Insight

International Chornobyl Centre Magazine Issue 13, 2004

- CHORNOBYL 18 YEARS ON – IS THE WORLD FORGETTING?
- THE LARGEST MOVEABLE STRUCTURE IN THE HISTORY OF MANKIND
- LIQUID RADWASTE TREATMENT

CONTENTS

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AFTER 18 YEARS – A NEW CHORNOBYL DANGER?

Facing the Chornobyl Sarcophagus is a viewing gallery. It contains a scale model showing in great detail the utter devastation that lies within the forbidding exterior of the Shelter.

The model shows walls leaning outwards at a dangerous angle, load-bearing beams propped up by railway sleepers, rooms containing plant and equipment blocked solid with debris either as a result of the accident or materials dropped by helicopter from above to suppress the fire and nuclear activity within the burning reactor. In the centre of the model is the nuclear reactor, showing how the explosion tilted almost vertically its top biological shield that weighted more than 2,000 tonnes; the pressure tubes are torn away and mangled; fuel and moderator debris is scattered everywhere. Some of the reactor's bottom plate has been destroyed. Molten fuel would have found an easy path through here and down to the lower levels of the building. In spite of its detail, the model cannot show everything within the Shelter such as dust, debris, contaminated water and fuel-containing lava that lies in inaccessible places — and it's all highly radioactive. To put the size into perspective, scale figures of people are dotted around the model — but in reality most areas are inaccessible. People do work inside the sarcophagus, like the dosimetrist pictured on the cover. Working under very difficult conditions they are carrying out monitoring, inspection and dust suppression operations, but for the most, movement within the sarcophagus is limited.

▼ *Model of Shelter and destroyed Unit 4*

All this is protected by the decaying, leaking Shelter that's vulnerable to even a moderate earthquake.

Outside the plant lie vast areas of beautiful countryside; towns, small villages, farmhouses, schools, churches, wild animals — but no people. Perhaps we may never know the true effect of the accident on people — apart from those who perished at the time. Whatever the effects whether medical or psychological the impact on the lives of over three million people was, and still is, devastating.

A small Ukrainian delegation travelled to New York last autumn. They went to plead to the United Nations General Assembly not to approve a proposal, put forward by several key member states, to relegate Chornobyl discussions from the main agenda down to committee level. Perhaps this proposal was an early sign of a new danger facing Chornobyl — the threat of apathy.

There is Good News Too

There is certainly no apathy on the part of those working on the Shelter and decommissioning projects. On the 18th anniversary of the accident they have cause to celebrate because real progress is being made. After years of assessing what needs to be done, deciding how to do it and then planning; site work to stabilise the Unit 4 Shelter is about to start. When that is accomplished the New Safe Confinement (NSC) will follow close behind. With the conceptual design agreed, tender documents for the NSC will be issued soon.

It may be 18 years after the accident, but getting to this point was no mean achievement. No one should doubt the effort and commitment of the international team that includes Ukrainians who, ever since the accident, have worked tirelessly to ameliorate its effect. But there is no time to relax. No one can predict if and when a hurricane, cyclone or earthquake will strike. The Shelter work is urgent.

Dosimetrist inside the Shelter (Photo by Sergey Koshelev. Picture courtesy of ChNPP)

GOVERNMENT SUPPORTS CHORNOBYL CENTRE

'International technical assistance is really important to us but it cannot last forever'. Those words were spoken by Serhiy Poliakov, the Ukrainian Minister of Environmental Protection, as he urged ministries, their departments and other interested entities to support the Chornobyl Centre in its efforts to become competitive in the nuclear and radiation safety market. He was speaking at a meeting of the Chornobyl Centre's Supervisory Board that was held in February this year.

Images of an important meeting with a positive outcome

It was a historic meeting for the Chornobyl Centre because it underlined the Ukraine government's determination to see the Centre succeed. In stressing the need for Ukrainian support, Mr. Poliakov said: 'Starting from 2004, we should support the Centre and give it the opportunities to participate in activities which are scheduled to be carried out within the framework of budget programmes.'

The Supervisory Board is an inter-departmental body that exercises control over the Chornobyl Centre's activities. It co-ordinates the measures taken by the relative Ukrainian ministries, their departments and the Verkhovna Rada (parliament) committees with regard to the Centre's work and its development.

The meeting highlighted the fact that the Centre has the scientific and technical basis to accomplish a range of important activities in the area of nuclear and radioecology research. Chornobyl Centre experts have accumulated years of national and international experience through fruitful co-operation with leading scientific and engineering organisations.

The Board members acknowledged the Centre's experience, gained on projects such as emergency response training, radioecological research within the Exclusion Zone, nuclear calculations, and the development of operational programmes for nuclear power plants. Members agreed that this expertise should be more extensively recognised and information on the Centre's capabilities widely disseminated.

Mykhailo Gaiovy, who represented the Cabinet Office, proposed that the Centre's potential should be more actively utilised to monitor nuclear and radiation safety projects. Mr. Gaiovy felt that the opportunities for collaborative working with the Ukrainian Scientific Centre for Radiation Medicine should be increased.

Signing the Chornobyl Centre's record of honoured visitors, Mr. Poliakov wrote: 'I wish the Chornobyl Centre joint and fruitful work in addressing radioecology problems and in the ecological recovery of the radioactively contaminated environment.'

TV and print coverage reflects the importance of the meeting to Slavutych. The success of the Chornobyl Centre directly impacts on the town's economy

▲ *Ukraine delegation at UN General Assembly*

UKRAINE URGES UN TO RESIST 'CHORNOBYL FATIGUE SYNDROME'

Ukraine has urged the United Nations not to succumb to what the media has described as 'Chornobyl fatigue syndrome'. The plea follows a proposal by some UN key member states, to move discussions on Chornobyl issues from the agenda of the main international forum to that of a UN committee.

The petition was made by Gennadiy Rudenko, chairman of Ukraine's parliamentary committee on ecology policies, who led an official Ukrainian delegation to the UN headquarters in New York in October 2003 to participate in the Assembly's meeting. Yevhen Garin, the Chornobyl Centre's co-ordinating director, was included in the Ukrainian delegation.

Speaking at the plenary session on humanitarian and emergency aid, Mr. Rudenko reiterated that Ukraine had inherited the legacy left by the Chornobyl accident. This included 3.5 million victims, of which over a third were children, together with environmental, economic and social consequences that would be felt by many future generations. The leader of the Ukrainian delegation emphasised the need to keep Chornobyl issues on the General Assembly's agenda, stressing the necessity for all parties to fulfil their international commitments towards Chornobyl when making this crucial political decision. While making his comments on the situation, Yevhen Garin added that a decision to relegate Chornobyl discussions to the level of a UN committee would have a detrimental effect on the attitude of some countries to these problems. This in turn will significantly reduce international support to this end.

After some discussion this 58th plenary session of the UN General Assembly confirmed that the Chornobyl problem would remain as an agenda item at its next meeting. Only time will tell if Ukrainian diplomats are able to maintain the profile of Chornobyl in the future. There is a certain risk that the repeated inclusion of Chornobyl on the main agenda could lead to 'Chornobyl fatigue syndrome' in the minds of member states. But no one should forget the fact that this item refers to untold suffering and hardship inflicted on the people of Ukraine and other countries by the world's worst civil nuclear disaster.

'The General Assembly... Stresses the need for co-ordinated international co-operation in studying the consequences of the Chornobyl catastrophe, in particular through effective work of the International Chornobyl Research and Information Network, the Chornobyl Forum, the International Chornobyl Centre for Nuclear Safety, Radioactive Waste and Radioecology, and other research centres from the most affected countries, and invites Member States and all interested parties to take part in their activities'.

'The General Assembly... Welcomes the decision of the Council of Heads of State of the Commonwealth of Independent States to proclaim 26 April the International Day Commemorating Victims of Radiation Accidents and Catastrophes in the States members of the Commonwealth and invites Member States to observe this International Day and to conduct appropriate activities to commemorate victims of radiation accidents and catastrophes and to enhance public awareness of their consequences for human health and the environment throughout the world'.

(Cited from the resolution of the 58th session of the UN General Assembly, 17 December 2003)

▲ *Mayor Volodymyr Udovychenko explains the layout of the town to Ambassador Herbst*

WELCOME VISIT

The first visit to Slavutych by John Herbst, the newly appointed US Ambassador to Ukraine on 29 December 2003 was welcome for several reasons. During the previous year, the Chornobyl Centre staff in adapting from a purely research based organisation to a self-sustaining commercial entity, faced many challenges. The United States Ambassador had brought a vote of confidence in the Centre's stable development backed up by tangible support for its future. Others in Slavutych also had reason to welcome the visit.

The Chornobyl Centre's success is inextricably bound up with the town's drive towards future prosperity. Currently, the Centre employs almost 80 people most of whom are former ChNPP employees. But success does not come overnight, contracts have to be won and a track record of successful project completion established. The Centre holds many quality certificates but to compete against the best in the world it must demonstrate its compliance with the highest internationally recognised standards of quality and performance.

When during his visit, therefore, John Herbst announced that the US is to provide ongoing technical support for the Chornobyl Centre, to help it bridge the period between reliance on external funding and self-sustainability, the elation of its employees was palpable. Responding to the announcement, Yevhen Garin, the Centre's co-ordinating director, remarked that this would help the staff to complete the process of certification and licensing under international quality standards. Notwithstanding the Centre's growing commercial role, research will continue. Support to the International Radioecology Laboratory has also been extended. This will enable specialised equipment to be purchased that will greatly enhance the research being carried out within the Exclusion Zone.

Support and Friendship

The US has supported Slavutych for many years and its technical and financial contribution was a major factor in establishing the Chornobyl Centre. However, that country's involvement has extended beyond the role of a benefactor to that of a partner as its representatives have engaged with the local community in initiatives aimed at enhancing mutual understanding. The live video link provided to enable Slavutych children to interact with counterparts in Richland USA is one such example.

While her husband concentrated on social and technical aspects of Slavutych, Mrs. Herbst, who accompanied him, had her own programme that mostly centred on the town's most treasured asset — its children. It was in any case Christmas! Her visits to Slavutych children's organisations, where presents were distributed, were warm, friendly and sometimes very touching. This was particularly so for the visits to the disabled children's centre, to the orphanage and to the kindergarten for children with impaired eyesight. At all venues the children sang and talked enthusiastically about their interests, achievements, dreams, and wishes.

Meanwhile, the Ambassador met with Mayor Volodymyr Udovychenko and discussed the possibilities of establishing an international university in Slavutych and implementing an energy saving programme.

Ambassador Herbst also met with the leaders of the SIP Project Management Unit to discuss progress on the Shelter stabilisation work and on the New Safe Confinement project. The United States Government has allocated USD 156 million to implement the SIP project.

Summing up his visit, Ambassador Herbst paid tribute to the efforts of Slavutych people in tackling the social and economic consequences caused by the premature shutdown of ChNPP. Mrs. Herbst spoke of her esteem in facilities provided for children requiring special care. 'I am sure, that the future of Slavutych will be bright,' the Ambassador concluded.

▼ *One of many children who received gifts from Mrs. Herbst*

SLAVUTYCH BIDS FOR TOP AWARD

Slavutych is competing to win the United Nations Habitat Award for the best practices in improving the living conditions of its people.

The City Council has submitted the project entitled, 'Formation and self development of Slavutych Community. Optimum method of achieving ecological and socio-economic rehabilitation of the area that suffered as a result of the global Chornobyl catastrophe.'

Recognised by the UN Centre for Human Settlements (Habitat) and by the World Assembly of Cities and Local Authorities, the award was established in 1995 by the Vice President of the United Arab Emirates. Its objective is to identify outstanding achievements in improving living conditions in urban and rural habitats.

Since its inception, 25 countries have won the award including, Argentina, Canada, China, Egypt, Germany, Mexico, Netherlands, Spain, and USA. The announcement of winners and presentation of awards will take place in Dubai during October 2004.

TOWN HONOURS THE BEST

▲ *Insight's award*

On a wintry Saturday night, Slavutych people gathered in the town's ceremonial concert hall to honour the winners of the 'Slavutych-Resident 2003 Town Award Scheme'. Since the scheme was introduced two years ago it has become so popular with the town's community that is now regarded as one of the best Slavutych traditions.

The awards covered 17 categories. Amongst those recognised were outstanding Slavutych enterprises and organisations, doctors and teachers, businessmen and philanthropists, sportsmen and masters of art. There is no financial reward, but winners take great pride in such recognition of their achievements. The award is in the form of a prestigious gold-pinioned statue.

INSIGHT magazine was a winner under the category 'Informational Support to Slavutych'. The commission noted that INSIGHT communicates true information — about the town of power-men; about the aftermath of the most severe nuclear accident; the present situation at the Chornobyl NPP and within the Exclusion Zone — to over 50 countries of the world.

While it is a privilege to be recognised in this way, we feel that we can do better. We are always happy to receive feedback and comments regarding the topics covered in INSIGHT. Tell us what you want. We are always ready to listen.

SLAVUTYCH – A VITAL PIECE IN A LARGE JIGSAW

Weapons of mass destruction, non-proliferation, counter-terrorism and nuclear safety are issues that concern everyone right now. At the 2002 G8 summit at Kananaskis in Canada, leaders pledged to provide up to USD 20 billion over ten years for a new Global Partnership against the spread of weapons and materials of mass destruction. The money will fund a massive and complex programme ranging from dismantling chemical and biological weapons and old nuclear submarines to reducing the risk of proliferation of weapons expertise. Clearly, addressing the consequences of the Chornobyl accident comes under the nuclear safety heading but how does the UK-supported social consequences programme in Slavutych fit into the programme?

While Slavutych only came into existence as a result of the Chornobyl accident its inclusion under the programme is not solely due to that event. Slavutych is just one of many cities included as part of the UK's contribution to the Global Partnership. Under its social consequences programme the UK is supporting efforts to alleviate the effects of nuclear power plant closure in several FSU countries. It aims to address the social and economic consequences by promoting economic diversification while ensuring the safe operation of plants for the duration of their lifetime. Other nuclear towns under this category include those dependant on Ignalina (Lithuania), Kozloduy (Bulgaria), and Bohunice (Slovakia) in which plants either have been, or are due to be, closed.

Closed Cities

While like Slavutych, the above nuclear power plant cities have never been involved in supporting weapons programmes there is some similarity to the situation in closed nuclear cities. These were constructed to support the Soviet nuclear weapons programme and access to them was severely restricted. In Russia there are ten such cities. Now they are no longer manufacturing weapons and there is a need to reduce the proliferation of expertise through the creation of non-weapons related employment there. This will be achieved by improving the conditions for commercialisation, diversification and innovations within those cities, by identifying and developing promising technologies for commercial development, and facilitating commercial contacts and business start-ups. So Slavutych is only one of several cities occupying the attention of the UK's Department of Trade and Industry (DTI) and other UK government departments.

What's Special about Chornobyl and Slavutych?

Having suffered the world's worst civil nuclear disaster, Chornobyl is unique. However, it too is just one part, albeit a major part, of the international effort to make the world a safer place. What makes Chornobyl and Slavutych special is not just that they need international support — so do many other locations; it is that they also have a major contribution to make. In decommissioning nuclear facilities, those working and living there have the required expertise. In carrying out scientific research into the environmental impact of a major disaster, they have the knowledge and facilities to help. This has accumulated both from mitigating the accident consequences and from years of research. In applying scientific research to radiation protection there are some interesting results emerging.

And in the field of counter-terrorism where nowadays countries fear the consequences of small nuclear devices such as the 'dirty bomb' in large cities, they also have practical experience. Pripyat experienced that. It may not have been from a bomb but a wealth of information was gathered on the way contamination spreads in an urban environment and also what countermeasures work and what lessons were learned. Much of this information and expertise is held by the International Chornobyl Centre.

Making the World Safer

Dismantling nuclear submarines, destroying weapons, neutralising dangerous materials and decommissioning nuclear power stations demands a huge international effort. The G8 Partnership represents that effort and is a major force to make the world a safer place. Chornobyl and Slavutych will surely benefit from its programme but those living and working there have much to offer also. . .

The DTI together with the UK's Foreign & Commonwealth Office and Ministry of Defence is working with other G8 partners and the European Commission (EC). The G8 Partnership comprises US, UK, Canada, Germany, Italy, France, Japan and Russia. The US has committed USD 10 billion with the remaining USD 10 billion being pledged by other member states and the EC.

Much of the above information is taken from the UK's First Annual report on the Global Partnership. Those interested in following developments should visit the website for the programme on www.dti.gov.uk/energy/nuclear/fsu

Picture on page 8: Dismantling nuclear submarines
Picture on page 9: Partially dismantled nuclear submarine

Photographs courtesy of Zvezdochka Ltd., Severodvinsk

LARGEST MOVEABLE STRUCTUR

Chornobyl's proposed New Safe Confinement (NSC) will be the 'largest moveable structure to be built in the history of mankind', and a 'wonder of the world'. This is how the proposed 100m tall structure was described respectively by Michael Durst, Project Manager NSC and Ian Downing of the UK Department of Trade and Industry when addressing delegates to last years ICC scientific and practical conference on Chornobyl. When complete, the height of the arch-shaped NSC will be just 11 metres short of that of London's St Paul's Cathedral. Put another way it will stretch to the height of the central span of San Francisco's Golden Gate Bridge.

In previous issues we have emphasised that the NSC is not a sarcophagus. Neither should it be confused with the existing Shelter, stabilisation works on which are about to start. Its main purpose is to keep out water and to provide a safe environment for future works, particularly deconstruction of unstable parts. The steel framework will be covered by a material that will be strong but light; the type of material will be determined at the detailed design stage. The NSC's purpose is to prevent the spread of contamination, not to shield radiation. During deconstruction of the existing Shelter, localised shielding will be employed. In effect the NSC will be a giant workshop.

A Firm Foundation

To reduce radiation doses to workers the NSC structures will be constructed 180 metres away from the Shelter before being finally slid into position. The foundations will be 3—4 metres thick, 14 metres wide and supported by deep concrete walls.

Prior to the start of construction activities, the upper layer of soil will be removed. This will reduce the risk of personnel exposure. Earth moving activities will require the routine application of radioactive waste management techniques including dealing with the possibility of uncovering high-level waste and fuel-containing materials.

Early work will be to construct the sliding foundations at the assembly area. Once the initial stage is complete assembly work on the arch shaped structure can begin while the sliding base for the arch is steadily extended towards the Shelter.

Section by Section

Structural elements of the NSC will be fabricated at the contractor's manufacturing facility and transported to site by road or river.

To reduce the necessity of on-site work, the elements will be as large as transport limitations will allow. This means that they could be as long as 65 metres and weigh up to 200 tonnes. Two methods of lifting the assembled structures have been considered. The first utilises a large crane. The alternative method involves a lifter (strandjack) for the arch construction. With this method, the arch elements will be assembled into large sections at ground level. Each section will consist of three bays. The outer sections will be set on the foundation supports and lifted by lifter columns after which the centre arch section will be assembled. This will be lifted by the strandjacks and joined to the outer sections. The lifter columns will then be moved inwards and away from the assembled part that at this stage will represent 25 percent of the final arch. This will be moved a short distance eastwards towards the Shelter to clear the assembly area allowing work to start on the other three-bay sections of the arch. The process will continue until the NSC is completed. The current schedule envisages the completed arch to be positioned over the Shelter by 2008.

Sliding on steel beams with Teflon bearings the NSC will be finally moved over the existing Shelter in a single day. Pulling jacks will be located at the eastern ends of the foundation blocks, and a highly accurate hydraulic system will allow the pulling loads at each side of the arch to be very finely controlled ensuring smooth and even movement.

Many Outstanding Issues

The NSC design process is complex and is carried out in three stages: conceptual design, detailed design, and technical documentation. Currently, the NSC concept design has been completed. The detailed design stage will address many outstanding issues.

The shear size of the 20,000 tonne arch that will measure 100 m tall x 250 m wide x up to 150m long will present its own design challenges, such as the requirement to withstand a strong tornado. Other design issues include a 100-year service life, snow and wind loading, seismic loading, temperature effects and the influence on the structure of the four internal bridge cranes with a lifting capacity of 50 tonnes. Operationally, the design must make provision for radiation and nuclear safety, industrial health and safety, fire safety, ecological safety, physical protection and comprehensive control over both the Shelter's internal environment and the NSC status.

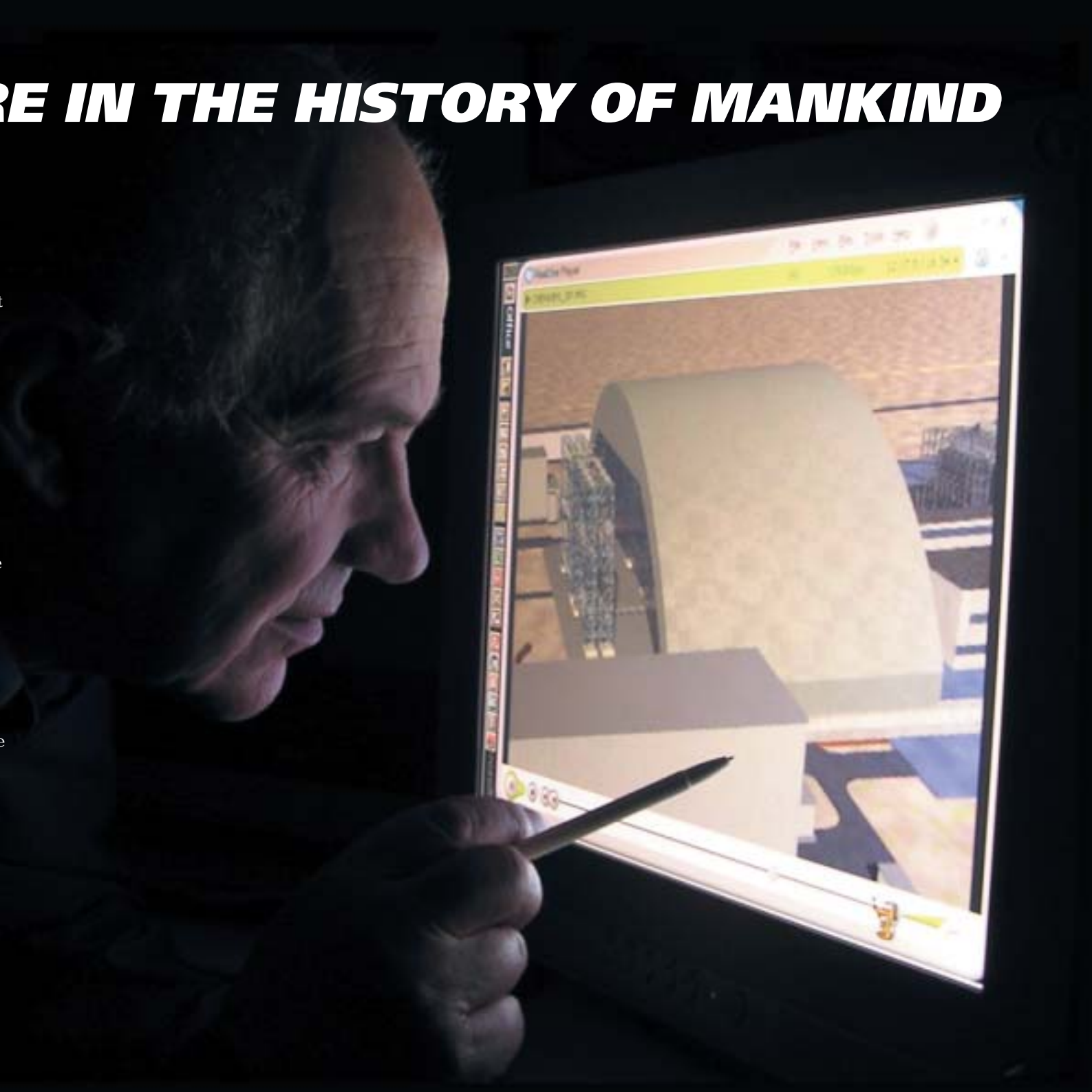
Publication of tender documents is expected as this issue of Insight goes to print (March 2004). This will mark the achievement of a major milestone in the NSC planning programme.

Interest from companies bidding for the construction is expected to be high. This is evidenced by the fact that over 30 companies attended seminars on the project that were held at the Chornobyl NPP site and at the EBRD in London during 2003.

Tributes to Two Great Achievements

Undoubtedly, the final operation to move the NSC over the Shelter will be watched by the world's media. Reporters will surely pay tribute to the engineering achievement that the gargantuan structure will represent. What is indisputable is that this achievement will only be realised through the significant use of Ukrainian resources. Perhaps also the reporters will pay tribute to the Shelter builders who, working under almost impossible conditions built the original structure in just seven months. That Shelter will have protected the environment for twenty-two years by the time that this new 'wonder of the world' is completed.

RE IN THE HISTORY OF MANKIND



3D –CAD model of NSC conceptual design. The picture shows a video presentation of the current status of conceptual design prepared by a team of engineers from Bechtel, EdF, Battelle Memorial Institute and the Ukrainian sub–contractor KSK. In this view the completed assembly is being moved clear of the construction area ready for its journey towards the Shelter.

Information provided by European Bank of Reconstruction and Development

WE HAVE THE TECHNOLOGY

The new Liquid Radwaste Treatment Plant that is currently under construction at Chornobyl NPP. This is being built to handle 25,000 cubic metres of liquid radwaste that was accumulated during the NPPs operating life. The plant will also process liquid radwaste arising from decommissioning work.

Liquid Radwaste Plant Nears Test Phase

Decommissioning issues tend to be somewhat overshadowed by efforts to mitigate and eliminate the aftermath of the Chornobyl accident. No one can dispute that the drive to stabilise the Shelter, build a New Safe Confinement and then somehow to clean up the utter devastation within the Unit 4 reactor building presents a Herculean challenge that will take decades to overcome. But even without all of this, the challenge of Chornobyl would be enormous. No RBMK reactors have been decommissioned anywhere in the world. Here we are preparing to decommission three of them. While the RBMK reactors will present their own unique problems there is thankfully a great deal of international expertise around. This is manifest in the rapidly developing decommissioning infrastructure in and around the nuclear power plant site. Of the projects that are currently under construction the Liquid Radwaste Treatment Plant (LRTP) is at the most advanced stage.

Accumulated Liquid Waste

During their operating life, Chornobyl's reactors have accumulated 25,000 cubic metres of low and medium-level liquid radioactive waste (radwaste). This consists of spent perlite and ion-exchange resins (used as a liquid radwaste filtering medium), and concentrates resulting from volume-reducing evaporation. This waste is currently stored in nine-1,000 cubic metre tanks and a further five tanks of 5,000 cubic metres capacity. A sixth tank is for water (know as 'supernatant') removed during the ChNPP evaporation process.

The Process

The new facility will receive, process, encapsulate and dispatch the radwaste for disposal at the Vector repository located 11-km away in the Exclusion Zone. Processing will be carried out in the Liquid Radwaste Treatment Plant (LRTP) that is currently under construction. The process involves further volume reduction which, depending on the type of waste, is achieved by separation or evaporation. With a capacity to process 2,500 cubic metres per year, it will take at least 10 years to clear the accumulated backlog. However, the facility will also be required to handle liquid radwaste arising from decommissioning activities.

Drum Roll

All operations for the end product management are automatic and carried out remotely. The LRTP process results in a final product that is in the form of a grout mix. This is discharged into standard 200-litre storage drums. The drums are moved via a roller conveyor that passes through a series of compartments that are segregated by sealed shield doors. The doors are sequentially opened and closed to allow the entry or exit of the drum. From receipt of the drum it passes in turn through an 'air lock' and through the compartments where it is filled by the end product, sampled and a lid loosely fitted, before it enters the curing hall. Curing takes two days and within the curing hall drums are moved by a remotely controlled overhead crane.

After curing, the drum starts its outward journey. Its identification number is checked and the grout hardness is tested before the drum lid is sealed on by crimping. Surface contamination and dose rate are measured to confirm that the drum conforms to the set requirements, if so it is classified as 'compliant' and passes to the loading bay within which it is placed in a concrete over-pack — with compartments for four drums — for transport by road to the Vector repository. Only the drums containing grout mix are disposed, the empty over-packs are returned to the LRTP. Non-compliant drums are diverted from the discharge route to a separate room where they are loaded into an over-pack and the entire over-pack sealed and exported for disposal as a whole.

Quality

The Euro 25 million project is administered through the EBRD Nuclear Safety Account (NSA) and managed by the NSA Project Management Group (PMU) comprising experts from Westinghouse, NNC, KIEP and ChNPP. The main contractor is a consortium of Belgatom, SGN and Ansaldo. Most on-site work is carried out by Ukrainian sub-contractors. The high specification plant and equipment has been manufactured and procured both in Ukraine and in the West. Ukrainian supply includes the stainless steel tanks and pipe-work, the overhead cranes, shield doors and heating and ventilation ducting.

Testing Time

With installation work substantially complete the facility will soon undergo pre-commissioning tests with non-active products followed by commissioning tests with active waste. Once commissioning is complete the LRTP will be handed over to ChNPP to start the processing of liquid radwaste.

▲ *Spent nuclear fuel dry storage in modules*

SAFE STORAGE

In spite of the Chornobyl accident nuclear power remains Ukraine's largest source of electricity production. Currently, spent fuel is sent abroad for long-term storage and reprocessing but this is expensive and costs are rising, so Ukraine is now looking to store its own spent fuel.

Following the Chornobyl tragedy the world attitude towards nuclear power changed. Those opposed to the technology disregard design details and cite the possibility of a similar accident at any nuclear power plant. There is also widespread concern over nuclear waste. Supporters assert nuclear power's environmental advantages; the fact that waste volumes are lower than those of other comparable industries and that spent fuel still contains approximately 95 percent of its initial energy. One tonne of nuclear fuel has roughly the same energy equivalent as one million tonnes of organic fuel.

While arguments continue, many countries are using nuclear power. Most of them choose the option of interim storage for spent nuclear fuel. In May 1996 the Ukraine Verkhovna Rada (parliament) approved the 'National Energy Programme to 2010' that laid down the strategy to address spent fuel management. The programme commenced in September 2002 with the commissioning of the first three storage containers for spent fuel at the Zaporizhzhia NPP. The next stage of the programme is to address the issues of spent nuclear fuel management at the South Ukrainian, Khmelnitsky, and Rivne NPPs. Successful outcomes from these projects will result in a seven to tenfold reduction in spent fuel management costs compared to the current costs incurred in dispatching the fuel for long-term storage and reprocessing to Russia. This cost is continuously growing, and since 1995 has doubled.

The most important stage in the process of constructing a long-term spent nuclear fuel storage facility (SNF SF) will be approval, by the Ukrainian state authorities, to start constructing the appropriate facility. The State Enterprise NNEGC 'EnergoAtom' is working to gain this approval.

Currently the technical and economic justification of the investments is being developed. It will identify the SNF SF location. Several possible options are being considered including a site within the Chornobyl Exclusion Zone. This would contribute to the creation of a unified technological complex for spent fuel and radioactive waste management and through employment opportunities help to address the social problems caused by the Chornobyl NPP shutdown.

The international tender for the investment project entitled 'Construction of Storage Facility for Spent Nuclear Fuel Generated by VVER Reactors' has been announced. Four consortiums represented by Ukrainian, Russian, English, American, French, and German companies are bidding to win the contract to build SNF SF on a turnkey basis. Commissioning is planned for 2008.

Regarding existing options of SNF interim storage, Ukraine has opted for dry storage in modular or container type facilities. However, the technology to be adopted for long term storage will depend on the outcome of international tender. Only then will we know the final answer to the question: 'what technology will 'EnergoAtom' choose?'

Information and pictures provided by NAEK 'EnergoAtom'

▼ *Spent nuclear fuel dry storage in containers*

UKRAINE RATIFIES KYOTO PROTOCOL

The eternal clock is ticking its way into the third millennium. And mankind looks into the future with concern. What lies ahead? – Many seemingly insurmountable problems. Is mankind in control of its own destiny or is it steadily destroying the planet and poisoning the air on which life depends? It seems as if we have the ability to blanket the atmosphere with a dangerous layer of greenhouse gasses; to pollute the oceans; to destroy forests and the land on which we live; yet we either lack the will or the ability to redress the situation. Today more than ever before it is vital for all countries to join in the struggle to save the planet's biosphere. Ukraine is playing its part. . .

On 4 February 2004, the Ukrainian parliament ratified the Kyoto Protocol under the United Nations Framework Convention on Climate Change. In so doing, Ukraine has committed itself to controlling levels of greenhouse gas releases to below the 1990 levels. The Kyoto Protocol was signed on 11 December, 1997. It identifies the procedures for reducing the levels of greenhouse gas emissions and stipulates market procedures to compensate for the costs required to achieve this.

In Milan during December 2003, the ninth annual meeting of the UN Convention member countries discussed climate change. Attended by 4,000 delegates from 188 countries, the conference looked at ways to implement the Kyoto Protocol. They discussed development programmes for ecologically clean energy, ways to transfer ecological technologies to countries with transitional economies; the status and preservation of forests and other painful ecological problems faced by mankind.

Back in 1990, Ukraine was the world's sixth worst greenhouse gas producer. Since that time, the country has almost halved its emissions, reducing greenhouse gasses by 49%. But levels are still too high. Not counting pollution caused by transport, the country released over two million tonnes of hazardous substances into the air during the first six months of 2003. This is bad for the environment and damaging to human health. What is worrying is that levels were 4.6% higher than during the corresponding period of the previous year. Gaseous and liquid substances are the main culprits accounting for 85 percent of the total. Over 13,000 Ukrainian enterprises release hazardous products into the environment: that averages out at around 155 tonnes each. Permissible contamination levels are repeatedly exceeded by industrial concerns in the fields of iron ores production, metallurgy; coking processes, oil-processing; coal mining; and electricity production by coal, gas, nuclear and water.

Experts believe that such pollution has a negative impact on our climate that is evidenced by extreme climatic events. These include the Transcarpathian floods (1998, 2000), hurricanes in Volyn and Ternopil regions (2000), drought in Ukraine in 2003, etc.

Today the Kyoto Protocol gives us opportunities to seek investments to address ecological problems, such as selling quotas for greenhouse gas releases. Economic analyses by international experts show that, due to its overall reduction in emissions, Ukraine could be a major supplier of gas reduction quotas. By 2012 this could attract over USD 1 billion to the country and also be a major inducement to Ukraine to strive for further reductions.

Within the framework of implementing the Kyoto Protocol, the Chornobyl Centre has initiated the project 'Analysing European Union Positions on Implementing the Kyoto Protocol and Developing Recommendations on the Ukrainian Position during International Negotiations'. The work will include assimilating information on the approach of other countries to climate change. The results will assist Ukraine to develop its own strategy towards climate change and help the country to formulate its position in international negotiations.

FIRST CLASS

▲ *The first class to use the state-of-the-art facilities*

There's an old saying that goes 'Give me a fish and I won't starve for a day... Teach me to fish, and I won't starve for a lifetime'. But even a skilled fisherman needs the tools to hook the fish...

Digital Community Centre

Through the support of World ORT — a non-governmental educational and training organisation — the town's modern computer-based 'Digital Community Centre' became fully operational on 11 February 2004. It can equip young people with the skills to serve them for a lifetime and could be a key factor in helping Slavutych towards a self-sustainable future.

The newly established Centre uses specially equipped resource rooms. Teachers are eager to help students to master computer literacy skills and to give them the opportunity to access the infinite bank of knowledge available through the internet. Educational specialists are working at the Centre to develop a computer based educational syllabus. A class from the higher education centre pictured above, was the first to use the facility. On most days similar classes can be seen utilising the modern resources. However, it is not just these students that will benefit; other programmes are planned for secondary and primary schools such as a course in computer art design for pupils from the Slavutych children's art school. The Centre's facilities are also to be used by disabled children, kids from the town's orphanage and those who previously could only dream of accessing the world of knowledge provided through computer technology.

Special programmes for adults are also planned; for teachers; redundant ChNPP personnel who require re-training and for the disadvantaged. In fact, the Centre is a vital resource for organisations devoted to improving the social and economic situation in the town. And, offering untold possibilities for the town, there is a potential that is yet to be realised — the fibre-optic cable link.

Link to the Future

The Chornobyl Centre working under contract to the UK's DTI is carrying out a feasibility study for the fibre-optic link that would be funded by UK, USA and possibly others. This study will also identify training needs so that Slavutych is ready to exploit opportunities such as e-business, internet services, web design, etc. Those wishing to take advantage of the huge possibilities offered by the link will need to be fully computer literate and possess marketable computer skills. Working with the higher education centre and other organisations, the Digital Community Centre (DCC) could be at the core of this training process. The DCC will itself benefit from the link through for example, rapid connection to the remote education server of the World ORT's professional on-line training centre.

ORT

The Centre was established under the umbrella of World ORT that is one of the world's largest non-governmental organizations working in the area of education. Vlad Lerner, ORT Director General in CIS and Baltic countries, came to see the facilities in use and signed collaboration agreements with many Slavutych social services and educational establishments.

Established in St. Petersburg, Russia, over 120 years ago, World ORT is now represented in more than 50 countries. In Ukraine alone, about 10,000 people each year study in ORT educational and technical centres. Slavutych Mayor Volodymyr Udovychenko, convinced the organisation that Slavutych is the very town, where the project could be successfully implemented. Subsequently, in August 2003, a trilateral collaboration agreement was signed by the ORT leaders, Slavutych City Executive Committee, and the Kyiv Polytechnic Institute.

The American corporation 'Hewlett-Packard' has provided technical equipment and will financially support the Centre for a period of three years. The high-tech equipment provided by 'Hewlett-Packard' includes 50 new state-of-the-art computers, servers, printers, digital projectors and other teaching aids. Slavutych's administration provided the accommodation and renovated the premises within a former kindergarten school; it will also meet the cost of the utility services. The Centre's modern furniture was provided by the Kiev Polytechnic Institute. The DCC's three computer-teaching, resource and network areas, together with offices occupy an area in excess of 400 square metres.

Team Work

The possibilities for training and learning offered by the DCC are endless but there are some difficulties to overcome. As a service to the community the bulk of the facilities are offered without charge. While there is limited funding for additional specialised teaching support it relies heavily on voluntary help. The town administration has played its part but its resources are also limited. Computer aided training is only as good as its software but programmes such as *Windows XP Professional* are expensive. While planning courses that the community needs, the DCC's staff hopes that somehow it will be able to obtain the software that can make a real difference to people's lives.

Back in 1880, Nikolai Bakst developed the ORT philosophy. It was 'to train people in skills that would earn them dignity and independence'. In this 21st century that is all that the people of Slavutych are asking.

▼ *Vlad Lerner, ORT Director General in CIS and Baltic countries, signs collaboration agreements with local social services and educational establishments*

FUNDING A NEW FUTURE

Four years before the closure of ChNPP a team of Ukrainian and international experts developed a socio-economic strategy document named 'Action Plan for Addressing the Problems of Chornobyl NPP and Slavutych'. It contained proposals to support Slavutych entities such as the BDA, Business Incubator, and the Union of Goods & Services Providers. The strategy aimed to raise the finance for small and medium business development through a charitable fund. Since it started just six years ago, the 'ChNPP-Slavutych-Development' Fund has led to the creation of 150 new jobs, supported charitable events and helped the sick and needy.

▲ *Natalia Ivanovska, Head of 'ChNPP–Slavutych–Development' Fund*

Presidential Support

The fund was established in 1998 by several organisations including the Slavutych Union of Goods and Services Providers, NNEGC 'EnergoAtom', the ChNPP Trade Union, and Slavutych Public Council. During the early years donations were sparse. In December 2000 however, the situation changed dramatically after the intervention of Ukraine's President Leonid Kuchma. While in Slavutych immediately after the closure of ChNPP, the president urged the directors of Ukrainian State Oblast administrations to support the fund. Consequently, by early 2001, the fund had accumulated over UAH 1.7 million. (USD 320,000)

Since its inception the fund has enabled 27 Slavutych enterprises to benefit from interest free loans. This has created 150 new jobs. Industrial companies have accounted for about half of the funds including those in the fields of woodworking, sewing, stationery, carton and paper, food, construction materials, and equipment manufacturing. Goods and services businesses have received around 35 percent.

Applications from new enterprises wishing to benefit from the fund are assessed by the Business Development Agency on the basis of economic efficiency, job creation potential, the availability of expertise and project implementation dynamics. The Fund Executive Committee takes the final decision on suitability for financial support.

Although recently no significant donations have been made, the fund continues to grow at a gradual rate. This is mainly due to contributions by companies who, having originally benefited from the fund and paid off their debts, are now investing in the future of Slavutych by paying into the fund and in turn helping other new companies.

Not Just For Businesses

Such actions have resulted in the fund showing a modest surplus over commitments. So now it can support the town in other charitable ways. The sponsorship of the 'Slavutych Golden Autumn' festival is typical of such support. This is an international celebration of children's creativity in which they become involved in the performing and visual arts, television and press reporting and sports competitions. Last year the fund paid for young pupils attending the children's art school to travel to Strasburg and demonstrate their talents. Another example of helping the community is through its support to the parents of a child who was badly in need of a complex and expensive medical operation.

As well as the BDA, the Business Incubator and Slavutych Executive Council actively participate in the activities of the Fund. Recently it was joined by the Slavutych Entrepreneurship Support Fund that is financed from the local budget. Its support, to established and new enterprises, comes through bank loans. Now applications from those applying for financial assistance will be considered by executive committees of both funds who will jointly decide on the most appropriate support. Through its work therefore, the Slavutych charitable fund, together with others, is playing a central role in helping those with the vision and courage to explore new directions to succeed.

▲ *Cabinet of Ministers of Ukraine. Chornobyl Centre for Nuclear Safety, Radioactive Waste and Radioecology*

IMPROVING COMPETITIVENESS

The Ukraine's Chornobyl Centre and NPP Operation Support Institute and Nuclear Research Institute Rez plc. of the Czech Republic have agreed to co-operate in the fields of nuclear, radiation and radioecological safety, radioactive waste management, emergency response, nuclear and physical calculations.

The agreement in the form of a protocol was signed on 27 February 2004, in Prague. This links the Chornobyl Centre to a co-operative consortium that will implement scientific, technical, social, educational and other programs in the field of nuclear energy. The joint potential of the consortium's members will significantly improve their competitive position in foreign markets.

ECONOMIC REGENERATION

Five representatives from Slavutych travelled to Vilnius, Lithuania, to take part in the first international conference on business capacity development and economic regeneration. Their participation was within the framework of the UK Department of Trade and Industry's social consequences support programme for the town.

The conference was held from 27 to 30 January 2004, and its objective was to discuss business capacity development and economic regeneration in areas that are loosing the main employer.

During the section sessions the representatives of various towns shared their experience in creating the organisational, social and economic structures to develop small and medium-sized business in mono-profile towns that have to cope with the loss of the main economic generator.

There was particular interest shown in the reports from the Slavutych delegation. These stimulated a great deal of discussion that was sometimes quite heated. This was particularly so when discussing the activities carried out by regional development agencies, business incubators, and community development centres. Representatives from Slavutych shared their experience in organising the activities of an employment service that is playing an especially important role under the conditions of the Chornobyl NPP shutdown. Their reports analysed opportunities for modern business development by utilising state-of-the-art information technologies and new production techniques. They also shared their opinions on the role of the government and international assistance during the transition stage. Yevhen Garin, co-ordinating director of the Chornobyl Centre, made a presentation on the progress of the fibre optic communication link development in Slavutych that will help to create jobs for the highly qualified, though redundant, workers of the Chornobyl NPP.

Most of the projects have been implemented and are being developed through the active support of UK, US and international partners.

FRENCH–GERMAN INITIATIVE WORK NEARS COMPLETION

Work by the Chornobyl Centre to create a database on the consequences of the Chornobyl catastrophe is nearing completion.

The work is being carried out within the framework of the French and German initiative on Chornobyl. The agreement for this project was signed in July 1997 between Institut de Protection et de Surete Nucleaire (IPSN, France), Gesellschaft fur Anlagen und Reaktorsicherheit, mbH (GRS, Germany) and the Chornobyl Centre for Nuclear Safety, Radioactive Waste and Radioecology (Ukraine).

The database covers three areas: Shelter safety, radioecological impact and health consequences resulting from the Chornobyl accident. The project aims to collect and assess data that can be used in emergency planning, to identify areas for further scientific work and to provide information to the public.

The results and their significance will be discussed at a workshop to be held in Kyiv during 5th—6th October 2004. Follow progress on our website: www.chornobyl.net.