Turvey
Board Member
Date: 23 October 2001

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 DECEMBER 2000

1 Tangible Fixed Assets

	Leasehold £	Office and Laboratory Furniture and Equipment £	Motor Vehicles £	Total £	Total €
Cost:					
At 1 January 2000	620,838	3,058,152	17,415	3,696,405	4,693,467
Additions	-	191,450	-	191,450	243,092
At 31 December 2000	620,838	3,249,602	17,415	3,887,855	4,936,559
Depreciation:					
At 1 January 2000	237,538	2,652,528	3,483	2,893,549	3,674,049
Charge for year	20,175	186,411	3,483	210,069	266,733
At 31 December 2000	257,713	2,838,939	6,966	3,103,618	3,940,782
Net Book Value at					
31 December 1999	383,300	405,624	13,932	802,856	1,019,418
Net Book Value at					
31 December 2000	363,125	410,663	10,449	784,237	995,777

2 Capital Account

	2000 £	2000 €
Balance at 1 January 2000	802,856	1,019,418
Transfer (to)/from Income and Expenditure Account:		
Grants allocated for Capital purposes	191,450	243,092
Grants amortised in year	<u>(210,069)</u>	<u>(266,733)</u>
Balance at 31 December 2000	(18,619)	(23,641)
	<u>784,237</u>	<u>995,777</u>

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 DECEMBER 2000

3 Salaries and Pensions

	1999 £	2000 £	2000 €
Gross Salaries	1,331,596	1,412,679	1,793,731
Employer's P.R.S.I.	35,988	40,636	51,597
Pension Deductions	(76,437)	(79,236)	(100,608)
	<u>1,291,147</u>	<u>1,374,079</u>	<u>1,744,720</u>

Breakdown of Salaries and Pensions

Administration	222,277	223,215	283,424
Regulation/Dosimetry/Licensing	346,524	340,359	432,167
Environmental Monitoring	301,474	302,833	384,518
Information/Radon/Radioecology	299,632	341,345	433,419
Emergency Plan	96,252	124,124	157,605
Nuclear Safety	24,988	42,203	53,587
Charged to Income and Expenditure Account	<u>1,291,147</u>	<u>1,374,079</u>	<u>1,744,720</u>

The average number of full-time permanent persons employed, excluding Board Members, in the financial year was 42 (1999 - 42).

4 Commitments and Lease Obligations - Operating Leases

3 Clonskeagh Square

Lease commitments payable in the next twelve months amount to £195,000 (€247,599) 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 1 October 1998.

Floor 1, Block 1, 1 Clonskeagh Square

Lease commitments payable in the next twelve months amount to £10,000 (€12,697) 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 October 2001.