Insight

International Chornobyl Centre Journal Issue 17, 2006

- Remembering 1986: construction of the sarcophagus
- Quality Control
- Women in Nuclear

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CHORNOBYL center

State Registration Certificate KV 3694 dated 24 January 2000.
Circulation 2000 copies.

Layout of Insight was prepared by the Chornobyl Centre in Slavutych.

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NUCLEAR POWER INDUSTRY IN UKRAINE – STAGNATING OR DEVELOPING?

Given that the Chornobyl accident was the most severe nuclear disaster in the history of mankind, Ukraine is unwilling to turn its back on the development of nuclear engineering. Quite simply, it is too important for the national economy. Today, the Ukrainian nuclear power plants (NPPs) produce approximately 50% of the country's total annual electric energy output. The National Energy Strategy (NES), adopted earlier this year, forecasts maintaining this level from 2006 to 2030.

The NES sets out a clear priority for the dynamic development of the national nuclear industry, particularly in an increase in production of nuclear energy from 89 milliard kW in 2005 to 219 milliard kW in 2030. How is it possible to achieve this, bearing in mind that the nuclear power units have already operated for approximately half of their intended design life? First of all, for the majority of the nuclear power units currently operating in Ukraine it is possible to prolong their operational life by 15 years. In total, there is a requirement to commission around 20.5 GW of compensative and additional capacities at the NPPs. Various expert evaluations state that this will require the construction of a further 20 energy producing units. In order to put the NES into practice, it is necessary to use nuclear fuel more efficiently and reduce time spent in routine repairs. It is also important to implement a series of upgrades and reconstruct primary equipment and systems at the nuclear power plants.

Within the next few years, Ukraine has to select from the new generation of reactors in its plans for the future construction of power units. The best international practice in the area of nuclear engineering and water-moderated reactors operation show a preference to units with pressurised water reactors, i.e. the VVER (PWR in Europe). The forecasted power of each new nuclear power unit should range between 1,000 and 1,500 MW; more powerful and safe equipment with a longer operational life is anticipated. Analysts predict that three companies will be engaged in competition for the right to supply reactors to Ukraine - American WESTINGHOUS, French FRAMATOM, and Russian ROSENERGOATOM. However, a cooperative option for these, and other leading producers, is not excluded.

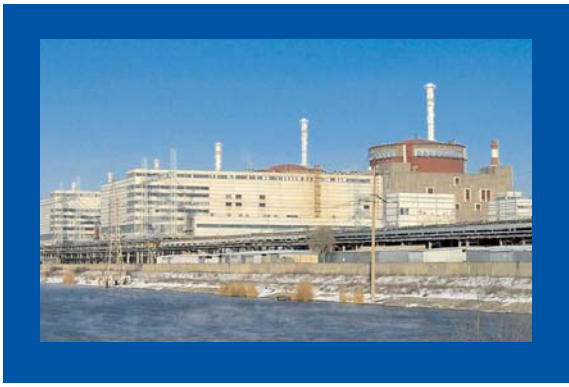
The timetable for the selection process for the construction of three or four new nuclear power plant sites is foreseen to be within the next three or four years. The Strategy envisages the possibility to prolong the lifetime of the nine currently-operating nuclear power units for 15 years and decommission six units after 2011. As for the new capacities, the document provides for commissioning of Units 3&4 at the Khmelnitsky NPP before 2016.

Nuclear Fuel: Strategy of Partnership

The Ukraine's potential in the area of electric power production by NPPs depends, initially, on the global attitude to nuclear engineering, the stable operation of Ukrainian NPPs and the availability of uranium and zirconium in the national stock of raw materials. It is hardly probable that completely worn-out and out-of-date heat power engineering with its technical, financial, and ecology problems is worthwhile upgrading or updating.

The resources available in Ukraine provide an opportunity to develop in-house production of nuclear fuel. A rich stock of uranium ores is sufficient to provide 25 million-kilowatt reactors with fuel in the course of over 100 years. In the event that the transfer to fast reactors takes place, the potential of the national uranium stock will increase 60-70 times. Ukraine is also extremely rich in zirconium which is used in the reactor fuel assembly manufacturing process.

Only 30% of Ukraine's nuclear power industry's demand for uranium is met by national sources



▲ *Zaporizhska NPP*

of raw materials. Most of the fuel, as before, is supplied from Russia, where raw materials of Ukrainian origin are only partially used in the manufacturing process. In reality purchase of nuclear fuel on the global market and its subsequent production in collaboration with other states is the most probable prospective option for Ukraine.

Stabilisation of existing industrial potential and the further step-by-step increase of uranium production facilities are the conditions which will ensure Ukraine's position as one of the world leaders in the production of natural uranium. In accordance with this, construction of two new extractive complexes will fully meet the needs of Ukrainian NPPs in terms of uranium concentrate.

"In Ukraine's medium and long-term plans, nuclear engineering is still an important component in ensuring the safety of the country's energy provision. In the next few years, the importance of nuclear engineering will be evident and this is manifested in the Energy Strategy of Ukraine adopted by the Government of Ukraine at the beginning of this year. Even now, several states including Ukraine are adopting programmes where nuclear engineering plays an important role, which is a clear indicator of a gradual renewal of trust in nuclear energy", said Yurii Boiko, Ukraine Minister of Fuel and Energy, during his address to the International Atomic Energy Agency's 50th General Conference in Vienna earlier this year.

REMEMBERING 1986

Unsettling memories recalled on April 26, 2006, when the whole world remembered the events that occurred at the Chornobyl NPP twenty years before, are not over yet. There is another memorable date which we should not forget. On November 30, 1986, the State Admission Commission took control of Chornobyl NPP Unit 4, which was brought to a safe storage state for maintenance. That date went down in history as a day of victory over the damaged reactor. Today, on the eve of the 20th anniversary of the sarcophagus construction, we are returning to that distant year of 1986, remembering, comparing, analysing...

Pipe sheeting which formed a basis for the Shelter housing

Construction of the Shelter Object played a key role in the large-scale process of localising the Chornobyl accident and eliminating its aftermaths. As early as the very first days following the accident, a group of experts realised that the damaged Unit 4 had to be brought to a safe storage area. This group was headed by academician, Valery Legasov, and included high-level scientists from the Soviet Union and members of the State Commission.

On May 10, 1986, the Soviet Union's Political Bureau of the Communists Party's Central Committee took a pivotal decision: to develop a design for containing the damaged power unit. Numerous research and development institutions, design organisations, scientific subsidiaries of ministries and their offices were involved in the design process. A series of resolutions was adopted by the Council of Ministers of the USSR, outlining construction details and considering who would undertake the work.

The All-Union Scientific, Research, and Design Institute of Power Engineering (AUSRDIPE) was appointed as the chief developer and designer of the shelter. The design idea was to construct a cover consisting of structural elements that would be up to 50 metres long and use the intact walls and structures as supports. Among the 18 options proposed, the one selected was the most risky. Developing a design without preliminary research of a support had no precedent in construction practice. The risk was offset only by an expected reduction in the construction term and the fastest cessation of radioactivity releases into the atmosphere.

Unprecedented design

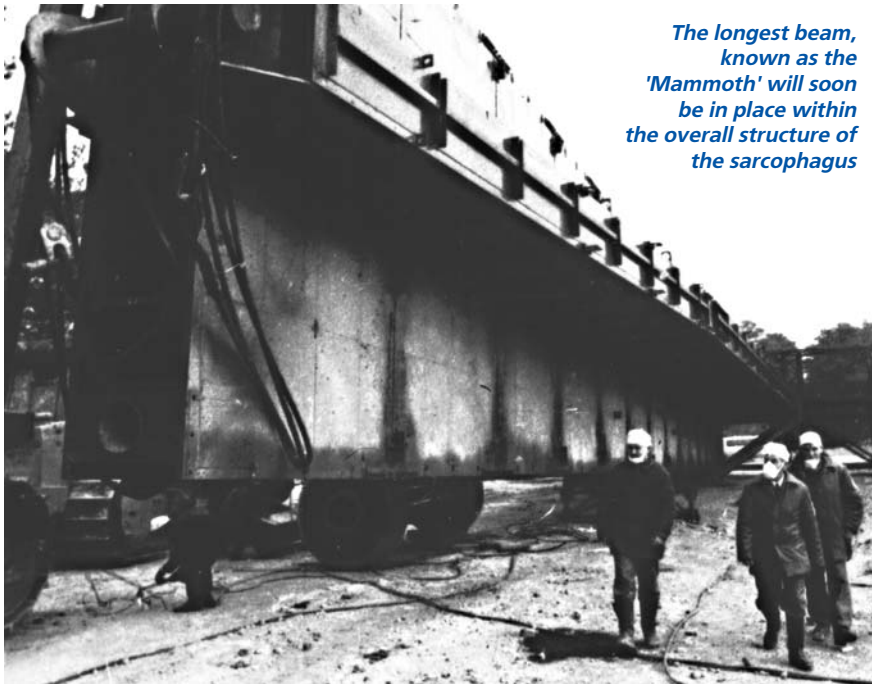
Alexey Bytskiy, who was appointed as chief engineer on behalf of the AUSRDIPE, personally collected all the required information, flying over the damaged reactor in a helicopter in a special cabin hanging under a hoisting crane. He recalled, "There were no long-term programmes, approved schedules... The task was set - 'to do something urgently' - a team consisting of all sorts of scientists from different institutes was gathering..."

Indeed, a team was gathering, headed up by Vladimir Kurnosov, a member of the international Academy of Ecology and a Doctor of Technical Sciences. Evgeny Tsurikov, Chief Design Engineer of the AUSRDIPE, was in charge of the design concept for separate elements of the Shelter and all capacity calculations. Ivan Moyseev lead the group of 25 architects, who created the sarcophagus's physical configuration, with which we are all familiar today. There were also those who prepared the design of the columns and beams, including the famous 'Mammoth'.

Mikhail Zavadskiy, Head of the Technical and Economic

CONSTRUCTION OF THE SARCOPHAGUS

Assessment Department, tells further of the fate of Unit 3 and the town of Pripyat. It was his proposal to restart Unit 3 and abandon the town. "Both during the design process and during the shelter construction, it was particularly difficult to work under the extreme conditions of severe radiation. For the most part, the designs were developed using only photos, which were taken by pilots every day. The design process itself was protracted for five and a half months - the whole period while the sarcophagus was being built. Dozens, hundreds of corrections were made on the spot. And that is why the design was unique. The world had never experienced the like. We hope it never will again". (As remembered by V.O.Kurnosov).



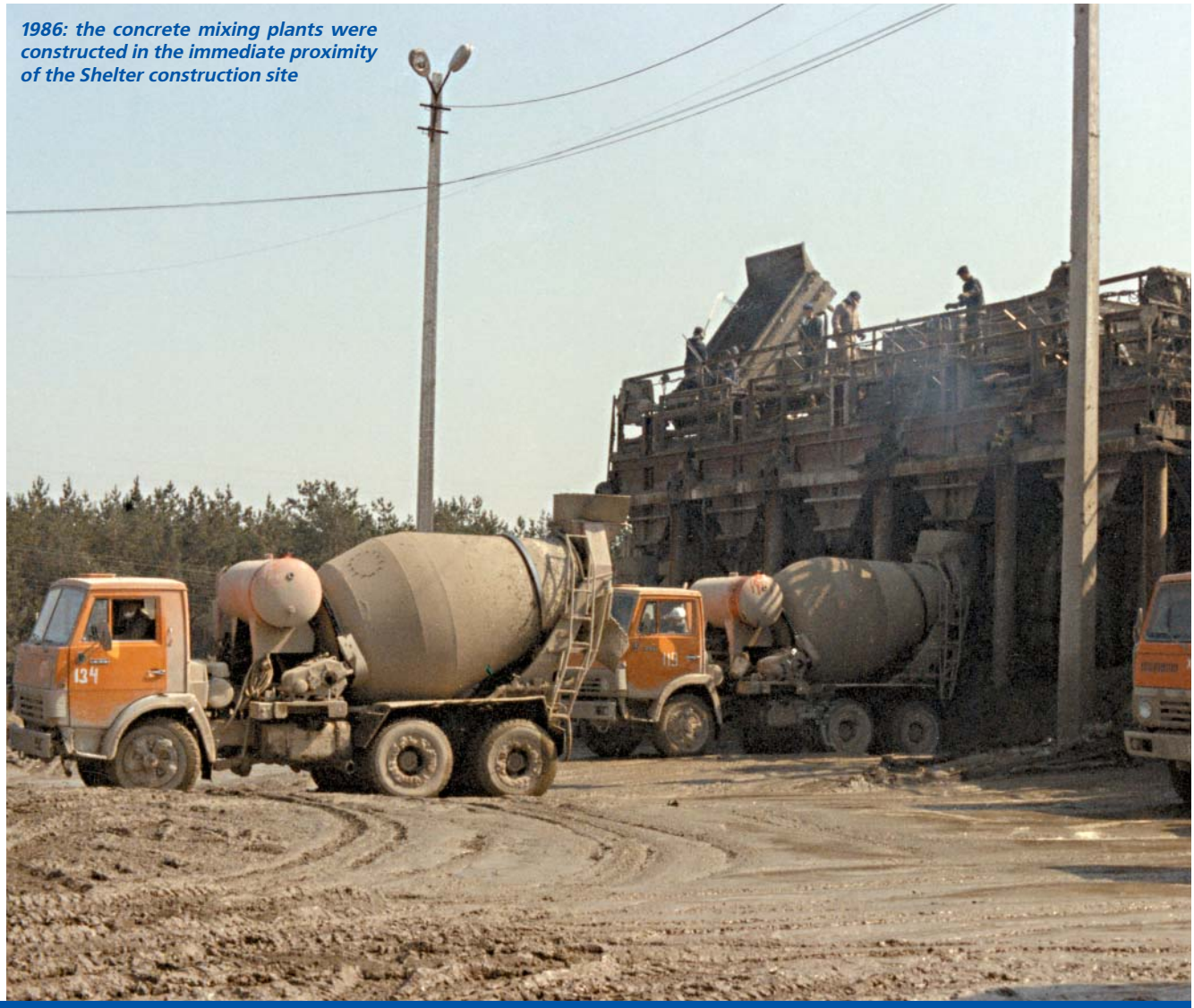
The longest beam, known as the 'Mammoth' will soon be in place within the overall structure of the sarcophagus

The Construction Administration, known as US-605, was specially established under the Ministry of Medium Engineering to monitor the construction activities on-site. Members of US-605 took part in the building process in three stages, or as they called them - duties or shifts. The stages lasted two months or longer as each stage differed in their tasks and each shift included people from different walks of life but an amazing solidarity was common for all the 'shifts'.

A workforce of thousands

The first duty lasted from May 20 to July 15, 1986. The main objective of that period was to produce the structures and elements of the Shelter necessary to protect

1986: decontamination



1986: the concrete mixing plants were constructed in the immediate proximity of the Shelter construction site

working sites from major sources of radioactivity, perform decontamination, and make preparations for the building works. These included construction of a concrete mixing plant, transport communications, expansion of the railway network, development of infrastructure for social and every-day life, manufacture of large-dimensional structures, etc. The second duty, from July 16 to September 15 1986, accomplished the major part of construction activities with the third shift, which involved the completion of building and assembly works, lasting from September 16 to November 30, 1986.

The Shelter has been constructed by hundreds of people from all the former Soviet Union countries. Builders alone numbered around 90,000. Approximately, 40 ministries and their departments and hundreds of enterprises worked to solve the construction problem. The Shelter Object has become the creation of combined herculean efforts.

November 1986, when construction of the Shelter was practically coming to an end, was extremely hectic and demanding for the personnel of the ChNPP Radiation Saftey Service. Valeriy Glygalo, Acting Deputy Chief Engineer of ChNPP at the time, recalls, "Radiation background level in all premises adjacent to the wall newly-constructed between Units 3 and 4 and along the perimeter of the Shelter was subject to thorough control. Numerous working reports were compiled and, based on these, the Report on the Shelter State Admission to Operation was developed".

Over 20 years, the Shelter Object has fulfilled its objective - to protect. At the same time, it has been a huge scientific and technical, uncertain and thus dangerous, problem during these years. Fortunately, today Ukraine is not alone in managing the problem. Joint financial and intellectual efforts of the international community mean that any hazards hidden in the sarcophagus will be addressed by a global taksforce. This year, completion of the Shelter stabilisation is due. To date, five dangerous zones in the 'sarcophagus' have been stabilised, including Mammoth Beam's supports, frame and floor slab panels of the deaerator stack. As the foreign consultants of the Project Management Unit say, they have never heard of a more complicated operation than the one performed during stabilisation of the

'sarcophagus'. The major hazard is the same as it was 20 years ago - radioactive exposure.

Completion of the stabilisation activities will provide us with time to find, and make final steps towards, transformation of the Shelter Object into an ecologically safe system.

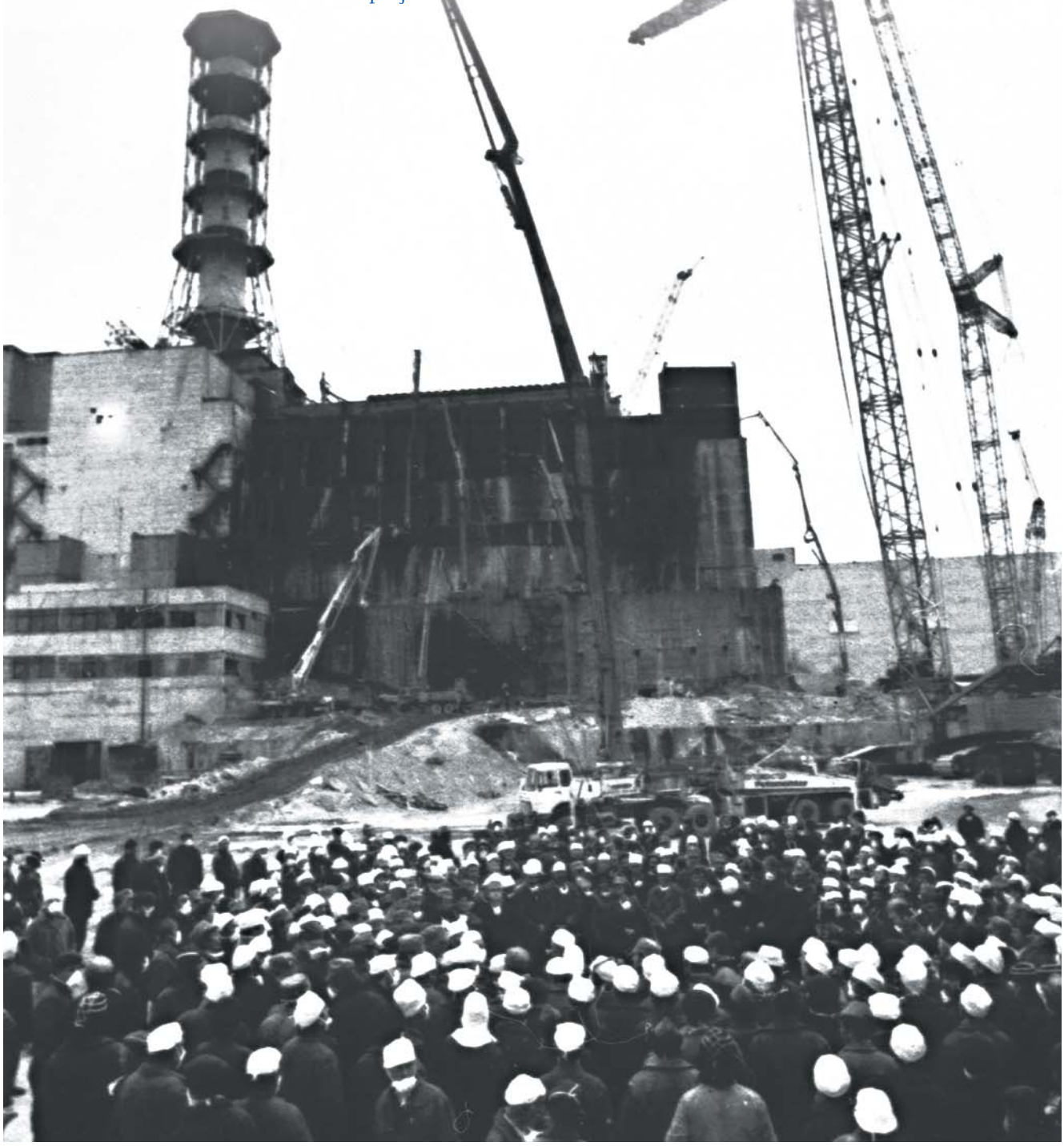
The German government announced continuation of activities aimed at the development of the database on the Chornobyl sarcophagus that was created within the framework of the French and German Initiative for Chornobyl (FGI).

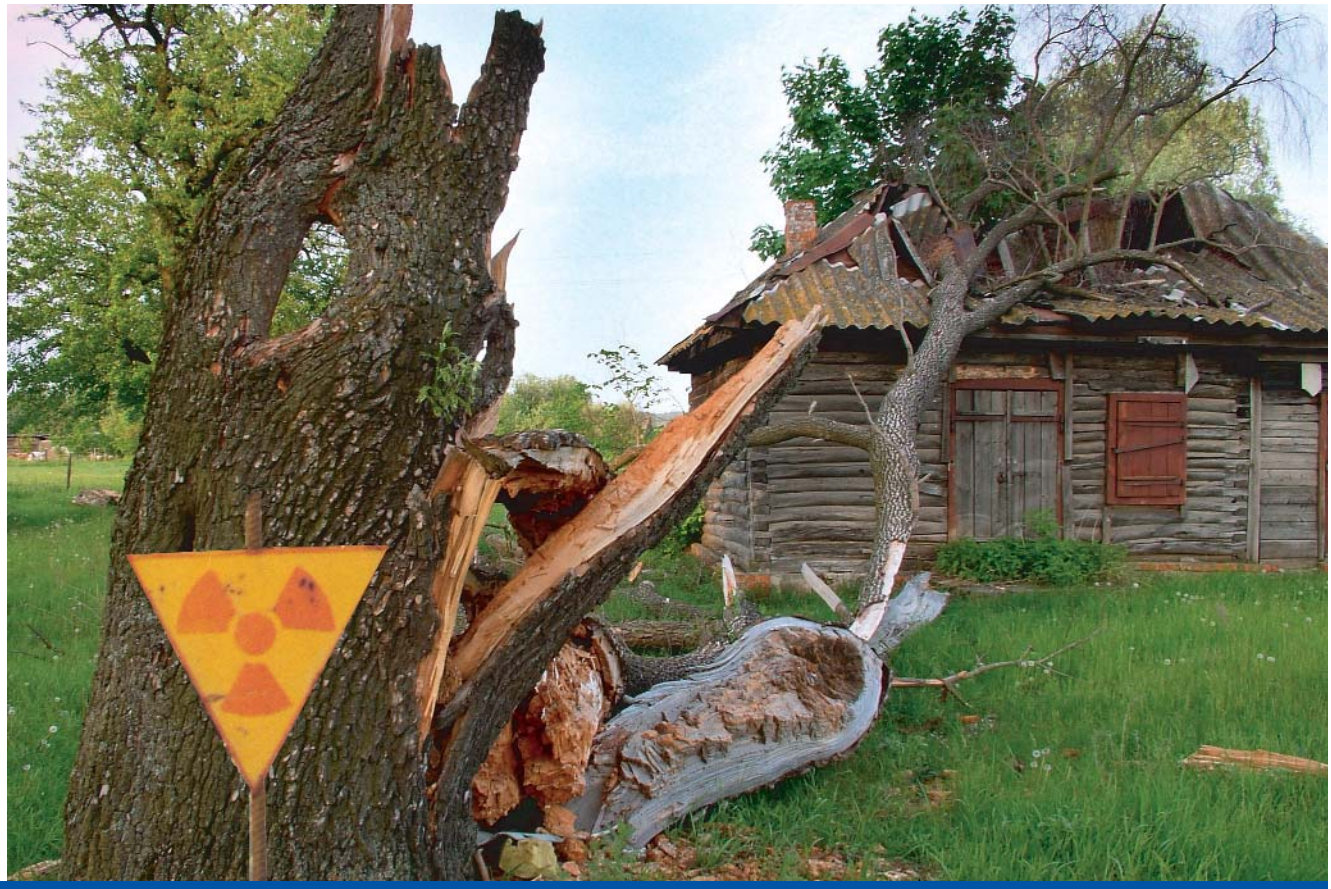
The project will continue till 2010 and will be targeted at regular update and completion of the database on the Shelter Object. Integration of the databank created within the FGI framework into the Integrated Shelter Database, which has been developed under the Shelter Implementation Plan (SIP), is among the tasks of the new initiative.

Experts of such institutions as ECOMM, National Research Institute of Building Structures (Ukraine), Institute of NPP Safety Problems (Ukraine), Russian Scientific Centre 'Kurchatov Institute' (Russian Federation) will participate in the project. The Chornobyl Centre (Ukraine) is assigned to coordinate the initiative.

Negotiations with the representatives of the French government and the IAEA will take place this September in order to discuss participation in the project.

▼ *1986: a meeting dedicated to the completion of the reactor hall covering construction in the damaged Chornobyl Unit 4.*





▲ *Abandoned villages in the Chornobyl Exclusion Zone*

RADIOECOLOGY TERRORISM: THE DANGER IS REAL

A new threat

The 21st century brought with it a new threat to mankind - large-scale terrorism, extremely difficult to forecast, and therefore, to prevent. Leonid Bolshov, Director of the Institute for Safe Development of Nuclear Engineering, Member of the Terrorism Prevention Council, Russian Academy of Sciences reasons, "Motives of modern terrorists are religious and ethnic and are rooted in revenge and hatred. Hence, there is an urge towards using nuclear, bacteriological or chemical weapons. These are totally new tactics. There are very few opportunities for terrorists to produce a full-scale nuclear explosion. It's too complicated a venture, taking into account, for instance, the tight control over nuclear material. On the other hand, it is comparatively easy to disperse radioactive material over a large area".

More than half a century has passed since radioactive material was first used in industry, science, and medicine. According to information from the International Atomic Energy Agency (IAEA), there are around 10,000 sources used for radiotherapy. Each and every one contains a thousand Cobalt-60 particles. In only two minutes, just one particle emits enough radiation to exceed the safe annual radiation level for an individual. It is generally known that the security of radioactive material used in industry, hospitals and research laboratories is not as strict as at nuclear facilities. Hence, the danger of theft is ever-present.

Since 1996, over 300 confirmed cases, including the unauthorised sale of radioactive material, have been recorded. Two widely known incidents, which can be categorised as radioecology terrorism, occurred in Russia: Chechen militants buried Caesium-137 in Izmailovky Park in Moscow in 1995 and in 1998, a container with radioactive material attached to a mine was discovered at a railway track close to the town of Argun in Chechnya. Ukraine has also had to deal with the threat of theft of radioactive material and its possible use by terrorists. Indeed, in April 2004, the Security Service of Ukraine detained several individuals attempting to sell two containers with Caesium-137 in the town of Armiansk (the Autonomous Republic of Crimea).

What is a 'dirty bomb'?

Use of a 'dirty bomb' can be categorised as a modification of

radioecology terrorism. The bomb is made to disperse radioactivity over a vast area by way of its combination with an ordinary explosive. Such a device does not produce a nuclear explosion and, in theory, does not result in a large number of direct victims, though may provoke panic and make buildings located within an affected area unusable. Michael Levi, a research officer under the Brookings Institution's Foreign Policy Studies Programme, said, "The main problem will be to mitigate the long-term consequences of the accident. Clean-up of the affected area, resettlement of people, public training will all be required in order to prevent general abandonment caused by an exaggerated fear of radiation". This, almost side-effect of terrorism is based on radiophobia and is aimed at destabilisation of a society by way of intensifying panic. People cannot adequately assess how the aftermath of the radioecology terror will affect their life and health, because radiation is 'invisible' and 'impalpable'. Moreover, the level of public training programmes educating people on how to objectively judge radiation hazards is currently very low.

Preventing the danger

Michael Levi believes that to prevent radioecology terrorism occuring, improved security should be put in place for the following seven basic radioisotopes: Cobalt-60, Caesium-137, Iridium-192, Strontium-90, Plutonium-238, Americium-241, and Californium-252. The first three emit gamma-rays and thus constitute a threat to people exposed to external radiation. If these isotopes were used in a 'dirty bomb', people can minimise the effect by rapid evacuation of the contaminated area. The fourth agent, Strontium-90 emits beta-particles and the last three irradiate alpha-particles. In this case, the inhaled radioactivity produces serious effects and evacuation will not be as effective as in a gamma-radiation incident. In the scientist's opinion, a combined approach to control over radioactivity sources is the most important element of any preventive strategy and, in order, to achieve this more financial investment must be made.

Borderline control is also crucial in the matter of counteracting radioecology terrorism. Where a state or country has already made some steps towards protection of radioactive material inside its territory, tracking an import of high-level radioactive material can form an important additional preventive measure. Developing a systematic approach to mitigating the consequences of a radioecology terrorist act is vitally important in eliminating the potential aftermath of a 'dirty ,bomb'. Addressing the difficulties of a long-term clean-up operation by developing procedures and plans focused on efficient re-vegetation of an area is one part of such a plan. A reliable information exchange as well as public training in clarifying a danger caused by radioactive contamination, should also be developed in order to prevent exaggerated fears and present the real facts concerning radiation. Practically all modern scientists and experts believe that addressing the problem of radioecology and nuclear terrorism prevention requires world-wide collaboration and co-ordination of actions.

'Insight' has previously covered implementation of a programme initiated by the U.S. Department of Energy within which framework, safety upgrades were accomplished in more than 50 Ukrainian medical oncology institutions which used radioactive materials. The Chornobyl Centre for Nuclear Safety, Radioactive Waste and Radioecology has managed the project on behalf of Ukraine. This large-scale programme has already been completed and the Centre is currently putting in place the next phase with regard to ensuring the security of radioactive materials.

A new upgraded security project will be implemented at the facilities of 'Radon', Ukrainian State Association, where radioactive waste is stored. Initially, security systems will be installed at the industrial complexes in Kyiv and Odessa. The programme and technical safety criteria have been developed by a group of experts working within the framework of radioecology risk reduction programme (managed by the National Nuclear Security Administration of the U.S. Department of Energy). Based on the above criteria, experts of the Chornobyl Centre have already designed security systems for the most vulnerable storage facilities containing high-level radwaste at the sites of 'Radon' in Kyiv and Odessa. Simultaneously, equipment is being assembled with the objective to speed up safety improvements at the above-mentioned facilities.

Integrated approach

The aim of the project is to improve the situation at the most critical sites in a short space of time. However, it will not solve all the problems at 'Radon' storage facilities. At a later stage, the security equipment installed by the Chornobyl Centre must be integrated into the general system designed to ensure storage of spent radioactive sources in accordance with the requirements stated in the Ukrainian legislation. Storage of spent high-level ionizing radiation sources is an urgent problem for Ukraine. During the implementation of this project, Chornobyl Centre specialists discovered that the spent sources are stored improperly at the sites of operating organisations and are not dispatched for disposal. The Cabinet of Ministers has adopted a special resolution to approve the State Programme for ensuring safe storage of materials. This programme will continue until 2009. It envisages the compilation of a national register of spent radioactive materials, design and construction of a near-surface storage facility for interim storage, removal of spent radioactive materials and their deposit into a newly-constructed storage facility. Ukraine's State Nuclear Regulatory Committee is committed to improving security for radioactive materials and developing new legislation to enforce this. In line with this, it has recently set up a team of experts which includes representatives from the Chornobyl Centre who are obviously highly qualified to advise in this area.

NUCLEAR POWER UNITS ARE NOT

After the last operating unit, Chornobyl 3, was shutdown in December 2000, Ukrainians became aware of the concept, 'Nuclear Power Plant (NPP) decommissioning'. The accident in 1986 brought Chornobyl NPP to the attention of the world and the world continues to remember the tragedy, sometimes accurately, other times not.

There are people, not only in Ukraine but also elsewhere, who would like to close all Ukrainian nuclear power plants - Zaporizhia NPP, Rivne NPP, Khmelnitskyi NPP, and South Ukrainian NPP. Their 15 power units generate about 50% of the total bulk of power energy in Ukraine. But everything in its own time. As the years go by, the problem of decommissioning will become more urgent for Ukrainian NPPs, not only in the case of accidents but from general 'wear and tear'. So, what is the next step?

Based on conservative assessments made in the1970s and 1980s, the operational life of each power unit with VVER-440 and VVER-1000 reactors installed at the NPPs operating in Ukraine today is 30 years. Therefore, the first power unit to be examined in terms of decommissioning before 2010 is Rivne NPP Unit 1.

The final shutdown of the last currently-operating power unit in Ukraine is expected to happen no earlier than 2044 and its decommissioning completed no later than 2066.

However, let us return to nuclear power units, international experience and preliminary assessments demonstrate that a 10-15 year prolongation of operational life is technically possible and economically sound for reactor facilities of the VVER type. But it is too early to make such statements as, today, Ukraine lacks the comprehensive reference information required to make well-researched forecasts and decisions regarding possible prolongation of the operational life of reactor facilities.

Standards set for decommissioning

But, let us return to nuclear power units decommissioning as the final stage of their life cycle. In May 2004 the Ministry of Fuel and Energy approved the Decommissioning Concept for NPPs operating in Ukraine. The Concept covers activities aimed at decommissioning all the operating NPPs over 40 years.

International practice in the area of NPP operation demonstrates two possible options for the decommissioning of a nuclear power unit. These are 'immediate' and 'deferred' dismantling. Both are suitable for conditions in Ukraine, as far as acceptability level is concerned though some preference may be given to the deferred dismantling. Indeed, the latter option was chosen for Chornobyl NPP. The main difference between the two scenarios is that during a deferred dismantling some systems of a reactor facility are brought to safe storage and subject to a long-term cooling (over several decades) with the aim of reducing their activity by the natural decay of

▲ *Experts at the Chornobyl Centre provide scientific and engineering support to the decommissioning of nuclear power units*

radionuclides. Both options envisage obligatory disposal of the radioactive waste accumulated during a dismantling period in special-purpose radwaste storage facilities.

To date, 523 nuclear power reactors have been constructed in the world of which 80 have been finally shutdown. Among the ones remaining in operation, 63 reactors (14%) are more than 30 years old and 143 reactors (32%) are over 20 years. Two states - Germany and Finland - have already made their decisions regarding decommissioning of VVER-type nuclear facilities using a scenario of immediate (early) dismantling. Countries such as Bulgaria, Russia, Slovakia, Hungary, and the Czech Republic tend to favour deferred dismantling.

How much will it cost?

International Atomic Energy Agency's (IAEA) policy regarding the power units already shutdown is to perform a safe and efficient decommissioning. This, over and above many other factors, requires considerable financial resources. Taking into consideration the problems faced by the Chornobyl power units during the first stage of their shutdown, it is extremely important for Ukraine not to waste time but to begin preparing the financial structure which will take them through the long period of cessation of operations at the four NPPs.

In accordance with Article 11 of Ukraine's Convention on Nuclear Safety and other international liabilities, the international community considers the state budget to be an actual guarantee of the state's possession of the financial reserve necessary to safely bring an NPP's life cycle to an end. However, it would be utterly ridiculous to rely on this source alone, especially when

taking into account the experiences of the early stages of Chornobyl NPP decommissioning. So, what is the situation? In the majority of countries where there is a history of nuclear engineering, specific foundations accumulate financial resources for NPP decommissioning during the operation's lifetime. This is reflected in the cost of the electric power generated by the NPP. As yet, such resources have not been amassed in Ukraine.

Meanwhile, the previously-mentioned Concept provides some guide to funds required for decommissioning some power units. For example, in the case of a deferred dismantling, the cost of decommissioning a VVER-440 unit will be approximately $159 million; for a VVER-1000 unit the cost would be around $207 million (excluding expenses for accumulated radwaste disposal). Given these figures, the total amount of forecasted and obligatory annual deductions corresponding to regular saving of money for NPP decommissioning, including radwaste disposal, would amount to UAH 436.3 million per year. According to 2002 figures, this is 8% of the cost of electric power generated by the NPPs. This percentage is considerably higher than comparative assessments for foreign power units of PWR type (2.5%). The reason for such a difference is that the tariff for electric power sold from Ukrainian NPPs is around 1.8 times lower than the world average. The financial situation is further compounded by the fact that raising funds for decommissioning began much later than the actual commissioning of power units.

Experience of Chornobyl Centre

Experts from the Chornobyl Centre's Decommissioning Department have been providing scientific and technical support to decommissioning projects at Ukrainian power units for almost 10 years. Their competence covers, among other issues, participation in the development of regulations, safety analysis of nuclear facilities, comprehensive radiation survey and development of informational databases.

"Most of our projects are targeted at our major customer and strategic partner, Chornobyl NPP", said Vasyl Rylov, Departmental Head. "We have developed a comprehensive programme for the safe decommissioning of the ChNPP power units and the transformation of the Shelter Object into an ecologically safe area. We have also prepared a package of documents necessary to obtain authorisation from the State Nuclear Regulatory Committee before any work can be commenced. These include the 'Chornobyl NPP Power Units Shutdown Programme' and 'Technical Regulations'. The documents contain a list of activities to be performed at the shutdown stage, their schedules, economic justifications of labour input and financial expenses".

The Chornobyl Centre has prepared a summary document needed to preliminary analyse day-to-day and scheduled activities in the final shutdown stages of Chornobyl Units 1 and 2, looking at storage from the viewpoint of safety analysis, potential failures of basic systems still operating, risks to personnel, public, and the environment emerging out of the work performance process. The document includes comprehensive information on the individual state of the power units and the plant as a whole with regard to the relevant safety systems. It also provides appropriate recommendations, where applicable. A draft procedural document for Chornobyl NPP power units has also been developed based on a paper by the UK's British Nuclear Group and the Ukraine's Nuclear Plants Safe Operation Support Institute Ltd.

Furthermore, experts have developed a conceptual design for the comprehensive engineering and radiation survey (CERS) of reactor facilities. Here, the ChNPP experience in CERS performance gained in 1997-1998 proved extremely useful. The project was implemented with the support of the US Department of Energy and its results developed into the National Nuclear Energy Generating Company 'Energoatom's' branch standard for all Ukrainian NPPs. This document which was effected in 2001 is known as the 'CERS of an NPP Power Unit. Scope and Procedure'. A survey of nuclear facilities at the South Ukranian NPP, using this document, is already underway.

In order to record the accumulated material safely and for a potentially wider audience, departmental personnel have developed two databases for the ChNPP, known as Infodec. An informational database for radwaste management has also been commissioned. Staff are also developing the database for CERS performance at the South Ukrainian NPP based on these databanks. The experience gained in all this research and recording must prove useful in the decommissioning process which is an inevitable occurrence, both in Ukraine and the rest of the world.

▼ *Chornobyl NPP*

QUALITY CONTROL

▲ *A workshop of a presentation on quality control systems for managers working in businesses and institutions in Slavutych*

In a normal competitive market, producers continuously search for ways of persuading customers, clients, and consumers to purchase exclusively their products and services. Unfortunately, rapid transition to a market economy in Ukraine has meant that the quality of goods and services is not always ensured. If Ukraine does not want to lag behind its neighbours, it has to continue to progress in its modernisation of social, economic and political programmes. Implementation of quality systems, particularly in the area of public services, must become a priority. Consumers' rights have to be protected and, with this in mind, the Government of Ukraine has established the state committee for the technical regulation of consumer policy and costs for quality control development have been re-allocated to regional budgets.

Since the closure of Chornobyl Nuclear Power Plant (ChNPP) public sector services have been developing at a fast pace in Slavutych and donor programmes, including ones financed by the UK's Department of Trade and Industry (DTI), have contributed much to this end. Several new types of public services provided to Slavutych people have been developed in the social and economic domains. However, the quality of some of these services leaves much to be desired. Therefore, within the framework of the Community Capacity Building Project, the DTI supported a project for identifying, in terms of priority, the development of public services in commercial and non-profit sectors. The Community Development Centre (CDC), which is the leading partner in the project, organised a tender for the best public services and the people of Slavutych were asked to vote for the best provider and services. The results revealed a marked difference in the level of services and also indicated the need to develop a system of quality control benchmarks.

Poll results

This poll, and its results, formed the basis of a new project which began in April of this year with the aim of implementing quality management procedures and improving service quality of all services in all areas of the town. But the CDC does not work alone, local municipal authorities are also working for quality improvement and establishment of a bureau for quality management systems development will be tangible evidence of their initiatives.

Several workshops and presentations dealing with quality management systems have been organised for representatives of 33 Slavutych companies operating in the area of public services, communications, telecommunications, construction, design, education, medicine and public initiatives. Training was delivered by 'Partner - ISO', who is working with the CDC on this project. The following three companies from private business, public entities, and social services sectors

were selected to start development and implementation of quality management systems:

1. Closed (joint-stock) Company 'UkrAtomIzdat' specialising in development of design documents, cost estimation, and performance of construction and assembly activities;

2. Community Development Centre, one of the most active NGOs in Slavutych;

3. Out-patients department of family medicine under the Slavutych Medical and Sanitary Station-5 (as a representative of the social services domain).

Documentation from the selected organisations has already been collected and analysed. Also, diagnostic audits that have been performed at each enterprise revealed a clear list of documents which will need to be developed in the area of quality management. The next step will be for participants to receive draft quality manuals and procedures developed in accordance with ISO 9001:2000 standard. Employees of the above-mentioned organisations are participating in the development of these drafts.

Quality a clear advantage

In a comparatively short space of time, a large amount of work will be undertaken in the participating institutions, including development of quality policy and objectives, quality manuals, as well as corresponding procedures, instructions and training of internal auditors. This painstaking effort will result in the implementation of quality management systems and certification under ISO 9001:2000 standard which is acknowledged throughout the world as one of the most reliable indicators of quality management. Availability of the certificate is a mandatory rule for foreign businessmen and, therefore, obtaining it is vital in the development of the competitive potential of national and foreign companies. The certificate confirming regulation under the ISO 9001 standard, not only guarantees the reliability of a company's performance in the eyes of its consumers but also ensures a clear advantage over competitors in competitions and tender bids. Furthermore, it allows potential investors to quantify business performance against a global standard.

Today, the number of enterprises certified under ISO 9001 is over 500,000. China, Japan, Western European countries, the USA are among the leaders. In recent years, the Eastern European and CIS countries, including Ukraine, are actively working at implementing quality management systems in their companies. Several years ago certificates of conformance to ISO 9001 standard were obtained by large businesses alone but that has changed and now small and medium enterprises also have this opportunity. In February 2005 the BVQI (Bureau Veritas) International Company certified the quality management system of the Chornobyl Center (Slavutych, Ukraine) as compliant with the requirements of ISO 9001-2000 international standard.

However, obtaining the ISO 9001 standard is a very complicated and rather long-term process. Under the CDC project, three Slavutych organizations began working towards obtaining the certificate but it is not only these three enterprises that will benefit from the project. Representatives of at least 30 Slavutych institutions will study quality management systems and the latest version of ISO 9001 and four people from Slavutych will be trained as quality consultants and external experts, monitoring the effectiveness of implementation. An operations manual for quality control development will also be developed. The work of the project will be summarised and disseminated among the organisations which took part but also will be available as a role-model for those companies wishing to 'see how it is done'.

▼ *The out-patients department of family medicine is one of the Slavutych institutions where quality management systems will be implemented*

SLAVUTYCH LEADS THE WAY IN SERVICE PROVISION REFORM

Compared to many other cities and towns of Ukraine, Slavutych has become the exception to the rule when tackling issues around the transition from state-controlled enterprises to a more Western-style market forces operation, discarding the more generally accepted solutions for an innovative approach.

▲ *Yuri Yegorenko, Director, Grand Service, a private company, believes that the safety and comfort of people must be a priority for municipal service providers*

And this has been carried through to the municipal facilities. The old regime of providing power to social and cultural facilities in the satellite towns of Chernobyl Nuclear Power Plant's(ChNPP)nuclear power plants at the cost of an electrical energy tariff based on 2001 rates, has been phased out. It is now under the control of local government authorities with a view to making a self-sustainable operation, completely free from grant aid.

However, Rome, or in this case, a cost-effective and viable energy provision, was not built in a day. It was unrealistic to expect this to happen overnight. Production costs and the tarrifs established for service provision were prohibitive. It was clearly recognised that there needed to be private sector investment into public service provision but state regulation of the costs and tariffs had made such a 'partnership' increasingly unattractive.

In essence, a whole new approach was needed to solving the problem of energy provision to Slavutych's communal services.

Numerous attempts were made to study the experiences of other cities and towns but these revealed, in fact, that Ukraine possessed no model on which to base a practical plan of action that could be systematically and successfully implemented. Slavutych had to create its own model for reforming the Housing and Communal Services System (HCSS).

From April 2001, the slow and painstaking path to accomplishing this began. Causes of emergencies in public services were studied and the attitude of service providers to their 'customers' closely examined. The crux of the HCSS reformation was that the interests of the consumer should be a priority. This simple statement required a complete change of mentality on both the part of the consumer and public service providers. A practical change was also needed in relation to quantifying cost, establishing the extent and the quality of services.

It was realised early on that, if reforms were to succeed, there had to be a dramatic change from a monopoly situation to a free market position. To this end, a unified customer service with a central common payment centre was established - the Housing and Communcal Centre (HCC). This provided an opportunity to protect the interests of Slavutych residents with regard to service providers. The model is based on a legal agreement with the provider of services (HCC) and provides a consumer with a plenipotentiary (HCC), who proposes a team of professionals (engineers, economists, lawyers, etc.). The unified customer service is at the very centre of the public services system reform in the town: its experts actively co-operate with the local government authorities while developing bases for tenders dealing with communal services provision, calculation of tariffs for the services, etc. Services covering the maintenance of houses and adjacent territories were the first to be modified. Private companies, which have bid on tenders, replaced the habitual ZhEKs (Housing and Operational Offices). Provision of services to remove and utilise solid domestic waste was then put out to competitive tender. The next phase included services for repairs and maintenance of Slavutych roads together with outdoor lightning.

At the present stage in its development, the unified customer model is representing the consumer, replacing out-dated house committees and communities of co-owners in tenement houses. At the same time, however, residents have not lost the power to set up similar groups for managing their joint ownership. Interestingly, the establishment of this service has not increased the cost to the consumers, as it is completely self-financing.

Introducing this interface as a tool for addressing municipal problems has not meant shifting problems from the shoulders of the state to those of its people. Part of the costs for establishing the HCC, which is managing the unified customer and common payment centre, came from funds allocated from the state budget for winning national-level competitions for

projects to support and develop local self-governing authorities. A large amount of the money, UAH 100,000, was used to purchase and install vital computer equipment in the common payment centre.

It is thought that the efficient organisation of production and provision of key services prevented the possible collapse of Slavutych HCSS which could have resulted in serious consequences similar to those experienced in the accident in the town of Alchevsk during the severe winter of 2006. In contrast, 2004 statistics show that Slavutych residents have seen the greatest improvement in living standards, while 2005 figures deem Slavutych to be the best town in the Kyiv region.

The well-regulated interface system between the local authorities, Slavutych residents, and public service providers means other opportunities can be considered, including implementation of new projects and programmes aimed at improving existing systems. For example, the supply of heat and water in the town. At present, a project for decentralisation of the heat supply system by way of gasification of Slavutych and re-equipment of the existing central distribution point (boiler plant) into mini heat plants is being developed. Installation of state-of-the-art equipment will not only be more cost-effective due to a decrease in energy, but also see a significant reduction in gas consumption and, subsequently, its popping and release of combustion products into the atmosphere. This project is currently exploring all avenues for sources of finance and potential investors.

Many experts believe that the Slavutych model of the HCSS transformation is the best in Ukraine. The project to establish a national training centre in communal services reformation in Slavutych is already underway with people travelling from all over the country to study the model. The importance of integrating the model into the European system is also recognised and the development of common standards and certification of public service providers under ISO 9001 system is a priority for 2006-2007.

▼ *Staff from Grand Service, a pioneer in the reform of Slavutych municipal services*

▲ *Slavutych has one of the best records for cleanliness in Ukraine*

An organisation of producers and employers operating in the area of public services has also been founded in Slavutych and all organisations providing communal services are members. Yurii Yegorenko, director of the private company, Grand Service, was instrumental in creating this union and is currently serving as its president. Mr Yegorenko was involved in the practical implementation of the HCSS reforms, helping to pioneer this complete, and sometimes difficult, turn around. The successful activities of Grand Service not only demonstrated the efficiency of the new model but also served as a positive example to other entrepreneurs, encouraging them to become active in providing high-quality public services to the people of Slavutych.

HCSS reform is still underway. As with major changes, there are sometimes problems and pitfalls but these are outweighed by the successes and early opposition has been convincingly quashed. Many important tasks still lie ahead for the town but it is perhaps difficult to find issues more crucial than making a safe and comfortable life for the people. The residents of Slavutych clearly understand this and, therefore, are fully behind the reforms. They are also pleased to see that Slavutych's concept for reforming the HCSS was approved six months earlier than the national one and that Slavutych was the first town in Ukraine to begin to implement it!

UNUSUAL TRIP...

Or a story of how anything is possible, with a little help from your friends

The visit was organised well ahead. However, when it came down to it, some things just had to be managed right on the spot. This story is about 'eurobikers', the European association of motorcyclists registered in Bonn (www.eurobiker.de). Since 2003, eurobikers annually undertake friendly tours, mostly to Eastern European countries. Their aim is to share experiences and ideas between nations, regardless of cultural and mental differences, as well as giving tangible humanitarian assistance to people in need.

▲ *The eurobikers' race in June 2006 was dedicated to the 20th anniversary of the Chornobyl disaster*

This year their trip was dedicated to the 20th anniversary of the Chornobyl accident. The participants gathered in Vienna early in the morning of 3 June, near the Hofburg Castle to undertake the long journey to Ukraine via Slovakia, covering around 600 kilometres a day. It was raining and this was to be the case for much of the journey. Approximately 100 people took part using 70 motorcycles and several support vehicles; the logistics were, in fact, far harder to manage than the physical part of the ride.

It was agreed with the organisers that I would ride with them using my own bike and fully support them in all technical and practical issues. The journey would include a visit to the Exclusion Zone around the damaged reactor at Chornobyl, crossing the border into Belarus and a charitable event in a hospital in the town of Vetka (the Gomel Region).

Rain, rain and more rain...

So, on a rainy Monday afternoon, I rode in the direction of Gomel and on to the small Ukrainian town of Slavutych, which was built in late 1980s for the former residents of Pripyat, the town evacuated after the Chornobyl accident. Slavutych has housed the majority of the nuclear power plant employees and, although the nuclear power plant itself has been shutdown, large-scale construction of infrastructure facilities, the sarcophagus and support and protect employees, are still going on.

Despite wearing a high-tech tex-thermo suit and other appropriate motorcycle clothing, I arrived in Slavutych drenched with perspiration after a 460km journey! Eventually, late in the evening, I met Larisa Syomina from the local Chornobyl Centre to discuss some organisational details of the events planned for the next day. However, everything turned out very differently...

Tuesday started with rain (nobody expected anything else) as we awaited the arrival of the eurobikers who had left Kyiv that morning. It was agreed that they would be there at 10 am at the very latest as the train conveying the plant personnel to Chornobyl leaves at 10.30am. I was on tenterhooks as at 10 0'clock there was not a biker to be seen. However, after some 20 minutes, the first lights appeared in the distance. My intention was to guide the bikers back from the railway station now that we had missed the train. But, what happened next was nothing short of a miracle as I had practically given up hope of visiting the Exclusion Zone (as in the saying 'He, who is not on time, is late'). Larisa stood smiling as she told me that she had got the train drivers to agree to wait until most of the team had arrived. It was eventually 11.30 am before the rumbling train moved off carrying a team of 70 weather-beaten faces looking around in expectation. The motorcycles had been left behind near a police post on the Slavutych railway station as they swapped two wheels and a road for the train and metal rails. My attempt to explain what we were going to see over the noise of the train soon resulted in a hoarse voice as we trundled through the countryside.

All of them were really impressed with travelling to the power plant across the Exclusion Zone and on to the ghost town of Pripyat. Talks during lunch in the Chornobyl canteen and on the way back demonstrated that it was more than just an adventure for them, it was more meaningful even though it could not have been called wonderful. Nothing can substitute for a first-hand impression of the situation. It was another chance to verify this. For myself, it was my third visit to Chornobyl and I greeted a guide like an old friend.

Questions, questions, questions....

Once we returned to Slavutych, we had to make our way to the bikes through a crowd who were keen to question us about maximum speed, cost, horse power, etc. We were pleased to do this, common interests break down many barriers and international understanding which must be a good idea. Finally, we paid a short visit to the 'European Forest' in the centre of the town, which has been newly planted. This forest was the idea of the eurobikers and organised by them. 25 saplings were planted which symbolise all the European Union countries and embody the idea of European unity and international understanding and reconciliation.

We rode to Belarus in pouring June rain and with some apprehension about crossing the border but thanks to a very kind and hospitable atmosphere even the obligatory red tape was not a problem. Accompanied by a police escort we set off to Gomel, which was not that far. Next morning, we all left for Vetka, a small town located in a highly contaminated area within 20 kilometres of Gomel. A German charitable foundation has been supporting a local hospital there for many years and providing donations for all types of equipment - beds, medicines, toys, etc. And our charitable involvement was dedicated to that same hospital.

The eurobikers were expected to arrive in Warsaw that evening. My own tour finished in Minsk leaving me with a sense of a well-being at the success of an 'important official mission' entrusted to me. The mission, and the trip, brought me plenty of pleasure but the very interesting and, one would have to say, sometimes difficult job had come to an end. The event, which was unique for Belarus and Ukraine, must surely have contributed to mutual understanding, as the eurobiker's motto states: 'Overcoming borders and integration of cultures'.

I would like to thank all those who helped to organise the tour for a highly efficient and extremely pleasant event, only made possible by working together, across cultures, for the benefit of others.

According to materials supplied by Wolfgang Faust, Economy Councellor of the Embassy of Germany in Belarus.

▼ ***The 'European Forest' embodying international unity and understanding was newly planted by the eurobikers in the centre of Slavutych***

WOMEN IN NUCLEAR

Today, it is hardly possible to imagine that anyone would consider women to be inferior to men in business, politics, addressing important public issues, and many other professional areas. Indeed, women can sometimes be superior and the idea of gender equality has, over the years, gained more and more support. While addressing crucial issues, whether they be social, political, public, or psychological, women unite to achieve maximum results. WIN (Women in Nuclear) is one association.

What is WIN?

WIN is an international association that is an Affiliate of the World Nuclear Association (WNA). It unites women working professionally in the fields of nuclear energy and application of radiation. The association started in 1993 with the aim to help to clearly inform the wider public about nuclear power engineering and the use of radiation. It does this through educational programmes, information exchange, and study visits. WIN Global has around 2000 members in 60 countries. While most of the members of WIN are employed in the nuclear energy sector, a large number are working in other areas where nuclear technologies are also used. All members of WIN have one thing in common: they want the general public to have a better understanding of nuclear matters and opportunities for the use of radiation. Every year, WIN members from all over the world gather together for a conference to exchange experiences in the area of 'popularising' nuclear engineering among the general public and develop ideas for joint projects.

Svitlana Lynkevych, who is responsible for producing the INSIGHT journal, had the honour to receive an invitation to the 14th WIN annual conference, which took place on May 30-June 1, 2006, in Waterloo (Ontario, Canada). Representatives of the Chornobyl Centre met with WIN members during a presentation on the journal to an audience of communication experts at PIME-2006 (Public Information Materials Exchange) Conference held in Vienna in February of this year. This conference was covered in the previous issue of INSIGHT.

Chornobyl, Radiophobia, and Factual Information

In 2006, over 300 delegates from 40 countries attended the WIN conference. A specific section - "Chornobyl 20 Years Later" - was considered to be a special feature of the conference and attracted many participants. Dr. Kusumi on behalf of the Nuclear Safety Commission of Japan and Svitlana Lynkevych on behalf of the Chornobyl Centre, Ukraine, presented their reports during this session. Dr. Kusumi communicated interesting comparative data on the aftermaths of the Chornobyl disaster and the tragedy in Hiroshima and Nagasaki. Svitlana Lynkevych covered the experience of the Chornobyl Centre in disseminating Chornobyl-related information.

Participants exchanged opinions on the importance of providing the general public with factual information about the Chornobyl problems. Distrust of nuclear engineering increased worldwide following the Chornobyl disaster, resulting in the adoption of moratoriums on construction of new nuclear power units. This consequently held up development of nuclear engineering. Negative public attitude towards nuclear engineering is mostly rooted in radiophobia which is usually the result of lack of information. Last year, the sociological service of Razumkov Centre, Ukraine, conducted a sociological survey among the residents of Ukraine to find out their attitude towards the nuclear industry. Over 84% of Ukrainians confirmed that they did not know enough about the intentions of their government in the area of nuclear branch development. Reporters and information services, as well as scientists and statesmen should be fully aware of their responsibility for the validity of information about Chornobyl disseminated to the world and the possible outcome of their statements. INSIGHT editorial consultant and international journalist, Mary Donovan, covered this in our last edition.

I would like to add that all the reports presented at the conference were interesting and useful for the delegates. Participants of the forum took part in lively debates, actively communicating, becoming better acquainted with each other. A very warm and friendly atmosphere prevailed at the sessions and in the lobbies. This stimulated not only effective work, but also a pleasant environment. All conference delegates are grateful to the Canadian Nuclear Association which welcomed Win-Global-2006 and made every possible effort in order for the forum to be successful and memorable. The next WIN conference will take place in China in 2007. For detailed information about WIN Association, please refer to web-site at www.win-global.org

CHORNOBYL NPP RETIREES: AN AREA OF SPECIAL ATTENTION

The Chornobyl NPP is, or was, not just a place of employment for thousands of people: it became their fate. Many of them came to the plant as young specialists, carved out their careers there, endured the accident in April 1986, took part in elimination of its consequences and recovery of the power units' operation. They retire from the Chornobyl NPP and start a new though not an easy stage in their life.

ChNPP retirees form a special cohort of working population. The law provides them, working under especially hazardous conditions, with a right to retire earlier then the rest: women may step out at the age of 45 and men have an opportunity to leave work when they are 50. They are still relatively young, though the health of many is undermined.

The first sizeable portion of the pensioners, who have participated in the elimination of the accident aftermaths, occurred in 1990-1993. This was the time when the ChNPP management and trade union faced the problem of the retired personnel social protection. There appeared an idea to establish a trade union of the unemployed ChNPP retirees.

In September 1994, the first meeting and an official registration of the organisation took place. It numbered to 253 individuals. Ever since, its membership has been growing and in 2005 alone over 700 people joined the ranks of ChNPP 'retireees' from Chornobyl NPP. Today, 913 people are affiliated with the organisation. Lidiya Klimova, the Chairman, is an inspirer and driving force of the organisation since the moment of its establishment.

Before its final closure in 2000, the Chornobyl NPP has financially supported many of its retirees' social needs. The ChNPP union contract envisaged payment for their medical treatment, municipal services obtained, monthly payments, regular expenses. Following the plant closure and its transfer to budget financing, it has become difficult to continue with such help. That was the reason why members of the organisation took a decision to pay dues from their retired pay. The organisation is managing all the money collected and using it for its needs. The costs are for the most part used for attending sick people (these amounts to approximately 300 individuals annually) and payment for medical treatment in the most severe cases.

▼ *The Chornobyl retirees are favourably endowed with talents. They even have their own choir*

▲ *Mr Godzdeener (left) and Mrs Klimova (right) are pictured with the Mayor of Slavutych, Mr Udovichenko who conferred on them the rank of 'Honorary Citizen of Slavutych' in recognition for many years of active work in the trade union for unemployed ChNPP retirees*

The organisation provides consultative assistance to its members on retirement legislation, social protection issues and arranges meetings with leaders of the appropriate institutions, ChNPP, and local authorities.

Lidiya Klimova said that the organisation survives due to initiatives and direct responsibilities overcoming disinterestedness and indifference of activists. The local authorities support parties, artistic exhibitions, holidays on annual basis.

The events dedicated to April 26 top the list of the ChNPP retirees' plans. During these days, they come to Chornobyl NPP, Pripyat, meet their colleagues, recall their past and their friends, who have gone.

For each of them, the organisation has turned into a real family with prevailing mutual understanding and supportive atmosphere.

Address of the trade union of the unemployed ChNPP retirees

7, Druzhby Narodov Street

Slavutych, Kyiv Region, 07100

Tel./fax +38 04479 2 94 54

Lidiya V. Klimova, Chairman

A 15 DAY TRAINING COURSE, DATES TO BE ARRANGED ON EXPRESSIONS OF INTEREST

The course is aimed at specialists working in the area of radiobiology and radioecology, as well as students (over 18) studying biology at universities. It provides a glimpse of the Chornobyl Exclusion Zone, peculiarities of contamination, ionizing radiation effects for flora and fauna, and assists in mastering the following skills:

▷perform spectrometric measurements of plant, soil and animal samples

▷perform radiochemical analysis of samples to determine content of Sr-90

▷assess radiation situation within contaminated areas

▷calculate radiation doses within radioactively contaminated areas

COURSE PROGRAMME

DAY 1. Theoretical course

▷ Chornobyl Exclusion Zone:
- peculiarities of the territory contamination
- flora and fauna of the Chornobyl Zone

Trainer: S. P. Gaschak, Ph.D. of Biological Sciences

▷ Radioecology research within radioactively contaminated areas

Trainer: Yu. A. Makliuk, specialist in the area of radiobiology, molecular biology, cytogenetics, and radiochemical analysis

▷ Structure of radiation doses within the Chornobyl Exclusion Zone. Calculation models for absorbed doses

Trainer: S. P. Gaschak, Ph.D. of Biological Sciences

▷ Environmental spectrometry

Trainer: A. M. Maksimenko, specialist in the area of radiation safety, radiochemistry, and spectrometry

DAYS 2–3. Practical course

▷ lay-out of sections, determination of the sections' coordinates using GPS
▷ evaluation of the sections' radiation conditions

DAYS 4–7. Practical course

▷ making traps
▷ sampling (of plants, soil), capturing animals
▷ animals processing, dissection
▷ spectrometric measurements

DAYS 8–11. Practical course

▷ radiochemical analysis of Sr-90 content in samples

DAY 12. Practical course

▷ radiation doses calculation
▷ statistical processing of the material

Training course languages: English, Russian

Training course location

The training course will be conducted in the International Radioecology Laboratory of the Chornobyl Centre (Slavutych, Ukraine) using up-to-date equipment. The course will also include practical training in the Chornobyl Exclusion Zone

Cost of training (per delegate)

The cost of participation in 15-day training course is $ 3,000
The cost includes: participation in the training course, translation/ interpretation services, coffee breaks, lunch, accommodation in hotel

Additional services

1. Internet access and e-mail (free)

With the agreement of the participant:
2. transfer from Borispol airport to Slavutych and return
3. duration and scope of the training course may be changed
4. the training course programme may include a visit to the Shelter Object and Chornobyl NPP

TRAINING COURSE

▷ ASSESSMENT OF RADIOACTIVE CONTAMINATION AND RADIATION DOSES ACCUMULATED BY FLORA AND FAUNA OF THE CHORNOBYL EXCLUSION ZONE

▷ **CONTACTS**
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