JRC
EUROPEAN COMMISSION

Highlights of the JRC
50 years in science

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Table of Contents

Foreword

Roland Schenkel,
Director-General of the Joint Research Centre

2007 is the 50th anniversary (1957-2007) of peace, cooperation and prosperity in Europe. This calls for reflection and acknowledgement of what our founding members have achieved and how they achieved it. It is important to consider the integration of new Member States and how we, the EU of today, will shape the Europe of tomorrow.

In 1957, two Treaties of Rome were signed: one to establish the European Economic Community (EEC) and one to establish the European Atomic Energy Community (Euratom).

The Joint Research Centre was originally established under the Euratom Treaty. Euratom's role was to promote nuclear safety and security in Europe and the JRC has been contributing to this aim with its research activities ever since.

The JRC has, however, at the request of its customers, expanded to also embrace other fields important to policy making, such as life sciences, energy, security and consumer protection. It has transformed itself from a purely research-driven organisation focussing on nuclear technology and energy to a customer-driven, research-based policy- support organisation. Today, the JRC is deeply embedded in the European Research Area and the EU legislative process.

I invite you to browse through this brochure, taking note of how the Institutes of the JRC in Geel, Ispra, Karlsruhe, Petten and Seville have developed in response to the policy needs of a rapidly developing and evolving European Union.

On behalf of the JRC, I extend my gratitude to our stakeholders and staff and I acknowledge their vision and dedication. We will continue to build on this rich heritage.

Introduction

A JOURNEY THROUGH TIME – AND RESEARCH

Our mission

To provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

Developments in science and technology impinge on all aspects of our society today, creating new opportunities and challenges. The Joint Research Centre (JRC) serves European citizens by providing scientific and technical support to European policy-makers. The JRC is a Directorate-General of the European Commission, and strives to act as a reference centre for research-based policy support in the EU.

The JRC comprises seven institutes, which carry out customer-driven research of direct concern to Europeans. Over the years, the JRC has developed special skills and unique tools to use science for providing and assessing policy options. Its activities range from the risk assessment of chemicals to the forecasting of natural disasters, from evaluating product safety standards to providing assistance to humanitarian crises.

After half a century of developments and achievements, the JRC is today an impressive research organisation and plays an important role in supporting EU policy-makers. Its 50th anniversary is the perfect time to look back at the history of the JRC and celebrate what has been accomplished so far, as well as to reflect on what the future holds.

This brochure is certainly not a complete history of the JRC. Instead, we have selected highlights from each of the last decades to underline the scientific successes of the JRC and the positive impacts these have had on the everyday life of Europe's citizens. We begin by showing the moment when it all began, the signing of the Treaties that would launch the JRC.

We quickly move to the inauguration of each of the JRC Institutes and then follow the evolution of the JRC, starting in the 1950s when its focus was on nuclear research. As we move forward through time, we see how nuclear research evolves from reactor-development and safety research to the safety of the fuel cycle and nuclear safeguards (keeping track of nuclear materials). We also see how the JRC has expanded its research activities into many other areas of prime concern to European citizens, from food safety to renewable energy, from environmental protection to internet security.

Photographs are used to illustrate the physical construction and transformation of the JRC, as well as some of the tangible outcomes of its work. We will see some JRC staff and learn about some of the important visits made by well known individuals to the different sites and Institutes of the JRC. A timeline places the development of the JRC in the context of the evolution of the EU and shows how the Centre has moulded itself in response to European needs, events, social change and an ever-expanding Union.

In 2007, the JRC comprises seven institutes in five Member States.

GEEL, BELGIUM

The Institute for Reference Materials and Measurements (IRMM) validates and develops new or improved testing methods to ensure that results are reliable. It is one of the largest reference-material providers in the world and a provider of neutron data. Its aim is to encourage the use of standards across the EU, for example for testing for contaminants in food, detecting animal infection, identifying genetically modified ingredients or monitoring radioactivity.

ISPRA, ITALY

The Institute for the Protection and Security of the Citizen (IPSC) provides scientific and technical support on EU security policies, particularly in the areas of global security and stability, border management, transport and energy security, and nuclear safeguards. IPSC also works in the fields of risk prevention and management, antifraud and econometrics.

The Institute for Environment and Sustainability (IES) supports policies aimed at the protection and sustainable development of the European and global environment. It covers all environmental sciences, with particular competences in the fields of remote sensing and Earth observation.

The Institute for Health and Consumer Protection (IHCP) carries out research to improve the understanding of health risks in the food chain, chemicals, drugs and biochemical systems in order to support the development and implementation of EU policies in these areas.

KARLSRUHE, GERMANY

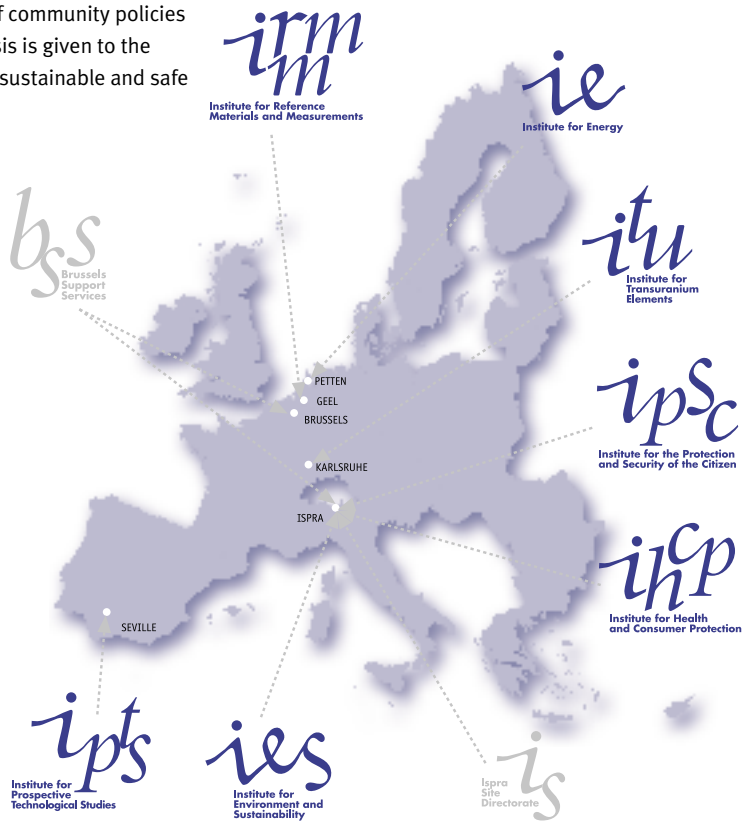
The Institute for Transuranium Elements (ITU) helps to protect the citizen by contributing to the safety and security of the nuclear fuel cycle, including evaluation of methods to extend the life of fuel and improved waste management for very long-term storage of spent fuel.

PETTEN, THE NETHERLANDS

The Institute for Energy (IE) provides scientific and technical support for the conception, development, implementation and monitoring of community policies related to energy. Special emphasis is given to the security of the energy supply and sustainable and safe energy production.

SEVILLE, SPAIN

The Institute for Prospective Technological Studies (IPTS) carries out techno-economic analysis to support EU policy-making. It does so by researching science-based responses to policy challenges that have a socio-economic dimension, as well as a scientific or technological connection.



Signature of the Treaties of Rome

On 25 March 1957, high-level representatives from six countries (Belgium, France, Germany, Italy, Luxembourg and The Netherlands) met in Rome to sign the Treaty on the European Economic Community (EEC) and the Treaty on the European Atomic Energy Community (Euratom).

Treaty establishing the European Atomic Energy Community

Article 8

1. *After consulting the Scientific and Technical Committee, the Commission shall establish a Joint Nuclear Research Centre. This Centre shall ensure that the research programmes and other tasks assigned to it by the Commission are carried out. It shall also ensure that a uniform nuclear terminology and a standard system of measurements are established. It shall set up a central bureau for nuclear measurements.*
2. *The activities of the Centre may, for geographical or functional reasons, be carried out in separate establishments.*

The birth of the JRC

The last five decades have witnessed the inauguration of seven scientific Institutes which, together with the horizontal directorates and the office of the Director-General, make up the present-day JRC.

April 1959
Inauguration of the Ispra Site by the President of the Italian Republic (Ispra, Italy).

May 1960
Inauguration of the Central Bureau for Nuclear Measurements (Geel, Belgium).
This would later become the Institute for Reference Materials and Measurements (IRMM).

October 1962
Inauguration of the Petten site (The Netherlands) which was named the Institute for Advanced Materials in 1989 and later renamed the Institute for Energy (IE) in 2001.

April 1965
Pierre Châtenay, President of the Euratom Commission, inaugurated the Institute for Transuranium Elements (ITU, Karlsruhe, Germany).

September 1994
The Institute for Prospective Technological Studies (IPTS, Seville, Spain) was officially inaugurated.

October 1998
The Institute for Health and Consumer Protection (IHCP) was established (Ispra, Italy).

September 2001
The former Environment Institute and parts of the Space Applications Institute were merged to form the Institute for Environment and Sustainability (IES, Ispra, Italy).

September 2001
The former Institute for Systems, Informatics and Safety and parts of the Space Applications Institute were merged to form the Institute for the Protection and Security of the Citizen (IPSC, Ispra, Italy).

PART 1

Scientific Achievements

1957 > 1969

PUTTING THE ELEMENTS TOGETHER

Following the Second World War, and in particular the energy crisis caused by the Suez war in 1957, nuclear energy was seen as one of the main future means of energy generation in Europe. As the nuclear industry started to expand at an unprecedented rate, national authorities in many European countries considered it critical to be able to further develop nuclear knowledge: for example, neutron data were urgently needed for reactor design, waste management and reactor safety calculations.

With a view to achieving this, in 1957 the European Atomic Energy Community (Euratom) Treaty was signed by six European countries. This called for the European Commission to establish a Joint Nuclear Research Centre, and a budget and research activities for the following years were defined. A series of sites at different locations across Europe were taken over by the European Commission. Together, these sites would work to research nuclear energy, safety and security.

JRC had laboratories for analytical chemistry since the very beginning.

AND SO IT BEGAN

1958 marked the start of the construction of an italian nuclear research establishment at Ispra, Italy. The Ispra-1 nuclear reactor was completed within a year and, in 1959, Italian authorities agreed to pass the site over to the European Commission who decided, in July 1960, to establish part of the JRC (Euratom) at the Ispra Site. The Ispra-1 nuclear reactor was then completed and later, in 1962, design work began for another reactor named ESSOR.

These were used for the initial nuclear research themes at Ispra, which were directed towards reactor development (reactor physics, materials and safety) and learning more about the fuel cycle.

During the second half of the sixties, nuclear reactor safety had become an issue of increasing importance for the nuclear industry and national authorities. As a consequence, activities in analytical and experimental reactor safety research were started.

HIGH FLUX IN A LOW COUNTRY

In 1957, Dutch authorities decided to establish the Reactor Centre Netherlands (RCN) in Petten, where they would build the High Flux Reactor (HFR) that was to be used for material research. Construction started in August 1957.

In 1962, the reactor became fully operational and the HFR would remain a focal point for nuclear research for many years to come.

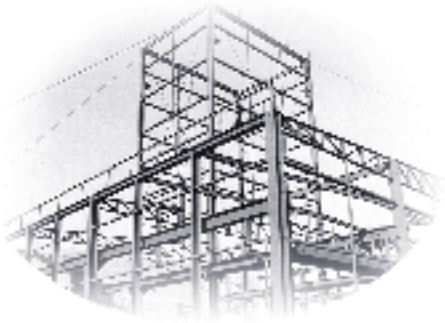
The reactor was used for research into safety, for testing new components and fuels for the European civil nuclear power programmes, and for performing materials testing.

Construction of the HFR reactor, Petten.

A CALCULATED DECISION

Meanwhile, in 1960, the Central Bureau for Nuclear Measurements (CBNM), was established in Geel, Belgium. The CBNM specialised in nuclear measurements for isotope analysis and absolute measurements of radiation and neutron absorption, essential in understanding how to safely produce nuclear energy.

In 1962, the Van de Graaff (VdG) accelerator was installed and, in 1965, the linear electron accelerator was inaugurated. In addition, mass spectrometry laboratories were constructed between 1962 and 1963.



Construction of the Van de Graaff building.

IMPRESSIVE PIN PRODUCTION

The laboratories of the Institute for Transuranium Elements (ITU) became operational in 1964 and the **"hot cells"** needed for examining irradiated fuels were used from 1966 onwards.

The first plutonium sample to be tested was introduced into a **glove box** on 10 February 1965.

The initial results on nuclear fuels were obtained by the research teams in an impressively short time.

The most spectacular outcome was the production of 2100 metallic fuel pins for the French reactor Masurca in Cadarache – this was achieved in just nine months.

Construction of the ITU in 1963.

Too hot to handle

*A **hot cell** is a heavily shielded room in which radioactive materials can be handled remotely using robotic or other remote manipulators and viewed through protected windows.*

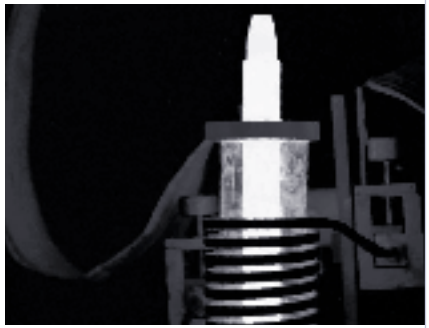
Manipulating fuel rods – safety precautions.

When is a glovebox not for gloves?

*A **glovebox** is a sealed container designed to allow a scientist to manipulate objects while being in a different atmosphere. Built into the sides of the glovebox are two or more gloves so users can perform tasks inside the box without breaking the seal or damaging their hands.*

FIRST OF A KIND

Experiments in Ispra included studies on and the development of European prototypes for novel lines of nuclear power reactors, such as ORGEL (Organique-Eau Lourde), with the ORGEL Critical experiment (ECO) and the construction of the reactor experiment ESSOR (Essai ORGEL).



Reactor safety research in ECO.

1970 > 1979

SHAKING UP RESEARCH IN EUROPE

The public debate in the 1960s had coined two new terms – 'technology gap' and 'brain drain'. The 1970s began with growing concern over the widening gap in R&D efforts and achievements between Europe and, most notably, the US. The overly-fragmented research efforts in Europe sparked the need to increase European research collaboration and coordination.

DIFFICULT TIMES

The JRC entered into a very difficult period when the Council could not reach immediate agreement on a new multi-annual programme after the second five-year period (1963-1967). The JRC was left in a situation where new initiatives proved difficult and where much imagination was needed by those who, fortunately, continued to trust that the JRC could find a new future and a fresh approach to continue its activities in the service of Europe. The competences vested in the staff, alongside the fine – and sometimes even unique – equipment situated at all four JRC sites, would prove to be a solid foundation for the future. A new era was finally initiated for the JRC early in the next decade (1973), fostered by the new European developments that began to appear at that time.

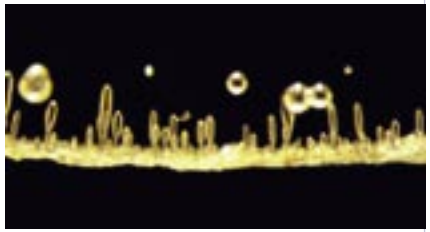
RESPONDING RAPIDLY

The beginning of the decade saw investigations related to the safety of fuel used in "fast reactors" (more efficient than conventional nuclear reactors).

The JRC's Institute for Transuranium Elements undertook a series of experiments looking at how dense fuels, like uranium-bearing carbides and nitrides, increase in volume during the reaction process.

Extensive analyses were used to work out the ideal conditions for the fabrication and irradiation of the carbide and nitride fuels needed for the fast reactors.

In order to develop safety measures, research also focused on discovering how fuels would react if there was a severe core meltdown.



ITU fire experiment in a glove box.

GOING SOLAR

The direct conversion of sunlight into electrical energy was first demonstrated by Edmund Becquerel more than 150 years ago. The European Solar Test Installation (ESTI) has the primary objective of providing the scientific and technological basis for a sound and credible assessment of all aspects of photovoltaic energy. It assists both policy makers and industry, and provides scientific input to standards organisations and national agencies. Over the past 30 years, ESTI has developed into one of the worlds leading laboratories for photovoltaic reference measurements. In 2004, ESTI became the world's first laboratory to obtain accreditation for the calibration of photovoltaic devices.

NOT JUST NUCLEAR

In response to new policy priorities, the JRC began to broaden its scope of research, branching out from the nuclear field into other areas. It continued to strengthen, build on and expand its existing capabilities. This led to programmes on renewable energy (notably solar energy), informatics, and materials research.

The JRC used its experience in high temperature materials in the previous decade to inspire a fresh approach and undertook other programmes and projects, including the evaluation of new hydrogen-based technologies.

The Ispra solar house – also useful in winter time.

SEEING THROUGH THE HAZE

Building on its many scientific disciplines, such as chemistry, the JRC began to develop new competencies. These gave rise to different kinds of environmental research, including work on air pollution and its effects on citizens. The JRC launched projects involving the collection and analysis of data on chemical substances and their possible impact on the environment.

The JRC also started to develop remote sensing from space which could be used for studying pollution and monitoring agriculture and natural resources.

Research on remote sensing applications started in the 1970s.

BACK ON TRACK

The JRC work areas were formalised from 1973 onwards in the multi-annual research work programmes adopted by the Council, including resource allocation, which facilitated orderly long-term planning of research and finances. Once again, it became possible to plan and implement new experimental facilities and equip the laboratories to meet novel requirements. A committee of experts was established for each individual programme where national representatives provided guidance for the research and ensured the transfer of research results throughout the Community and Member States.
A general advisory committee of national representatives was established over the entire JRC. This was later strengthened and transformed into a governing board and then, in the following decade, into the Board of Governors, as we know it today.

1980 > 1989

COMBINING FORCES

During the 1980s, there was widespread debate across the European Economic Community on how research and technological development activities could strengthen industrial competitiveness in the Community. This led to the launch of industry-related programmes and improved collaboration between industry and research.

At the same time, the multi-annual programmes adopted by the European Council called for better research results. To achieve these, the JRC was increasingly invited to work more closely with national research bodies. Nuclear safety remained heavily on the minds of the public – and high on the scientific agenda.

SUPER COLLABORATION

Together with the *Commissariat à l'Énergie Atomique* (CEA), during the eighties the Institute for Transuranium Elements (ITU) launched the experiment SUPERFACT. The aim of the CEA and ITU scientists was to prove the feasibility of "transmutation", reducing the radioactivity of waste by transforming long-lived radio-isotopes into short-lived once. This involved carrying out an irradiation experiment on nuclear fuel in the Phenix fast reactor in Marcoule (France). The ITU was in charge of aspects relating to the fuel, while the CEA performed the feasibility studies and the irradiation. Together, the two organisations performed the post-irradiation examinations and interpreted the findings.

The experimental data gained through these irradiation experiments were an important element in the debate launched in France on the treatment of the end products of the fuel cycle and the possibility of transmutation. For these studies, the ITU, based in Germany, was the first non-French institute to get the "CEA Prize", which is awarded annually and is designed to help a research team, department or institute.

SHINY AND NEW

Surveillance programmes at Petten had revealed that the vessel in the High Flux Reactor (HFR) – used for testing nuclear fuels – was becoming brittle and needed to be replaced.

The detailed design phase for the new vessel took two years, accompanied by an assessment of future needs to determine which specialised equipment should be installed at the same time. Finally, the dismantling began in early 1984, followed by cleaning, inspection and an overhaul of the reactor and storage pools. The new reactor was fully installed in October 1984.

The replacement of the reactor pressure vessel in 1984 paved the way for new irradiation possibilities.

This included an increase in the production of radiopharmaceuticals for diagnosis, therapy, and pain treatment. Nowadays, hospitals could not imagine working without nuclear medicine and, every day, many thousands of patients around Europe are treated with radiopharmaceuticals from the HFR. The production of radio-isotopes was outsourced to an industrial company, the operations were handed over to the Nuclear Research and consultancy Group (NRG) and the JRC uses the reactor today for research into the reduction of radioactive waste and the safety of future reactor designs.

Other important work by the HFR includes the operational safety of current reactors, also with regard to Eastern Europe. The HFR is a safe and highly reliable multi-purpose reactor which will undoubtedly continue to play a key role in nuclear and nuclear-medicine research in the future.

Irradiation

Irradiation is the process by which an item is exposed to radiation energy in the form of waves or particles.

ENHANCING REACTOR SAFETY

In the aftermath of the Three Mile Island accident in 1979 and the Chernobyl disaster in 1986, the Loop Off-Normal Behaviour Investigations (LOBI) project, launched in 1974, gained increased international interest in the field of reactor safety research. The project focused on the experimental and analytical investigation of reactor safety problems, and in particular on assessing the performance of the installed safety and emergency cooling systems in LOCA conditions. The results have been used for the further development and verification of computer models and codes applied by licensing authorities for the reactor safety analysis. After termination of the LOBI experiments, the results were placed on the web for worldwide access.

LOBI Project - Testing facility.

OBSERVING THE EARTH FROM SPACE

In the late eighties, the JRC started the Monitoring Agriculture with Remote Sensing (MARS) project, which has developed, tested and implemented new methods and tools specific to agriculture using remote sensing.

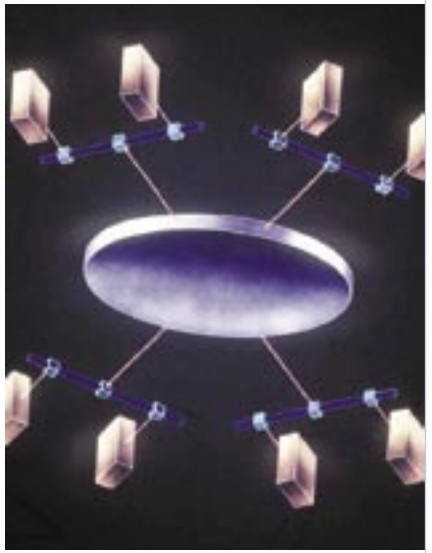
MARS is able to provide statistics on crops and yields in any given area, contributing towards a more effective and efficient management of the Common Agricultural Policy.

STRONGER TOGETHER

JRC research collaboration has taken many forms contributing, for example, to Europe-wide nuclear fusion programmes through its materials research and working with other European organisations in carrying out remote sensing from space. Public benefits were enhanced through many projects, such as the launch of the European Inventory of Existing Chemical Substances in 1987, which made data available on over 10000 chemical substances. Following the Chernobyl disaster, a databank was compiled to store information from all over Europe on environmental radioactivity.

PRIORITY TO THE PEOPLE

JRC participated in the first European Informatics Network, a far-reaching telematics network which offered users access to databases throughout European countries.



JRC - Ispra was a partner in pioneering European informatics networks.

1990 > 1999

GROWING AND ENERGISING

In this decade, the JRC further developed its work in areas such as environmental impact and nuclear energy, and focused heavily on public health, safety and security. It also moved into entirely new fields, reflecting the developments of the time: for example, at the end of the nineties, food scares such as BSE ('mad cow disease') and dioxin contamination led to the creation of the Directorate-General for Health and Consumer Protection, separating the issue of food safety from that of industry and the environment.

For the JRC, this meant the creation of the Institute for Health and Consumer Protection (IHCP).

Furthermore, the need to address new policy challenges involving both a socio-economic and a scientific or technological dimension, led the JRC to establish its Institute for Prospective Technological Studies (IPTS).

SORTING THE PAPE FROM THE PLONK

At the end of the eighties, many cases of wine fraud were uncovered. These involved the sugaring and watering of wine, as well as false claims concerning authenticity. To protect consumers from such misleading practices, in 1993 the European Commission established the European Office for Wine, Alcohol and Spirit Drinks (BEVABS) at the JRC. Using magnetic resonance, scientists are able to identify where a wine is from and whether sugar has been added. Information is then entered into a central database, managed by BEVABS, which is today part of the IHCP.

The JRC's role in food and drink expanded widely in this decade and, in 1998, the Institute for Health and Consumer Protection (IHCP) came into fruition. The IHCP performs activities in support of food and feed legislation.

SOUND ADVICE ON CHEMICAL RISKS

In 1993, the European Chemicals Bureau (ECB) was established within the former Environment Institute, today part of the IHCP.

The ECB hosts major EU databases on chemicals and provides scientific and technical advice for the development of EU policies on dangerous chemicals. This includes significant input into the implementation of the new chemical legislation REACH, which came into force in early 2007. In particular, the ECB is managing and preparing the technical guidance documents for use by the chemicals industry and the Member State authorities. This has enabled a smooth start to the policy and the establishment of the fully operational European Agency in Helsinki, in June 2008.

MERGING INSTITUTES, BROADENING RESEARCH

In the mid-nineties, the Safety Technology Institute (STI) and the Institute for Systems Engineering and Informatics (ISEI) merged to form the Institute for Systems, Informatics and Safety (ISIS). During this process, new lines of research also opened in non-nuclear domains where the JRC's expertise could be applied. This included monitoring and anti-fraud, analysing the safety and security of chemical installations, and assessing transport systems and infrastructures.

Later, ISIS would join with part of the Space Applications Institute to form the Institute for the Protection and Security of the Citizen (IPSC), while the Environment Institute (EI) and another part of the Space Applications Institute (SAI) amalgamated to form the Institute for Environment and Sustainability (IES).

FIGHTING POLLUTION

In 1997, the European Commission set up the European Integrated Pollution Prevention and Control Bureau (EIPPCB). The bureau helps to implement EU rules aimed at preventing or reducing pollution from industrial sources, and achieving integrated control of their emissions and consumption of energy, water and raw materials. It produces guidelines for EU Member State authorities to follow in setting emission limits for industrial processes.

Waste from a Polish copper mine: an issue for EIPPCB.

BRANCHING OUT

In a bid to discover more about climate change and its impact on our society, the project TRopical Ecosystem Environment observation by Satellite (TREES) was initiated in 1991. Its aims were to develop techniques to enable the creation of a global tropical forest inventory, to detect and monitor deforestation, and to set up a comprehensive Tropical Forest Information System. It has, among other things, provided unique insight into the ecosystems of Africa, Central and South America and Southeast Asia.

STOP THE SMUGGLERS

Since the early 1990s, there have been numerous instances of illicit trafficking of many types of nuclear materials worldwide, including materials suitable for producing nuclear weapons. In ongoing efforts to assist in preventing this, the JRC has put a team of nuclear forensic experts on standby at all times to respond immediately to any seizure of nuclear material in the EU. A first analysis is then delivered to the appropriate authorities within 24 hours of a sample arriving at the Institute of Transuranium Elements (ITU). The analysis reveals the nature of the material and the associated radiological hazard. A subsequent, more detailed analysis then provides clues on the origin of the material, date and location of production and its intended use.

Collecting samples for nuclear forensic analysis.

EN GUARD

In support of the International Safeguards Authorities, the JRC played an important role in developing tools and methodologies to verify that nuclear material intended for electricity production could not be diverted for use in clandestine activities.

It was also responsible for setting up – and is now running – specialised laboratories for monitoring the flow of nuclear material at reprocessing plants in France and the UK.

The JRC built and operates a Performance Laboratory (PERLA) in Ispra for the research, development and testing of non-destructive analysis equipment for nuclear safeguards. This lab is also used for training of Euratom and IAEA (International Atomic Energy Agency) inspectors.

Analysing nuclear materials at the ITU.

JOINED-UP THINKING

In order to get the best research results and share best practices, the JRC headed a series of international networks, which focused on nuclear issues. With public concern over the safety of ageing plants, the JRC continues to provide impartial technical advice on matters such as the operational safety of reactors.

A FLOW OF INFORMATION

In 1997, the JRC started activities on flood hazard and flood damage assessment. A model was designed to simulate flood events (LISFLOOD) in order to understand more about their impact. Flood extent mapping, achieved by SAR (Synthetic Aperture Radar), was evaluated for its efficiency in assessing flood damage – vital in allowing authorities to initiate an appropriate response.

Today, LISFLOOD has evolved into an early-warning system for floods in major river basins in Europe. It is able to predict floods between three and five days in advance, contributing to damage prevention and saving lives.

Images taken during the Elbe flood in August, 2002.
Aerial photos © pik-postdam.de

SUPPORT NEAR AND PHARE

From 1991, the JRC has provided assistance to the European Commission in supporting the transition in Eastern countries – under the TACIS Programme, for New Independent States, and the PHARE Programme, for Central Eastern European Countries. The JRC helped specifically with the nuclear safety programmes in these regions, in areas such as operational safety, waste management, technical support and results dissemination.

COMMUNITY ACQUIS

Launched in 1999, the JRC's Enlargement Programme was designed to promote collaboration with Candidate Countries' scientists, to help them integrate into the European Research Area and take up the Community Acquis. The programme includes workshops, training courses and temporary stays for visiting scientists.

OTHER OPTIONS

With growing concern over animal welfare and a need to improve the accuracy of chemical testing, in 1991 the European Centre for the Validation of Alternative Methods (ECVAM) was set up.

ECVAM, part of today's Institute for Health and Consumer Protection (IHCP), is responsible for validating methods to reduce, refine and replace animal testing.

Alternative testing method at ECVAM.

SEEING GREEN

In 1992, a project called EcoCentre was set in motion by the JRC. It was designed to demonstrate the feasibility of improving the environmental impact of an ageing research infrastructure; for example, by reducing site energy consumption through both retrofitting and new, low-energy construction.

The retrofitted Mensa building (Ispra), February 1996.

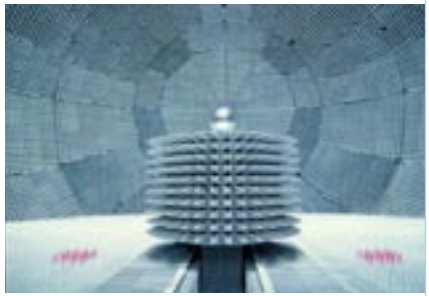
SAFE AND SECURE STRUCTURES

With the creation of the European Laboratory for Structural Assessment (ELSA) in the early nineties, the JRC started research in the field of earthquake and structural engineering. ELSA has since developed to become the worldwide leader in pseudo-dynamic testing with substructuring for earthquake simulation.

The European Laboratory for Structural Assessment, Ispra (Italy).

MEASURING MICROWAVES

In 1992, the European Microwave Signature Laboratory (EMSL) was inaugurated in Ispra. Specialising in measurement capabilities in the field of microwave remote sensing, the laboratory has been successfully used in other research fields such as antenna measurements, non-destructive testing, and detection of buried objects, such as landmines.



Target calibration in the EMSL microwave laboratory.

GOOD GUIDANCE

A Board of Governors for the JRC was founded in order to involve Member States in strategic decisions. Comprising top representatives from EU Member States, Candidate and Associate Countries, the Board advises on strategy, work programmes, budget and high-level appointments.

2000 > 2007

PREPARING FOR THE FUTURE

Technological advancements were continuing to develop at an impressive rate and were enhancing numerous aspects of everyday life across Europe. In this decade, amidst new ways of producing food, energy and consumer goods, the safety and well-being of EU citizens had to remain a priority.

GMOs: CONSUMER CHOICE

In 1998, the JRC started its activities on detection of genetically modified organisms (GMOs) in food by validation of analytical methodologies in the Institute for Health and Consumer Protection (IHCP) and production of certified reference materials in the Institute for Reference Materials and Measurements (IRMM). This led to the creation of the European Community Reference Laboratory (CRL) for GMOs in food and feed in 2004.

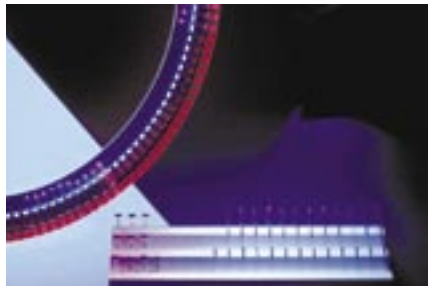
Besides its activities on control of GMOs in food and feed, this CRL collaborates closely with the European Food Safety Authority (EFSA) to support the authorisation process of GMOs in the EU.

Genetically modified corncob (Bt maize).

BETTER TESTING FOR SAFER FOOD

In 2002, a significant part of the activities on food and feed safety and quality was moved from the IHCP to the IRMM. From 2004, the JRC became a **Community Reference Laboratory** (CRL) in various fields of food control. The JRC increased the number of CRLs in 2006 and 2007 by inaugurating four more (to give a total of two in the IHCP and four in the IRMM).

The CRLs ensure that the testing for certain substances is performed to a reliable standard across the food chain, helping to guarantee the safety and quality of food for consumers. The JRC is well recognised for the support it has provided in emergencies, including the Belgian dioxin crisis in 1998, the BSE crisis, and the 2002 discovery of acrylamide in food products.



Sample preparation for verification of food origin.

Community Reference Laboratories

Community Reference Laboratories *(CRLs) are analytical laboratories with scientific and technical expertise in a particular field and form an integral part of the European risk management system. They assist the European Commission in meeting the requirements of legislation: for example, the need to detect genetically modified organisms or contaminants in food. Their duties include setting up EU-wide standards for testing, training analysts from national laboratories and coordinating a network of national reference laboratories.*

The JRC operates six CRLs. These are for:

- *Feed Additives*
- *Heavy Metals*
- *Mycotoxins*
- *Polycyclic Aromatic Hydrocarbons*
- *GM Food and Feed*
- *Food Contact Materials*

NUCLEAR GENERATION

The European Union currently imports 50% of its energy and, if the current trend continues, this may increase to 70% within 20 years. One third of the electricity in Europe is currently produced via nuclear fission, so the move to innovative reactor systems holds great promise.

In 2006, the European Atomic Energy Community became party to the Framework Agreement for International Collaboration on Research and Development of Generation IV Nuclear Energy Systems (GIF Framework Agreement). The "Generation IV" initiative concerns concepts for nuclear energy systems that can be operated in a manner that will provide a competitive and reliable supply of energy, while satisfactorily addressing nuclear safety, waste, proliferation resistance and public perception concerns. The JRC, with its strong international dimension, is not only the implementing agent for Euratom in the Generation IV international forum, but also participates actively in related R&D projects. The R&D projects are focused on fuel development, reprocessing and irradiation testing, fuel-cladding interaction and corrosion, proliferation resistance and basic data for fuel, reprocessing and waste treatment.

IAM → IE

In 2001, the Institute for Advanced Materials (IAM) was renamed the Institute for Energy (IE) underlining its focus on EU energy policy development.

The three main scientific priorities of the new Institute are non-nuclear energy, nuclear safety and nuclear medicine.

Advanced materials in a laboratory burner rig.

Forest fire devastation in Corsica.

FUELLING THE HYDROGEN ECONOMY

Two new testing facilities opened in Petten, The Netherlands in 2005. They will provide policy-makers and industry with an independent evaluation of the performance of hydrogen and fuel-cell technologies in terms of efficiency, safety, environmental impact and reliability. The facilities contribute to the development and harmonisation of test procedures, which are needed for the successful take-off of the hydrogen economy, and thus provide support to sustainable development.

SMOKE SIGNALS

Following the forest fires of 2003, the JRC worked with the European Commission's Environment DG to establish the European Forest Fire Information System (EFFIS). This enables fire risk calculations to be made at EU-level while fire risk forecast maps are distributed via the internet to the civil protection and forest fire services in Member States.

CUTTING DOWN ON WASTE

Cogeneration is the use of a heat engine or power station to generate both electricity and useful heat. The construction of the Ispra cogeneration plant was completed in 2003. After an initial period of testing, the plant was put into permanent operation in September 2004. It is highly efficient and saves around 30% in fuel consumption when compared to traditional technologies and produces fewer greenhouse gases.

Ispra cogeneration plant.

FORWARD THINKING

The JRC Futures Project was launched in mid-1998. With a 10-year time horizon, Futures identified the major drivers that Europe was to face in the beginning of the 21st century: new information and communication technologies and biotechnologies, strong environmental pressures, the Euro, as well as enlargement and significant demographic changes.

The Futures Project examined the individual and combined effects of technological, economic, political and social drivers.

Logo of the Futures Project.

MONITORING COMPANIES' R&D SPENDING

Published for the first time in 2004, the EU Industrial R&D Investment Scoreboard provides information on the top EU and non-EU corporate investors in Research and Development (R&D). The Scoreboard has already become a reference document for evidence-based R&D policy-making. As part of the overall EU strategy to foster private investment in R&D, the JRC uses the data collected in the Scoreboard to perform analyses of industrial research trends and developments.

Cover of the 2005 Scoreboard.

EVOLUTION IN REFERENCE MATERIALS

Since 1994, when it took over the storage and distribution of all BCR® materials from DG Research, the roles and responsibilities of the Institute for Reference Materials and Measurements (IRMM) have continued to grow.

The IRMM has developed a large variety of certified reference materials for industrial, environmental and food analysis, as well as for biotechnology and health applications. It was the first institute in the world to produce certified reference materials for, among other things, the analysis of GMOs, genetic testing, and pathogens.

In May 2004, it launched the ERM® label, which is a guarantee of high quality and is only granted for reference materials that have successfully passed a peer evaluation.

October 2005 saw the inauguration of a new 1550 m² storage building to house about 600 different materials totalling 500000 samples stored under controlled conditions. In 2006, 23000 reference materials were distributed worldwide.

Picking samples for distribution in the storage building for reference materials at IRMM.

ISPRA GETS A MAKEOVER

Between 2003 and 2004, a careful analysis of the entire Ispra site was performed and a decision was taken to concentrate all scientific activities in a central area of the site, the "science zone". New buildings are being designed and constructed, starting with the Institute for Environment and Sustainability (IES). The overall aim is to make better use of space, reduce fragmentation, and so increase efficiency.

Design concept showing the new science zone in Ispra.

TARGETED TREATMENT

The JRC intends to improve the effectiveness of cancer treatment by radioimmunotherapy, which involves injecting the patient with a radioactive isotope "bullet" to selectively destroy tumour cells. In the past, treatment mainly involved the use of relatively low energy beta-emitters but, more recently, isotopes emitting alpha particles have been recognised as more effective. JRC researchers have been looking at ways to safely produce and handle these and, in 2001, the first European clinical trials of such alpha-immunotherapy started.

The JRC is also engaged in Boron Neutron Capture Therapy (BNCT) treatment, which is designed to damage only cancer cells wherever they are, sparing normal cells even in immediate proximity to the tumour.

RESISTING CONVENTIONAL THEORY

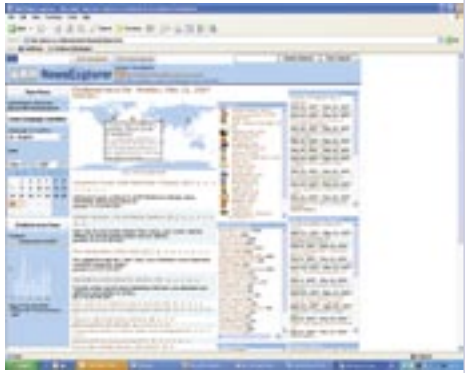
The JRC contributed to the discovery of the first plutonium compounds exhibiting superconductivity, a quantum mechanical phenomenon leading to zero electrical resistance when the material is cooled below its critical temperature.

The unconventional properties of the superconducting plutonium compounds are not completely explained by current theories. This sparked off extensive studies into the electronic structure of the actinide elements, yielding novel insights into the nature of superconductivity, magnetism and, ultimately, of matter itself.

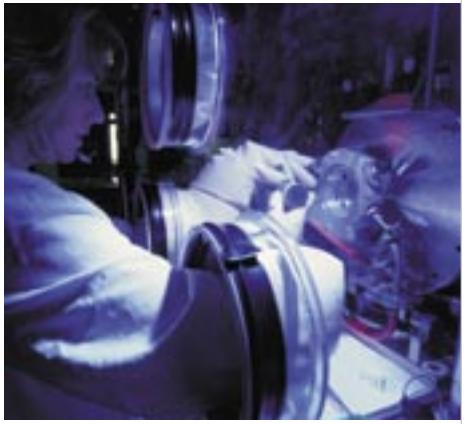
MOVING WITH THE TIMES

With the growing success of the Information Society, the JRC started a new line of research in the field of web technologies.

The Europe Media Monitor (EMM), developed by the Institute for the Protection and Security of the Citizen in 2002, is a web intelligence system. It provides a real-time press and media monitoring service to Commission cabinets and services, including daily reviews of press reports from Member States concerning EU policies. News articles are automatically detected as they appear across a large number of on-line media sites, and are immediately classified according to topic-specific lists of keyword combinations. EMM also provides a breaking news and alerting service.



EMM website.



Opening of a source for insertion of plutonium samples.

ARE EU POLICIES EFFECTIVE?

Modern econometric and statistical tools are essential for the analysis and assessment of key EU policies, such as growth and competitiveness, the internal market and education. Through its competences in data analysis, modelling, and information quality, in the 2000s, the JRC started to provide support to the European Commission in the fields of statistics, macroeconomic modelling, financial econometrics and sensitivity analysis, social multi-criteria evaluation and knowledge assessment.

PART 2

Parallel evolution: EU & JRC

1950s

1951 The European Coal and Steel Community is established by the six founding members: Belgium, France, Germany, Italy, Luxembourg and The Netherlands.

1957 The Treaties of Rome establish the European Economic Community.

1957 Signing of the Euratom Treaty, which calls for the European Commission to establish a Joint Nuclear Research Centre and the Central Bureau for Nuclear Measurements.

1958 Louis Armand is nominated President of Euratom and the European Commission.

1959 Etienne Hirsch is nominated President of Euratom and the European Commission.

1959 Inauguration of the JRC Ispra site and construction of the Ispra reactor.

1960s

1960 The German government and Euratom decide to construct the Institute for Transuranium Elements in Karlsruhe, Germany.

1960 The Belgian government and Euratom agree to establish the Central Bureau for Nuclear Measurements – later renamed as the Institute for Reference Materials and Measurements (IRMM) in Geel, Belgium.

1961 The High Flux Reactor in Petten, The Netherlands commences operation for the first time.

1962 Pierre Chatenet is nominated President of Euratom and the European Commission.

1962 The Van de Graaff accelerator is installed at IRMM.

1962 Construction of mass spectrometer laboratories at IRMM.

1962 Transfer of the High Flux Reactor from The Netherlands to the European Communities.

1963 The Ispra reactor is transferred to the EEC by the Italian government.

1964 The Institute for Transuranium Elements (ITU) laboratories become operational.

1965 Inauguration of the Linear Electron Accelerator at IRMM.

1967 Jean Rey is nominated President of the European Commission.

1970s

1970 Franco Maria Malfatti is nominated President of the European Commission.

1971 The European Commission adopts a decision which stipulates that the JRC will diversify its activities beyond nuclear to include non-nuclear technologies and that it will negotiate and conclude research contracts with third parties.

1972 Sicco Mansholt is nominated President of the European Commission.

1973 François Xavier Ortoli is nominated President of the European Commission.

1973 The Community expands to include Denmark, Ireland and the United Kingdom, and develops its common policies.

1977 Roy Jenkins is nominated President of the European Commission.

1979 First direct elections to the European Parliament.

1979 The Environmental Test Laboratory opens in Petten.

1980s

1981 First Mediterranean enlargement, as Greece joins the Community.

1981 Gaston E. Thorn is nominated President of the European Commission.

1984 Work commences on production facilities for biological and environmental reference materials.

1984 The High Flux Reactor in Petten is revamped.

1985 Jacques Delors is nominated President of the European Commission.

1985 The JRC and the Directorate-General for Research (known then as DG XII) are merged (Commission Decision 85/953/Euratom).

1986 The Community expands to include Portugal and Spain.

1988 The MARS (Monitoring of Agriculture with Remote Sensing) project is launched, providing independent and timely information on crop areas and yields via emerging space technologies.

1989 The fall of the Berlin Wall heralds the unification of Germany.

1989 Opening of the Performance Laboratory (PERLA) in Ispra, housing an extensive collection of renowned nuclear reference materials and instrumentation.

1990s

1990 The new Länder of Eastern Germany join the EU.

1991 Establishment of the European Centre for the Validation of Alternative Methods (ECVAM).

1992 The European Microwave Signature Laboratory (EMSL) and European Laboratory for Structural Assessment (ELSA) are inaugurated in Ispra.

1993 The Treaty of Maastricht establishes the European Union.

1993 The JRC establishes the European Office for Wine, Alcohol and Spirit drinks (BEVABS).

1993 The European Chemicals Bureau (ECB) is set up in Ispra.

1994 The Institute for Prospective Technological Studies is established in Seville (Spain).

1995 Jacques Santer is nominated President of the European Commission.

1995 The EU expands to 15 members, now also including Austria, Finland and Sweden.

1996 The JRC and the Directorate-General for Research – known then as DG XII – were uncoupled as two separate Directorates-General.

1997 The European Commission sets up the European Integrated Pollution Prevention and Control Bureau (EIPPCB).

1998 Creation of the Institute for Health and Consumer Protection (IHCP).

1999 Romano Prodi is nominated President of the European Commission.

2000s

2000 Start of refurbishment of the nuclear chemistry building into a non-nuclear one at IRMM.

2001 The Institute for the Protection and Security of the Citizen (IPSC) is created in Ispra as the Institute for Systems, Informatics and Safety (ISIS) merges with part of the Space Applications Institute (SAI).

2001 The Institute for Environment and Sustainability (IES) is created in Ispra.

2001 The Institute for Advanced Materials (IAM) is renamed the Institute for Energy (IE) in order to reflect the institute's changed mission.

2002 Euro notes and coins are introduced in the EU.

2002 The IPSC develops the Europe Media Monitor (EMM), a web intelligence system, providing a real-time news monitoring service.

2002 A significant part of food safety and quality activities is moved from the IHCP to the IRMM.

2004 Ten more countries join the Union: Cyprus, the Czech Republic, Estonia, Latvia, Lithuania, Malta, Poland, Slovakia, Hungary and Slovenia.

2004 José Manuel Barroso is nominated President of the European Commission.

2004 The IHCP becomes a Community Reference Laboratory (CRL) for GMOs in food and feed.

2004 The IRMM becomes the CRL for feed additives authorisation.

2004 Ispra cogeneration plants are put into operation.

2005 Completion of a new storage building at IRMM for reference materials.

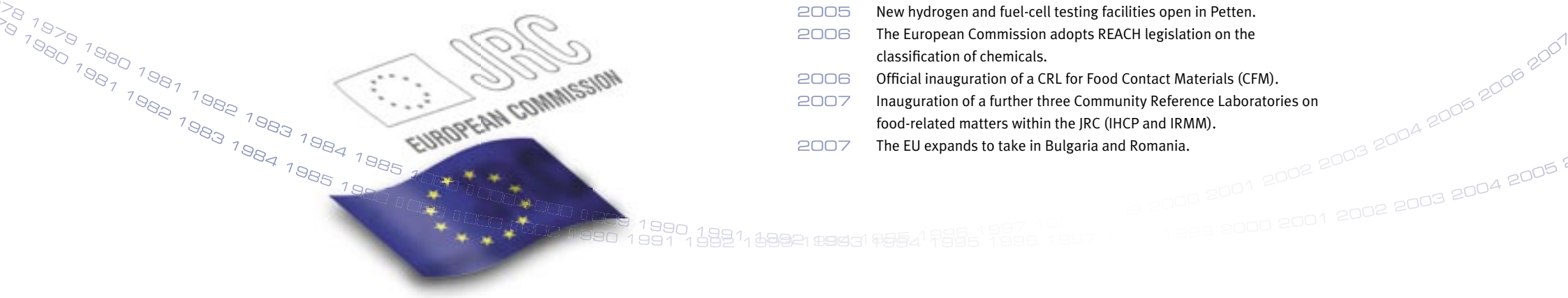
2005 New hydrogen and fuel-cell testing facilities open in Petten.

2006 The European Commission adopts REACH legislation on the classification of chemicals.

2006 Official inauguration of a CRL for Food Contact Materials (CFM).

2007 Inauguration of a further three Community Reference Laboratories on food-related matters within the JRC (IHCP and IRMM).

2007 The EU expands to take in Bulgaria and Romania.



PART 3

People and Visits

27-30 September 1960

Italian television company RAI visited Euratom at the JRC site in Ispra.

1965

The President of the Federal Republic of Germany, Heinrich Lübke, visited the Institute for Transuranium Elements (ITU), Karlsruhe.

1960s

The Federal Minister for Finance, Franz Joseph Strauss, the President of the European Commission, Jean Rey, the Prime Minister of the Land Baden-Württemberg, Hans Filbinger, and the Federal Minister for Research, Hans Leussink, all visited the ITU, Karlsruhe in the 60s.

5 January 1980

Visit of Vito Scalia, Italian minister for Scientific Research and the President of the Council of Ministers of the EC to Ispra.

16-17 July 1981

Viscount E. Davignon, Vice-President of the Commission of the European Communities, attended the inauguration of the new Cyclotron in Ispra.

29 October 1984

The Hon. L. Granelli, Minister of Scientific Research in the Italian Government, together with the Committee on Energy, Research and Technology of the European Parliament and Viscount E. Davignon, Vice-President of the Commission of the European Communities visited the JRC Ispra site.

19 February 1985

Karl-Heinz Narjes, Vice-President of the European Commission, visited the LDFT (Large Dynamic Test Facility) at the JRC Ispra site.

17 June 1985

Mr. Bertel Haarder, President of the Research Council and Danish Minister for Education, was accompanied by Mrs. H. Olsen, Counsellor at the Danish Permanent Representation in Brussels during a visit of the Photo-Chemistry Laboratory, Electronics Division in Ispra.

5 August 1987

The Committee for the European Development of Science and Technology (CODEST) delegation visited the JRC in Ispra.

28-29 September 1987

Members of the Social Democratic Group of the "Deutscher Bundestag" visited the MARK XIII A installation (fuel gas desulphurisation) in Ispra.

24 November 1987

Chong Wu Ruan, Vice-President of the Commission of Science and Technology of the People's Republic of China was accompanied by Wang Dan, Ruenzhai Li and Jianhua Fu, Chinese Embassy of Rome, on a visit to the JRC in Ispra.

April 1988

The Director General of the International Atomic Energy Agency (IAEA), Mohamed El Baradei, visited the ITU in Karlsruhe.

13 July 1988

Hon. Mario Dido, member of the European Parliament and Prof. A. Ruberti, Italian Minister for Scientific Research visited the JRC in Ispra.

1990s

Vice-President of the European Commission, Filippo Maria Pandolfi, visited the ITU in Karlsruhe.

26 November 1990

President of the European Commission, Jacques Delors, visited the JRC in Ispra.

22 October 1998

President of the European Commission, Jacques Santer, visited the JRC in Ispra.

22 September 2000

President of the Italian Republic, Carlo Ciampi, visited the JRC in Ispra.

22 November 2000

President of the European Commission, Romano Prodi, visited the JRC in Ispra.

2001

Vice-President of the European Commission, Loyola de Palacio, visited the ITU in Karlsruhe.

12 July 2002

The European Commissioner for Agriculture and Rural Development, Franz Fischler, visited the GMO laboratory at the Institute for Reference Materials and Measurements (IRMM) in Geel.

11 October 2002

The European Commissioner for Research, Philippe Busquin, re-opened the refurbished chemistry building at the IRMM in Geel.

July 2005

The European Commissioner for Science and Research, Janez Potočnik, opened two new hydrogen and fuel cell testing facilities at the Institute for Energy (IE) in Petten.

20 October 2005

The European Commissioner for Science and Research, Janez Potočnik, in the presence of Stanley Prusiner, Nobel Laureate for Medicine or Physiology, opened the new reference materials storage building at the IRMM in Geel.

16 April 2007

The European Commissioner for Science and Research, Janez Potočnik, visited the Institute for Prospective Technological Studies (IPTS) in Seville.

PART 4

Future Perspective

Over the past five decades, the Joint Research Centre has developed from a body exclusively performing nuclear research, to a customer-driven organisation providing scientific-technical support to policy-makers. This transformation very much reflects the evolving priorities of the European Commission and the objectives of Member States.

The last decade in particular has paved the way for the JRC of the future: in 1996, it was established as a Directorate-General, independent from the Research DG. This separated more clearly the Commission services which fund research carried out by third parties from the JRC, which carries out its own research.

Along with this distinction came a review of the way in which the JRC was guided in its actions: Member States are involved in strategic decisions of the JRC through a Board of Governors.

In 1998, the European Council adopted a new mission statement. This refocused the JRC's activities on the priorities of its customers and underlined its role as a reference centre, interacting closely with Member State institutions.

The JRC has responded well to the recent enlargements of the European Union. It has made efforts to help institutions in the new Member States and Candidate Countries achieve the scientific-technical basis of the Community body of law and it has integrated scientists and experts from these countries into its own staff.

Being 'customer-driven' means that the JRC is constantly evolving, in terms of its working methods, organisation and core areas of activities. The JRC's nuclear activities still make up nearly one third of its work programme, although these are now mainly centred on safety and security aspects of the nuclear fuel cycle.

The JRC is beginning to integrate socio-economic competences into all its activities, in order to provide a more holistic service to its customers and one which better meets their needs. It tries to anticipate areas that may require action by policy-makers, and so enters into new fields, such as the health and safety assessments of nanotechnology and the coexistence of genetically modified organisms.

It is able to respond flexibly to emerging priorities, including security, energy, maritime policy and global challenges. Through its participation in calls for proposals under the framework programmes for research, the JRC updates and develops its knowledge via networking, ensuring it is in a position to provide state-of-the art service to its customers.

As the European Commission's need for independent, in-house 'scenario modelling' in sensitive areas continues to grow, the JRC must expand its abilities in the near future. The JRC is also evolving to provide more support in crisis management, such as damage assessment, and anti-fraud activities.

The future of the JRC looks bright, with positive feedback and additional demands from existing customers, as well as the appearance of new customers – the European Parliament and the Council. In addition, Member States are more accepting of the JRC than ever before, revealed in the lead-up to and agreement of its latest framework programme. Staff at national level have shown strong support for the JRC's mission statement and core values, while the JRC has begun to strengthen cooperation with Member State organisations dedicated to activities supporting policy-making.

It seems certain that the JRC will surmount the challenges it faces in the future, heightening its efficiency in meeting customer demands. It will continue to guarantee excellence in its work, through benchmarking and competition, and will carry on using sound scientific fact to inform European policy-making.

European Commission - Joint Research Centre

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