

Co-ordinated Research Programmes (with year of start and completion)

Nuclear Power

Advanced reactor developments

Establishment of a thermophysical database for light and heavy water reactors	1990	1995
Acoustic signal processing for the detection of sodium boiling or sodium/water reactions in LMFRs	1989	1995
Intercomparison of LMFR seismic analysis codes	1991	1995
Validation of safety related physics calculations for low enriched high temperature gas cooled reactors	1990	1995
Design and evaluation of heat utilization systems for the high temperature engineering test reactor (HTTR)	1993	1997
Heat transport and afterheat removal for gas cooled reactors under accident conditions	1993	1997
Validation of predictive methods for fuel and fission product behaviour in gas cooled reactors	1993	1995
Thermohydraulic relationships for advanced water cooled reactors	1990	1994
Intercomparison of analysis methods for seismically isolated nuclear structures	1995	1999
Harmonization and validation of fast reactor thermomechanical and thermohydraulic codes and relations using experimental data	1995	1998
Potential of Th based fuel cycles to constrain Pu and to reduce long term waste toxicities	1995	1998
Case studies to assess and compare the potential role of nuclear power and other options in reducing emissions and residuals from electricity generation	1995	1997

Nuclear Fusion

Development of plasma heating and diagnostic systems in institutes in developing countries using small and middle scale devices	1992	1997
Development of software for numerical simulations and data processing in fusion energy research	1992	1995
Engineering, industrial and environmental applications of plasma physics and fusion technologies	1996	1998

Nuclear Fuel Cycle

Reactor fuel technology and performance

Examination and documentation methodology for water reactor fuel (ED-WARF-2)	1992	1995
Fuel modelling at extended burnup (FUMEX)	1993	1997
Stress corrosion cracking of zirconium alloy fuel claddings	1994	1997
High temperature on-line monitoring of water chemistry related to fuel behaviour and activity transport (WACOL)	1995	1999

Spent fuel management, technology and safety

Behaviour of spent fuel assemblies and storage equipment under long term storage conditions (BEFAST-III)	1991	1996
Irradiation enhanced degradation of materials in spent fuel storage facilities	1993	1997
Safety, environmental and non-proliferation aspects of the partitioning and transmutation of actinides and fission products	1994	1998

Radioactive Waste Management*Handling, treatment, conditioning and storage of radioactive wastes*

Performance of high level waste forms and packages under repository conditions	1991	1997
Waste treatment and immobilization technologies involving inorganic sorbents	1991	1996
Treatment technologies for low and intermediate level wastes generated from nuclear applications	1991	1996

Radioactive waste disposal

Performance of engineered barrier materials in near surface disposal	1991	1995
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Decontamination and decommissioning of nuclear installations

New methods and techniques for optimization of decontamination for maintenance and decommissioning	1994	1998
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Radiological and environmental aspects of waste management

Modelling of the radiological impact of waste dumping in the Arctic seas	1993	1996
Site characterization techniques used in environmental restoration	1995	1999
Extrapolation of short term observations to time periods for isolation of long lived radionuclides	1995	2000
Safety assessment of near surface radioactive waste disposal facilities (NSARS)	1990	1995

Comparative Assessment of Nuclear Power and Other Energy Sources

Case studies to assess the potential role of nuclear power and other options in reducing emissions and residuals from electricity generation	1995	1997
Comparative health and environmental risks of nuclear and other energy systems using case studies	1989	1996

Food and Agriculture*Soil fertility, irrigation and crop production*

Assessment of irrigation schedules of field crops to increase the effective use of water in irrigation projects	1990	1995
Optimizing N ₂ fixation in tree crops	1990	1997

Enhancing soil fertility and crop production by better management of <i>Rhizobium</i>	1992	1996
Use of nuclear and related techniques for evaluating the agronomic effectiveness of phosphate fertilizers, in particular rock phosphate	1993	1998
Optimizing fertilizer applications under irrigated wheat to increase the efficient use of fertilizers and consequently reduce environmental pollution	1994	1999
Use of irradiated sewage sludge to increase soil fertility and crop yields, and to preserve the environment	1995	1999
<i>Plant breeding and genetics</i>		
Induced mutations in connection with biotechnology for crop improvement in Latin America	1993	1998
Improvement of basic food crops in Africa through plant breeding, including the use of induced mutations	1989	1995
Induced mutations for sesame improvement	1993	1998
The application of DNA based marker mutations for improvement of cereals and other sexually reproduced crop species	1992	1997
Use of novel DNA fingerprinting techniques for the detection and characterization of genetic variation in vegetatively propagated crops	1992	1997
Induced mutations and other advanced technology for the production of crop mutants suitable for environmentally sustainable agriculture	1993	1998
In vitro techniques for the selection of radiation induced mutants adapted to adverse environmental conditions	1993	1998
Radioactively labelled DNA probes for crop improvement	1994	1999
Improvement of new and traditional industrial crops by induced mutations and related biotechnology	1994	1999
Cellular biology and biotechnology, including mutation techniques, for the creation of new useful banana genotypes	1994	1999
<i>Animal production and health</i>		
Development of feed supplementation strategies for improving the productivity of dairy cattle on smallholder farms in Africa	1994	1998
Development of supplementation strategies for milk producing animals in tropical and subtropical environments through the use of nuclear and related techniques	1993	1998
Use of immunoassay methods for improved diagnosis of trypanosomiasis and monitoring tsetse and trypanosomiasis control programmes in Africa	1994	1999
Improving the diagnosis and control of foot and mouth disease in South East Asia using ELISA based technologies	1994	1999
The use of ELISA for epidemiology and control of foot and mouth disease and bovine brucellosis in Latin America	1994	1998
Improvement of ruminant livestock productivity in developing countries through the use of progesterone RIA to increase the efficiency and quality of artificial insemination services	1995	1999

Insect and pest control

Development of practices for area-wide tsetse eradication or control with emphasis on the SIT	1989	1995
Evaluation of population suppression by irradiated lepidoptera and their progeny	1992	1998
Development of female medfly attractant systems for trapping and sterility assessment	1993	1998
Medfly mating behaviour studies under field cage conditions	1993	1998
Automation in tsetse fly mass rearing for use in sterile insect technique programmes	1994	1999
Enhancement of the sterile insect technique through genetic transformation using nuclear techniques	1994	1999
A molecular and genetic approach to develop sexing strains for field application in fruit fly SIT programmes	1994	1999
Improved attractants for enhancing the efficiency of tsetse fly suppression operations and barrier systems used in tsetse control/eradication campaigns	1994	1999

Agrochemicals and residues

Adverse effects on flora and fauna from the use of organochlorine pesticides on the African continent	1990	1995
Development of procedures to stabilize acaricides in livestock dips and of simplified methods to measure their concentration using nuclear techniques	1992	1996
Use of isotopic tracers in studies of herbicide performance in grasses and sedges	1992	1997
Radionuclide transfer from air, soil and fresh water to the food chain of man in tropical and subtropical environments	1993	1997
The use of nuclear and immunochemical methods for pesticide analysis	1993	1998
Agroecological effects resulting from the use of persistent pesticides in Central America	1993	1997
Distribution, fate and effects of pesticides on biota in the tropical marine environment using radiolabelled tracers	1993	1997
Impact of long term pesticide usage on soil properties using radiotracer techniques	1994	1999

Food preservation

Irradiation as a quarantine treatment of mites, nematodes and insects other than fruit fly	1992	1997
Irradiation as a public health intervention measure to control food-borne diseases (cysticercosis/taeniasis and <i>Vibrio</i> infection) in Latin America and the Caribbean (under the co-sponsorship of PAHO)	1993	1998
Standardized methods to verify the absorbed dose of irradiated fresh and dried fruit and tree nuts in trade	1993	1998
Integration of irradiation in a system for reducing post-harvest food losses in Africa	1994	1999
Market development and trade in irradiated food in Asia	1994	1998
Development of shelf stable and convenience foods through irradiation processing	1995	2000

Human Health*Nuclear medicine*

Nuclear investigations in cerebral function	1991	1995
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Qualitative nuclear cardiology	1991	1995
Development of indigenous capability to conduct a screening programme for hepatitis in developing countries (RCA)	1992	1996
Certification of quality control and preventive maintenance of nuclear medical equipment (Asia and the Pacific)	1992	1996
Comparative evaluation of the efficacy and toxicity of intravenous ^{89}Sr and oral ^{32}P in the palliative treatment of painful skeletal metastases	1993	1996
Nuclear techniques for the diagnosis of bacterial and viral infections (Africa)	1993	1996
Biological discrimination of hormone sensitive and insensitive breast cancer tissue using radioimmunoassay of hormone receptors and growth factors	1994	1996
Certification of quality control and preventive maintenance of nuclear medical equipment (Latin America)	1994	1996
Diagnosis of Chagas' disease (Latin America)	1994	1997
Nuclear techniques for the diagnosis of blood borne infections (Asia and Pacific)	1994	1997
Standardization of ^{131}I treatment of hyperthyroidism with an intent to optimize radiation dose and treatment response	1995	1999
Development of indigenous capability of reagent production for hepatitis B in developing countries	1995	1997
Perinatal diagnosis using radionuclide labelled probes	1995	1997
Radioimmunoassay of prostate specific antigen for diagnosis and follow-up of prostate cancer	1995	1997
Validation of IBM-PC interfacing with gamma cameras and appropriate application software for data processing of clinical studies	1995	1997
<i>Applied radiation biology and radiotherapy</i>		
Comparative assessment of mutagenic and carcinogenic effects of low level radiation and toxic chemicals released from energy cycles	1992	1996
Radiation responsiveness criteria for human tumours as a determinant for therapeutic modality planning	1992	1998
Modern techniques in brachytherapy of cancer with special reference to the developing countries	1993	1998
Clinical application of radiosensitizers in cancer radiotherapy	1994	1999
Randomized clinical trial of radiotherapy combined with mitomycin C in the treatment of advanced head and neck tumours	1995	1999
Application of heavy charged particles in cancer radiotherapy	1995	1998
Quality assurance in radiotherapy for Latin America	1995	1998
Use of radiotherapy in advanced cancer	1995	1998
<i>Dosimetry</i>		
Development of quality control dosimetry techniques for particle beam radiation processing	1988	1995
Characterization and evaluation of high dose dosimetry techniques for quality assurance in radiation processing	1994	1999
Development of a quality assurance programme for Secondary Standard Dosimetry Laboratories	1995	1998

Development of a quality assurance programme for radiation therapy dosimetry in developing countries	1995	1998
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Nutritional and health related environmental studies

Assessment of environmental exposure to mercury in selected human populations as studied by nuclear and other techniques	1990	1995
Isotope aided studies of the bioavailability of iron and zinc from human diets	1990	1995
Applied research on air pollution using nuclear related analytical techniques	1992	1997
Development and selection of analytical techniques and procedures for measuring accidentally released radionuclides in the environment	1992	1996
Application of stable isotope tracer methods to studies of amino acid, protein and energy metabolism in malnourished populations of developing countries	1993	1998
Comparative international studies of osteoporosis using isotope techniques	1994	1998
Development and application of isotopic techniques in studies of vitamin A nutrition	1995	1999
Applied research on air pollution using nuclear related analytical techniques in the Asia and Pacific region (RCA)	1995	1999
Ingestion and organ content of trace elements of importance in radiological protection (RCA)	1995	1999

Industry and Earth Sciences

Industrial applications

Irradiation treatment of water, waste water and sludge	1995	1998
Radiation processing to prepare biomaterials for applications in medicine	1995	1998
Modification of materials by ion treatment for industrial applications	1995	1998
Nuclear techniques for advanced ceramics and semiconductors	1992	1996
Application of nuclear techniques for environmental preservation in resource extraction and processing	1992	1996
Nuclear methods in the monitoring of wear and corrosion in industry	1992	1996
Nuclear techniques for the evaluation of healing pathways of pollutant damage in the environment	1992	1996
Stability and stabilization of polymers under irradiation	1993	1997

Development of water resources

Use of environmental isotopes in palaeoclimatology	1992	1995
Isotope aided studies of atmospheric carbon dioxide and other greenhouse gases in the atmosphere	1990	1994
Isotope techniques in lake dynamics investigations	1993	1996
Isotope techniques in water resources investigations in arid and semi-arid regions	1994	1997
Isotope techniques in groundwater pollution studies	1994	1997
Application of tracer techniques in the study of the Black Sea (jointly with IAEA-MEL)	1993	1996
Use of isotopes for analyses of flow and transport dynamics in groundwater systems	1995	1997

Isotope aided studies of atmospheric carbon dioxide and other greenhouse gases in the atmosphere — Phase II	1995	1998
Application of isotope techniques to study soil erosion and sedimentation rate in lakes and reservoirs	1995	1997

Physical and Chemical Sciences

Nuclear and atomic data for applications

Activation cross-sections for the generation of long lived radionuclides	1989	1995
Compilation and evaluation of fission product yield nuclear data	1991	1996
Plasma interaction induced erosion of fusion reactor materials	1991	1996
Improvement of measurements, theoretical computations and evaluations of neutron induced helium production cross-sections	1992	1996
Establishment of an international reference data library of nuclear activation cross-sections	1993	1997
Collection and evaluation of reference data on thermomechanical properties of fusion reactor plasma facing materials	1994	1996
Development of a reference input parameter library for nuclear model calculations of nuclear data	1994	1997
Measurement, calculation and evaluation of photon production data	1994	1998
Radiative cooling rates of fusion plasma impurities	1994	1997
Tritium retention in fusion reactor plasma facing components	1995	1998
Atomic and plasma-wall interaction data for fusion reactor plasma modelling	1995	1998
Development of a reference charged particle cross-section database for medical radioisotope production	1995	1998

Nuclear instrumentation

Development of computer based troubleshooting tools and instruments	1996	1998
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Utilization of research reactors and particle accelerators

Application of PCs to enhance the operation and management of research reactors	1990	1995
Analysis of research reactor transients	1995	1998

Chemistry

Labelling, quality control and clinical evaluation of monoclonal antibodies for scintigraphy	1990	1996
Antibodies immobilized on magnetic particles for radioimmunoassay and immunoradiometric assay of hormones	1991	1995
Optimization of the production and quality control of radiotherapeutic radionuclides and radiopharmaceuticals	1992	1996
Design and evaluation of heat utilization systems for the high temperature engineering test reactor	1994	1998
Evaluation of bulk reagents for the production of ^{99m}Tc radiopharmaceutical kits	1995	1998

Development of agents for imaging central neural systems receptors based on technetium-99m	1995	1998
Technetium-99m labelled peptides for the imaging of peripheral receptors	1995	1998

Radiation Safety

Occupational radiation protection

Intercomparison of in vivo counting systems using a reference Asian phantom	1995	1997
Reference Asian man project Phase II: Ingestion and organ content of trace elements of importance in radiation protection	1995	1997
Limitations of radioepidemiological assessments for stochastic radiation effects in relation to radiation protection	1994	1997
Radiation protection in diagnostic radiology in Asia and the Far East	1994	1997
Radiation protection in diagnostic radiology in eastern European countries	1993	1997

Radiation protection of the public and the environment

Radionuclide transfer to humans in tropical and subtropical environments	1994	1997
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Safe transport of radioactive material

Accident severity at sea during the transport of radioactive material	1994	1997
Assessment of safety of uranium hexafluoride (UF ₆) transport packages in fires	1992	1996
Development of relevant accident data for quantifying risks associated with the transport of radioactive materials	1994	1997

Safety of Nuclear Installations

Engineering safety issues of nuclear power plants

Benchmark study for seismic analysis and testing of WWER type nuclear power plants	1993	1996
Management of ageing of the concrete containment building	1992	1995
Management of ageing of in-containment instrumentation and control cables	1992	1995
Seismic data for the siting and site revalidation of nuclear facilities	1989	1996

Research reactor safety

Application of non-destructive testing and in-service inspection to research reactors	1995	1998
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Nuclear safety assessment practices

Validation of accident and safety analysis methodology	1995	1998
Collection and classification of human reliability data for use in probabilistic safety assessments	1994	1997