INSIDE
TECHNICAL CO-OPERATION
International Atomic Energy Agency

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NDT: An indispensable tool for industry

Cameroon's National Hydrocarbon Corporation (NHC) is involved with a consortium of international oil companies in a US$2 billion project to build 1,060 kilometres of pipeline to carry oil from Chad to northern Cameroon. An essential part of the project is quality control of pipe segments and welds, as well as fittings, pumps, valves, and other components during construction. Their integrity has to be maintained throughout the pipeline's operational life, for safety, efficiency and environmental protection.

Project Counterpart, Jean Kilama (second from right), and his technical staff discuss the siting of the new NDT facility in Cameroon with IAEA officials. Credit: A. Boussaha/IAEA

Non-destructive testing (NDT) techniques are vital to providing the high level of quality assurance required for such industrial activities. Until recently, Cameroon's participation in the operation — and therefore its benefit in employment and income — has been limited because it lacks NDT capability and operators of its own. An IAEA technical co-operation Model Project launched this year aims to help Cameroon develop its NDT capabilities for quality control in industry and, specifically, to establish NDT centres that could participate in the implementation of certain services needed for the pipeline.

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Brazil turns beam on chemical effluents...

Hoechst do Brazil is one of the largest chemical and pharmaceutical manufacturers in the region, and its operations create complex streams of waste. Even after in-plant processing to make them acceptable for conventional sewage treatment, some residues need to be impounded for long periods or interred in engineered tombs. So the charges for treatment and disposal are invariably high. Hoechst do Brasil currently pays over US$10 million bi-annually to the sanitation company of Sao Paulo State (SABESP) to discharge liquid effluent from just one production site.

Hoechst's waste is in many ways representative of waste from large industrial activities generally. Faced

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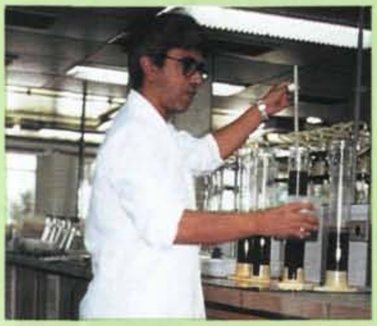
Brazil turns beam on chemical effluents...*(from page 1)*



SABESP technician conducting tests on chemical effluents. Credit: S. Ratnasabapathy

with increasing treatment problems from rapid industrialization, Brazil is looking for new solutions. Its Institute for Nuclear Energy and Research (IPEN) recently did preliminary treatment tests on Hoechst effluents using an electron beam on the scale of a small pilot plant. The stream contained low molecular weight aromatic and chlorinated hydrocarbons, phenols, as well as dyes and other complex organic compounds partly unaffected by the conventional biological treatment methods used by SABESP. The results for various stream components ranged from modest but promising to encouraging, even at the relatively low doses delivered (5-20 kGray).

The IAEA is supporting this effort through a technical co-operation Model Project launched in 1997 to raise the level of research and evaluate the potential of electron-beam treatment of complex industrial wastes on a commercial scale. Under it Hoechst do Brasil, and IPEN are jointly involved in funding and implementing three principal activities: upgrading the pilot plant; introducing procedures to better characterize the irradiated waste; and optimizing operating conditions to produce effluents that meet both national and international standards. In this project SABESP and IPEN are also working on the disinfection of urban sludges and domestic effluents. The IAEA will help upgrade the effluent characterization lab and, because post-irradiation toxicological studies are a crucial element of the project, help with both radiation and chemical hazard monitoring and protection.

The experimental results will help to assess the economic feasibility of treating the waste on an industrial scale. The project is designed to produce reliable data on engineering, performance, and costs so that the cost-benefit ratio of electron-beam treatment can be properly assessed. If the figures show it is conducive to commercialization, the process could spread beyond Hoechst and also beyond Brazil.

...Argentina irradiates urban sludge

Sewage sludge irradiation plant in Tucuman, Argentina
Credit: CNEA

A major waste problem afflicting large cities worldwide is disposal of sewage sludge; the lumpy semi-solid stuff left after liquid waste carried by urban sewers is treated. One widely adopted "solution" is to dump it in the sea. But this not an option everywhere. Tucuman, for instance, Argentina's sixth biggest city (population: 400,000), lies far inland in a high valley in the northeast. The Andes are on its east side, while the Atlantic ocean on its west is more than 1,000 kilometres away.

What can be done with the nearly 90,000 tonnes of sludge the city sewage treatment plant's anaerobic digestors produce each year? The city budget cannot afford incineration. Burial is a health hazard because the valley is sheltered by mountains and has a warm climate, conditions conducive to the spread of diseases. There is already a high incidence of cholera, diarrhoea and hepatitis. The current solution is clearly unsatisfacory: dumping it in the Sali River, which goes dry in the winter when it freezes in the mountains.

Utilising the expertise of a mature nuclear industry, Argentina opted to address the problem by irradiating Tucuman's sludge. The Atomic Energy Commission (CNEA) adapted a German-design gamma irradiator to local requirements, and will also make available the cobalt-60 sources required to produce the radioactive charge required to treat up to 180 cubic metres of sludge per day. So the world's first irradiation plant dedicated to decontaminating urban sludge on a commercial scale now stands next to the city sewage depuration plant. It will come into operation later this year.

Irradiation technology for sludge has been well tested. Pilot scale plants were operational in Germany, Japan and the United States for many years and clearly demonstrated the feasibility. But less costly technologies were available. As long as these worked adequately and economically, sewage firms and municipalities were unlikely to invest in irradiation. But when new plants and extensions to old sludge disposal systems are needed, irradiation can be an option, particularly if a profitable use can be found for irradiated sludge.

Many rapidly developing countries are studying the option, mostly still on a laboratory scale. India has been studying various possibilities in a demonstration-size plant for the past seven years. In most countries, growth of industries around urban centres has complicated the economics. Irradiation has no effect on industrial wastes such as heavy metals, which makes post-irradiation sludge unsuitable for uses such as agriculture.

Conversely, one principal reason for selecting the irradiation route in Tucuman was that there is practically no industry near the city and plenty of agricultural needs. So experiments began in 1996, soon after the plant was constructed, to work out the best regimes to use irradiated sludge as fertilizer and soil-amendment material. Both are in demand in this predominantly agricultural zone, where many areas have soils that are nutrient depleted and suffer from erosion and compactment.

Argentine scientist, Cecilia Magnavacca, measures sugarcane yield in a field fertilized with irradiated sludge.
Credit: CNEA

Argentine scientists have taken part in FAO/IAEA Co-ordinated Research Programmes (CRPs) on radiation treatment and safe reutilization of sludges. Moreover, a new three-year TC project was initiated in 1997 to assist the Tucuman experiments by providing experts, equipment and training in nutrient evaluation of the particular post-irradiation sludges and their agricultural value. In the short term, the project will benefit farmers by allowing them to replace chemical fertilizers with irradiated sludge. Over the longer term, degraded lands could be recovered and sanitary conditions in the zone should improve.

New aids to cure old ills

Prof. Janusz M. Rosiak

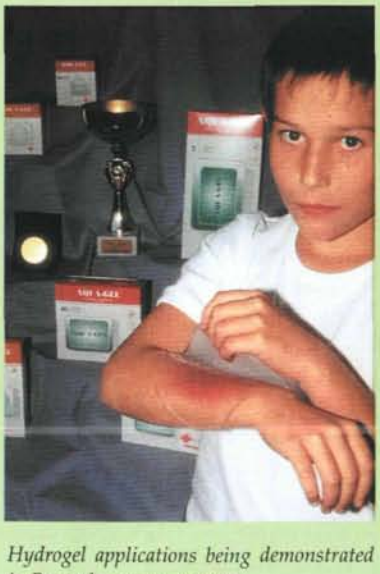
Research and development to use radiation to synthesize and bond together various materials for biomedical applications has been going on since the 1970s. Some of these so called "biomaterials" are now widely used medically, mostly to treat burns and other wounds, and already on the hospital doorstep are derivative devices that can be implanted in patients' bodies to treat a variety of ailments and conditions. Radiation has opened the way to producing such materials. It is able to synthesize, mold, fabricate and sterilize them in a single operation, at any temperature and pressure, in viscous, solid and heterogeneous forms, and in complex phases at various doses.

The Institute of Applied Radiation Chemistry at Poland's Technical University in Lodz is one of several centres particularly active in recent years in developing a variety of new biomaterials, generally called hydrogels. Many products are in advanced stages of development and trials. A few have passed all the clinical tests and been approved by a number of national authorities, including the U.S. Food and Drug Administration (FDA).

The 'Rosiak-method' for hydrogel dressings was developed by the Lodz group led by Prof. Janusz Rosiak. It won the gold medal in 1993 at the Brussels Eureka World Exhibition of Invention, Research and Industrial Innovation. Two Lodz hydrogels, one for dressing bedsores, burns and other wounds and skin grafts; the other for internal controlled release of prostaglandins to treat ulcers — are on the market in the Czech Republic, Germany, Hungary, and Slovakia.

"Though we patented technology only in developed countries like Germany, the UK and the USA, it has been transferred within the framework of IAEA expert missions and projects to developing countries like Brazil, China, Indonesia and Malaysia", says Rosiak who collaborates closely with the Agency. Hydrogel dressings prevent bacterial invasion from outside, while being permeable to drugs such as antimicrobials and allowing gases and water vapour to escape from the wound site. The material adheres well to the wounds and normal skin but, unlike stitches, can be removed painlessly. Lodz has other products at an advanced stage, including an artificial pancreas (the gland which produces insulin), grafts for blood and other vascular vessels, eye inserts to slowly release the alkaloid pilocarpine against glaucoma, and materials for dental surgery.

Further information on hydrogel dressings can be obtained at http://www.gwc.net.pl./kikgel.
Prof. Rosiak can be contacted via e-mail at rosiakjm@mitr.p.lodz.pl.



Hydrogel applications being demonstrated in Brussels. Credits: KIK-GEL

No major advanced industrial activity is conceivable without NDT techniques today. And it is an indispensable item in maintaining industrial safety. Reconstruction of the pipeline system in war-shattered Sarajevo, for example, which is funded by a $20 million World Bank credit and $60 million via bilateral arrangements, would be impossible using the old destructive testing methods. IAEA technical co-operation has just started a Model Project here too, to increase and upgrade national NDT capability.

Modern NDT techniques began with radiographic testing shortly after the discovery of X-rays in 1895. It developed rapidly, for quality control of arms and other military products, during the Second World War. Research and development in the 1950s was largely sponsored by the nuclear and aerospace industries in their search for new inspection technologies to ensure safety via the quality and reliability of critical components.

The five most widely applied techniques are dye penetrant, eddy current, magnetic particle, radiographic (still the most popular), and ultrasonic testing. No country aspiring to enter the global industrial market can do without these.

Most everyday industrial products are immensely complex, made up of numerous components welded and assembled. The average automobile includes some 2.5 kilometers of wiring and 100 critical welds. To be safe and reliable, products and factories alike depend on each and every part functioning properly for at least its minimum design life, and quality control of components begins with detecting and correcting defects and imperfections in the materials of which they are made.

To be competitive, manufacturers must turn out products that are safe and reliable. They must also keep production costs down and cannot afford factory shutdowns or overuse expensive materials. Only NDT techniques can do the precision checks and measurements plant operators require, on both plant and products, while the manufacturing process is underway.

Levels of NDT certification

The reliability of any NDT test depends on the abilities of those responsible for performing it. The IAEA qualification and certification system, based on national procedures in highly industrialized countries, is based on the new ISO standard, which details three levels of competence.

Level 1 - may be authorized to set up equipment, do tests under written instructions and supervised by level 2 or 3, classify (with written approval of a level 3) and report the results.

Level 2 - may be authorized to perform and direct testing according to established or recognized procedures.

Level 3 - may be authorized to direct any operation in the (NDT) methods for which certification has been received.

Certification is done by a National NDT Society which is affiliated with the ICNDT. Eligibility for examination is based on duration of training in each NDT method. Trainees must progress from one level to the next and minimum experience is specified for each level and method. Access to level 3 by a certified level 2 operator could take 1-4 years, depending on educational qualifications in science or engineering prior to NDT training.

Nearly 30 years ago, Argentina asked the UN Development Program (UNDP) for help to set up a national center for non-destructive testing. The simple request sparked a very successful IAEA/TC regional program involving 18 countries in Latin America and the Caribbean (LAC). A second programme based on the same lines, involving 13 countries in Asia and the Pacific was completed in 1996, and a third, for the African region, started in 1991 and has just entered its second five-year phase.

Regional and national training under technical co-operation projects is focused on the five main techniques (noted earlier), with the primary objective of developing national NDT capacities to meet a country's immediate and foreseeable needs. This means hands-on experience with NDT equipment, procedures, standards and techniques; interpreting the results of inspections; diagnosing the causes of detected defects of fabrication or deterioration of material in service and, where need be, taking remedial actions. To be sustainable, national capability must be established to train, examine, license and certify professionals and staff; absorb and introduce NDT equipment, procedures, standards and techniques from technological advances made worldwide; and to develop new techniques.

The strategy for the IAEA programmes in LAC was to establish a common regional system that met international standards. The strategy also aims to train large numbers at lower levels initially, and then to help those more capable to progress to the top level — capable of training, qualifying and certifying others. In this way the hierarchy needed to provide professional services throughout the region would gradually be put into place. Competence required for certification at all the three recognized levels (see box at left) must always meet the highest international standards.

All 18 LAC countries have now set up national NDT societies to oversee and ensure adherence to such standards and meet their needs. Most have their own level-3 personnel able to train and certify others as demand for services increases with continued industrialization. Between 1984 and 1994 some 22,000 people were trained in the region, without any project input but keeping to IAEA guidelines and methods set by the project.

Membership in the International Committee for Non Destructive Testing (ICNDT) signifies recognition that a country's technical competence has reached the top level. At the start of the regional programme only Argentina and Brazil were members. In 1989, ICNDT accepted 11 additional memebers. The LAC regional programme also influenced the drafting of a standard by the International Organization of Standardization (ISO) for qualification and certification of NDT personnel. The training programmes for the main NDT techniques, elaborated and published by the IAEA as technical documents (TECDOC-407/628), are a recommended guideline in the new ISO standard.

NDT entrepreneurs

Sri Lankan mechanical engineer Upul Ekanayake (shown below at right) was trained in the United Kingdom in 1982 under an IAEA fellowship and later certified (level-2) in NDT. He gained experience as an NDT inspector in the State Engineering Corporation of Sri Lanka for six years and then worked with the Bahrain Inspection Establishment for 30 months as an inspection engineer. Back home he started his own company, Electro Ref Engineers (ERE), to service air conditioning and refrigeration systems. Employing NDT personnel trained and certified by The Sri Lanka Atomic Energy Authority (SLAEA), ERE was the first private company in Sri Lanka to introduce NDT techniques to its client industries. In 1995 the company had a turnover of some 3,000,000 SL rupees from NDT activities alone. Ekanayake says his company is expanding to meet increasing demand, and with the help of the SLAEA, plans to train more staff, including himself to improve and extend ERE's services to the public and private sectors.

A common trend in Asia and Latin America is that both the public and private sectors now tend to hire NDT services rather than retain permanent staff and equipment of their own. Operators have responded by forming companies, such as Ekanayake's ERE, with NDT and other support staff and equipment, to provide the services. Such use of high-paid expertise and support staff is a boost for national employment, industrial safety-efficiency and the economy as a whole. But the key role remains with national NDT laboratories, such as of SLAEA, that have absorbed the most advanced techniques. These can train and help to certify trainees and also act as independent arbiter in disputes between service-providers and their clients. Many national labs are increasingly undertaking industry-orientated research in NDT.

Credit: U. Ekanayake

The "Industrious" Atom

NDT techniques are critical to quality and safety in advanced industries.
Credit: CGA

The most common uses for radiation processing are in industry. Major industrial activities from heavy industries, such as automotive, aerospace and rail transportation to electronics and microchips, employ non-destructive testing (NDT) techniques to assure quality control and safety. NDT services range from design studies, sensors and control systems; to X-ray and gamma ray inspection and measurements using tracers such as helium and other gases. The photo illustrates a process called microfocus X-ray tube inspection of an aircraft engine. NDT inspectors are specialists certified to exacting standards by national/international NDT boards. Other radiation processes are used to develop new materials with improved performance, reduce spoilage of foods and to mitigate environmental pollution.

The role of IAEA Technical Co-operation is to advise its Member States on developments and new techniques, and to help develop national capabilities to support safe and effective applications of radiation processing. This **INSIDE TC** describes some industrial uses of radiation and the people that are making quality management a reality in developing countries.

Radiation adds stretch to latex

Malaysia's latest development plan (1996-2000) reflects the vision of virtually all the rapidly developing countries of the Asia/Pacific region: industrialize, with emphasis on high technology, while protecting the natural environment. However, the country's rapid industrialization has already resulted in serious air pollution. Now, with support from IAEA technical co-operation programmes, radiation technologies are increasingly being applied across a range of industries in Malaysia and other Asia/Pacific countries to help lessen such pollution.

The conventional process is called vulcanization, or cross-linking, and entails heating and adding sulphur or other chemicals to form cross-links between the characteristic long chains of elastomer molecules — as has been done for more than a century to make rubber tyres. The more sulphur used, the harder the product. The vulcanized product withstands higher temperatures, pressures, and mechanical challenges to its integrity.

But sulphur vulcanization has significant human health, environmental and even economic drawbacks. It needs high temperatures to start the chemical reactions; it emits smelly and toxic gases; and it produces numerous unwanted chemical residues that have to be removed from the final products.

One promising radiation application improves the properties of elastomeric (stretchable) materials such as natural and artificial rubber and rubber-like plastics, which are used in numerous products, from insulated wiring in automobiles to condoms. Radiation cross-linking is a well-proven method that bypasses all these negative effects. Rubber, plastics and other polymers are cross-linked simply by exposing the material to high energy gamma rays from a cobalt-60 source or high energy electron beams. Radiation cross-linking is a room temperature treatment, itself an important cost advantage; it is easily controlled; and the desired properties are obtained simply by changing the dose (irradiation time). The transformed materials are in no way inferior to those produced by sulphur vulcanization.

Indonesian trainees get hands on experience with radiation vulcanization. Credit: IAEA

IAEA/TC has sponsored a number of national projects to help transfer such radiation technologies to developing countries. In addition, a Regional Co-operative Agreement (RCA) supported by the UN Development Programme (UNDP), provided international expert visits, workshops, seminars, scholarships, training and hands-on experience. The principal objective of these activities has been to promote transfer of the techniques and know-how from counterpart national nuclear research institutes (NNRI) to the commercial industrial sectors.

For the rubber-growing countries of the RCA group, the radiation cross-linking of natural rubber latex to make a variety of products, such as surgical gloves and condoms, is most important. The Radiation Vulcanization of Natural Rubber Latex (RVNRL) products are free of nitrosoamine compounds and RVNRL gloves have low ash content and low emission of sulphur dioxide when incinerated.

Many Asia Pacific countries have already advanced toward commercialization of RVNRL, with trial or pilot scale production of rubber-dipped products underway in India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Viet Nam. India and Indonesia set up semi-commercial plants in 1993. Malaysia began operating the third plant in 1996, which is the largest in the region with maximum capacity of 6,000 cubic metres of radiation vulcanized latex a year. Thailand will have the fourth in operation late this year.

Later in the year the Agency will organize a co-ordinated research programme (CRP) on RVNRL, which will link a network of developing and developed countries in the field according to a strict research protocol over a 5-year period. Japan, where radiation cross-linking is used in almost every industry, will play a lead role.

R&D on RVNRL has been done in nine latex producing countries with technical assistance from Japan's Takasaki Radiation Chemistry Research Establishment. Trials of dipping products done in the early 1990s in Indonesia and Viet Nam suggest the need to improve physical properties like tensile strength and tear resistance. This research may be conducted at the four new plants. Another new effort led by Japan has begun to develop low-cost irradiators for small-scale RVNRL and dipping-product manufacturing. As a substantial amount of latex produced in the region is from small scattered plantations, easier access to small plants will accelerate the commercialization process.

Advanced degrees in Medical Physics

One of the original 12 Model Projects approved in 1994 "National programme of training in Medical Physics" successfully completed its objectives in Mexico at the end of last year. Medical Radiation Physics is concerned with the accurate and safe medical exposure to ionizing radiation for the treatment of cancer and the diagnosis of human disease. It is also allied with health physics in regard to radiation protection and safety.

During 2 years of operation 15 hospital employees (physicists and engineers) upgraded their skills by participating in an advanced educational training programme consisting of 4 modules of 10 weeks duration each: module I on fundamentals of medical physics, II on radiological safety and quality assurance, III on radiotherapy treatment planning and IV on diagnostic radiology and nuclear medicine. Ten of the participants have successfully completed their training and have received an accredited diploma in Medical Physics. Parallel to this training, an agreement was reached between the National Institute of Nuclear Investigations (ININ) and the Autonomous University of the State of Mexico (UAEM) culminating in the establishment at the University of a modern syllabus leading to MSc and PhD degrees in Medical Physics covering the areas of radiotherapy, diagnostic radiology and nuclear medicine. This programme now continues without assistance from the Agency and is open to students from the region; 20 students are currently enrolled.

Andean barley is spreading

A new Model Project in Peru "Introduction of barley and other native crop mutant cultivars" is expanding the results achieved under previous efforts (see "Barley climbs the Andes" — **Inside TC**, March 1996). The objective is to increase food supply and farm income in the Andean Highlands by introducing a radiation-induced mutant barley line called "UNA La Molina 95". Earlier field testing successfully demonstrated that the new variety is drought and frost resistant, has a high nutritional value, matures early and provides yield increases up to a factor of two even under the harsh growing conditions in the highlands.

One of the immediate objectives is the development of sufficient seed capacity (up to 400t per year) to support widespread cultivation. Near the coastal town of Canete, on one of many seed production plots supervised by the project counterpart Mr. Romero Loli, harvest is already underway and soon the Government will start distributing the seed to farmers living or resettling in the highlands. Further field research is expected to yield new varieties of barley and kiwicha in 5-6 years time, whereas an advanced M2 generation of quinoa may produce a promising new variety within 3 years.

Targeting rinderpest eradication in Africa

Representatives of the main countries involved in the Pan-African Rinderpest Campaign (PARC) outlined their plans for eradicating the disease from Africa, and agreed it could be achieved over the next three to five years at a meeting in January 1997, organized by the Department of Technical Co-operation and the Joint FAO/IAEA Division. PARC involves 34 countries with all but two having rinderpest under control. Also attending were representatives of the campaign's donor organizations, including the European Union (EU) and the United States Agency for International Development (USAID).

During the Vienna meeting, participants defined the problems associated with the surveillance of residual rinderpest and discussed possible solutions. These involved the strengthening of disease surveillance and of the existing network through regional reference laboratories that will help national laboratories in the diagnosis of rinderpest. Participants agreed that the eradication of rinderpest from African countries will not only help to avoid disastrous cattle losses and resulting famines, but will also allow more trade in livestock and livestock products.

International livestock trade is regulated through the Organisation Internationale des Epizooties (OIE) by a set of rules and specific declarations relating to various diseases, a process called the "OIE Pathway". For rinderpest, country declarations culminate in the final objective "Declaration of Freedom from Infection". The majority of African countries are well on the way to achieving this goal and have already made "Provisional Declarations of Freedom from Disease".

In Memoriam

Vitomir Markovic
August 1936 — March 1997

In recognition of his long and distinguished service to developing countries in the field of industrial applications.

Private sector adopting nuclear techniques

Extending the shelf life of agricultural produce is a key element of food security
Credit: IAEA

Over the past 15 years, some 40 cobalt-60 irradiators have been supplied to developing countries through IAEA technical co-operation projects, along with the required regulations, infrastructure, and trained personnel to operate them safely. These facilities have been used for many purposes including sterilizing medical supplies, extending the life of fresh foods and dried foodstuffs, synthesizing industrial materials, modifying the physical properties of plastics and eradicating insect pests.

But such techniques become truly sustainable only when they move beyond the laboratory and the national counterparts to the industrial sector, where people with business know-how and financial resources can apply them commercially.

Attracting private industry is seldom easy, but occurs when projects can contribute sustainably to the recipient national economies. One noteworthy example is Gamma-Pak Holdings, a Turkish private company recently established in Istanbul. Turkey's first gamma irradiator, a medium size Cobalt-60 plant built under an IAEA/UNDP/Turkish Government project, began operating in 1993 at a nuclear research centre in Sarayköy, Ankara. A group of entrepreneurs led by Kubilay Göktalay were impressed by its performance and conducted a market survey of the Istanbul region. In 1994, they launched Gamma-Pak, purchased their own, much bigger, gamma irradiator and got it up and running in Istanbul's large industrial zone.

Gamma-Pak's irradiator is already making profits. Targeting the industrial needs of companies in the Istanbul region, Gamma-Pak contractually irradiates single-use medical products such as surgical gloves, syringes and catheters and decontaminates spices and dried fruits for trading companies. One area of growing promise uses idle capacity to crosslink polymers to make floor heating pipes.

Though completely private, Gamma-Pak is operated under the rules and supervision of the Turkish Atomic Energy Authority. "The links between government and private company are permanent", IAEA officials say. "The safety of equipment, product, personnel, public and the environment are issues for national nuclear authorities. So as long as the plant exists the links exist."

Peru provides another example of nuclear technology extending to the private sector. An IAEA project to support the installation of a multi-purpose irradiation facility, launched in 1984, made little headway over almost 10 years because the Atomic Energy Commission (IPEN) had difficulties raising its share of funding. But IPEN project counterpart Carlos del Valle and IAEA staff resisted repeated calls to abort the project. Their perseverance paid off in the early 1990s, when two entrepreneurs - Jesus Aymar Alejos and Manuel Mendoza - became convinced that the irradiator had commercial potential for their two separate companies.

Together with IPEN they formed a new company, Inmune Sociedad Anonima, and completed the essential ground structures dedicated to accommodate the irradiator, which was provided by the Agency with project funds. The plant was formally inaugurated in April 1996, but has yet to break even because its throughput is limited to medical products and a few others items. The irradiation facility was built next door to Santa Anita, a planned commercial centre for agricultural produce from all over the country. It is expected that a large portion of the throughput would be from excess agricultural produce from the centre.

Aymar, the General Manager, and partner Mendoza have begun to build-up production from a number of sources. They say they want it to be a gradual but steady progression. They have plans to put in new operations and modernize the plant. The new owners believe that their services will be both economical and make a major contribution to greater food security in Peru.

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