

Insight

International Chernobyl Centre Journal

Issue 16, 2006

- 
- INTERNATIONAL CO-OPERATION FOR CHORNOBYL
 - BARRIER TO RADIOACTIVE TERRORISM
 - PROSPECTS OF THE WORLD'S NUCLEAR POWER INDUSTRY

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TWENTY YEARS IN THE HOT SEAT

Looking back over the past twenty or so years there have been a number of world events which have attracted considerable media and public attention, and upon which we still reflect. We ask ourselves where we were and what we were doing when the Berlin Wall came down, when the tanks shelled the White House in Moscow, and, more recently, during the events in Independence Square during Ukraine's Orange Revolution.

But as a young radiochemist working in a Government Laboratory in the UK, the events at Chernobyl in April and May 1986 are fixed in my memory. I watched the effect of fall-out recorded on the monitors and indicating a rise in radiation levels on our roof in London. I recall seeing events unfold on the television set and recall my incredulity that such an occurrence could have happened in the first place but even more the denials that anything had occurred until the secret could be kept no longer. I then watched with admiration the commitment and dedication of the power plant workers, troops, helicopter pilots and other emergency services and construction workers who extinguished the blaze and then built the first Shelter. I later learned of the residents belatedly evacuated from Pripyat and elsewhere – never to return. Even now, I wonder what would have happened if a disaster of such magnitude had occurred in the UK or Western Europe? How would we have coped and how different would the UK have been now? Would we have evacuated such large numbers of people and would we too still have an Exclusion Zone, which is now being reclaimed by nature?

Little did I know that in 1998, I would become the Director in the UK Department of Trade & Industry responsible for the UK's response to the international efforts to mitigate the consequences of Chernobyl and, of course, other legacy issues in countries of the Former Soviet Union and Central and Eastern Europe. This, in turn, has brought me into close association with the Chernobyl plant itself and also the town of Slavutych. I have become immersed in the problems of Shelter stabilisation, the New Safety Confinement and the Interim Spent Fuel Store and Liquid Waste Treatment Plant. It has also been my privilege to co-chair the International Chernobyl Centre's Council of Members for several years. But I am particularly proud of the DTI's own programme to help Slavutych address the very important, but often overlooked, social and economic consequences of nuclear power plant closure.

As I said when I addressed the Chernobyl conference in September 2005, my time has almost come to an end and soon I shall have to bid farewell to Chernobyl and Slavutych. Certainly, the memory of the latter I will hold particularly dear to my heart. The transformation of the town that I have witnessed since first visiting in 1998, the sheer enthusiasm and driving force and vision of the formidable Mayor Udovychenko and so many other people, who have to be considered heroes



▲ *Ian Downing, the DTI's Director for International Nuclear Policy and Programmes*

because of their great vision and sense of purpose, will remain happy memories for me. I hope that the DTI funded projects with the Chernobyl Centre, Business Development Agency, and Community Development Centre have helped this transformation. But the real progress has come from within, from the people of Slavutych. Working together, we have merely inspired people to develop:

- A willingness of municipal governance to allow people to get on and live their own lives without too much 'old style' central control – but with declared wholehearted support for our projects,
- an understanding of the inherent skill base of the town – not just a fixation that it is servicing ChNPP, but a potential supplier of diverse goods and services world-wide,
- access to micro-financing for new start-up companies,
- a Business Development Centre to help entrepreneurs to understand the wider commercial world and formulate their proposals, responses to tenders (in terms of presentation and costing) in a way that would conform to international standards,
- over 100 local NGOs which are providing advice and support to enhance the 'social fabric' of the town replacing a dependency culture with one of optimism and excitement about the future,
- Language training.

It really is difficult to believe that twenty years have passed so relatively quickly. No one really knew where Chernobyl was before April 1986 and certainly Slavutych was not on any map. The intervening period has been difficult, but out of adversity has emerged a robust and vibrant new community. I hope that for the future the immense spirit of camaraderie and international co-operation that has been established can be maintained and further developed over the coming years.



▲ *The Chernobyl NPP site on a winter's day*

Decommissioning Units 1-3 will place a heavy financial burden on Ukraine. It is hoped that the international community will meet its commitments stated in the 1995 Memorandum of Understanding on the Chernobyl NPP closure, which was signed by Ukraine and governments and heads of state of the G-7 countries and the EC. Ukraine should not be left to solve the problem of the ChNPP decommissioning, and of spent nuclear fuel management in particular, on its own. The Assembly of Contributors to the Nuclear Safety Account (NSA) which took place in February 2006 has strengthened this hope. The donors declared that the member countries have a responsibility to address the issues of the Chernobyl NPP nuclear fuel management and confirmed that Ukraine will not face this alone. For its part, Ukraine announced its decision to join the NSA – an initiative which clearly demonstrates its willingness for constructive dialogue and efficient co-operation.

WHAT WILL HAPPEN TO THE CHORNOBYL FUEL ?

The facts

The final shutdown of the Chernobyl Nuclear Power Plant (ChNPP) on December 15, 2000, was not the final solution to the Chernobyl story: nuclear fuel is still present in the shutdown power units which means they are still classified as nuclear facilities and are therefore subject to the regulatory conditions which govern the use of nuclear energy. The reactor core of ChNPP Unit 1 is half-loaded and the load value of Unit 3's reactor core is approaching its safety level. The cooling pools adjacent to the three power units are now filled with spent fuel. This, together with fuel remaining in the reactors, has implications for the ChNPP decommissioning schedule with the potential to also delay international projects. For example, all the fuel should be removed from Unit 3 in order to construct the new safe confinement over the adjacent damaged Unit 4. This is a prerequisite condition.

Due to the delay in constructing the new dry fuel store (ISF-2) and the necessity to remove nuclear fuel from the reactors and pools as soon as possible, ChNPP management took the decision, in full agreement with the appropriate regulatory authorities, to dispatch the fuel into the existing storage facility (ISF-1). Although there is space for 1600 fuel assemblies, ISF-1 is practically full with not enough capacity to store all the fuel contained within the reactors. Furthermore, ISF-1's working lifetime expires in 2016 which makes the issue

of completion of ISF-2 one of the most urgent problems in the decommissioning process and the Shelter project.

Complex process

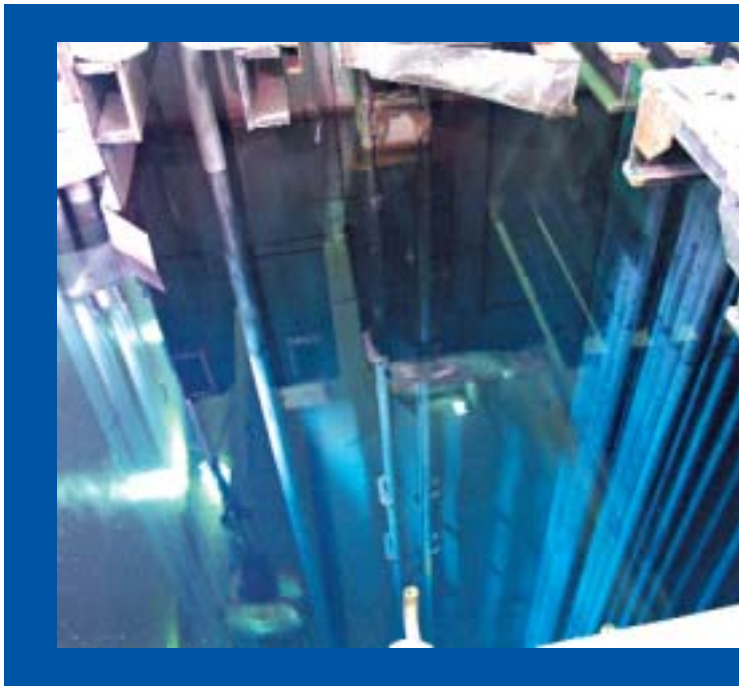
Removal of nuclear fuel from the Unit 3 reactor began on December 5, 2005, five years after the closure of the plant. Preparations during these years included obtaining the appropriate authorisations, preparing the necessary equipment to remove and transport the fuel from the power unit into ISF-1 and arranging delivery of the new storage reservoirs. Fuel is now being simultaneously removed from Units 1 and 3; more than 200 fuel assemblies have been dispatched for storage in just four months.

It has been a complex process and not the only one being dealt with by plant personnel; the search for a solution to the completion of ISF-2 continues. Such problems are inevitable when carrying out a decommissioning programme on reactors that are not only of a unique type which has never been decommissioned before, but also at the site of the world's worst civil nuclear disaster. In 2003, construction work on ISF-2 ceased. Because of these difficulties, additional effort, time and finance will also be required to address potential problems arising from unsealed and defective fuel assemblies, which were not

included in the work schedule for ISF-2. This is a separate issue to be faced by the Chornobyl NPP management.

"Once the problem of the fuel removal from the power units is solved, we will make a real step towards the ChNPP decommissioning", said Olexander Novikov, ChNPP Deputy Technical Director for Safety. "We will be able to start dismantling equipment, some of which will be re-used, some will be sold as scrap metal and some will be destroyed. Only after this phase is completed, can we begin the next stage aimed at bringing the reactors to safe storage. The latter phase is required to allow for the natural radioactive decay processes. This will ensure that radioactivity will have reduced to a level enabling reactor structures to be dismantled without the need for specific protective equipment".

'Wet' storage of spent nuclear fuel ▶



▼ *Drives monitoring for protection management systems*





◀ *Teams of dosimetrists at Chernobyl NPP in the first years following the accident*

A programme initiated by the U.S. Department of Energy covering 50 institutions including clinics, institutes and medical centres, where ionising radiation sources are used (stored) to detect early stage cancers, is reaching its end. The Chernobyl Centre was entrusted by the Government of Ukraine in 2004 to manage this programme under the framework of the treaty between the United States and Ukraine to assist the latter in the elimination of strategic nuclear weapons and prevention of the use of weapons of mass destruction. The project, which is currently being implemented at oncology clinics of Ukraine, concentrated on 'rapid' security upgrades of the nuclear facilities and other ionising radiation sources. Its objective was to effectively prevent any possible terrorist acts.

BARRIER TO RADIOACTIVE TERRORISM

Are oncology clinics and their radioactive materials really a target for terrorists? Danger sometimes lurks in the most unpredictable places. It seems far fetched but then a passenger aircraft with hijackers on board flying into skyscrapers in New York is also far fetched until it becomes a reality. The tragic events of 11 September 2001 compelled the world to consider the problem of terrorism from the viewpoint of possible use of radioactive sources by criminals. In particular, for making a so called 'dirty bomb' which utilises ionising radiation sources as a destructive element. Perhaps the Chernobyl accident could be also treated as one of the cases involving a 'dirty bomb', but in this case a steam eruption played the role of explosive and the nuclear reactor represented a container filled with radioactive isotopes.

Reference information. Over 300 types of radioactive sources (RS) are used in medicine today. Their activity ranges between 5 and 200 Curie. Some scientists believe that unauthorised, aggressive use of some RS (especially based on americium isotope) within a 2 km zone would see public protection methods being enacted in as little as six minutes.

In April 2004, this 'belief' could have become a reality when a group of people were detained as

the result of a special operation of the Security Service of Ukraine in the town of Armiansk (Crimea Autonomous Republic). The gang attempted to sell two containers of caesium-137. National and foreign mass media broadly covered the incident. This could have been Ukraine's six minutes.

A partnership of trust

Yevgen Garin, Co-ordinating Director of the Chernobyl Centre, is grateful to their American partners. "The world is changing and new challenges are emerging, unparalleled in their scale and subversive cruelty and we should not overlook any preventive or protective means. The initiative of the U.S. Department of Energy, Battelle Memorial Institute of the Pacific Northwest Division, within the framework of the Radiological Threat Reduction Programme, provided an opportunity for us to significantly improve safety standards in our medical institutions, an opinion shared by both the security systems' customers and users. The work has been interesting and extremely relevant for Ukraine. It is based on mutual partner trust and discussing relevance of technical solutions in complete openness and honesty, free from pressure".

Mr. Garin explained, "We began with nothing in terms of standards.

Medical facilities using radioactive sources should adhere to all operational rules; unauthorised intrusion should be nipped in the bud and strict security ensured. In reality, most of them were not even provided with guards, not to mention any special security equipment. 'No money, no technical resources', they used to say. Our experts studied the relevance of individual hardware in each and every clinic, then carried out design, installation, adjustment, set-up and commissioning of new equipment".

"How does it work? Stationary video cameras 'keep an eye' on any movement within a controlled area and in the case of any violations, a security system activates. A so called 'duress button' at the disposal of medical personnel, provides them with the ability to quickly summon guards. Following a systematic commissioning, every facility is serviced by a local security company on a contractual basis. During the subsequent three years, all the above-mentioned services, including remuneration of militarised guards, will be financed within the framework of the support programme initiated by the USA".

This is the first time in Ukraine when such a large amount of specialised security equipment has been installed in the country's medical institutions. The

Chornobyl Centre has been appropriately licensed by the State Nuclear Regulatory Committee of Ukraine in the areas of design, assembly and maintenance of physical systems for the security of nuclear material, radwaste and other radiological dispersion devices. The programme has not always gone smoothly. There were those who were sometimes a little suspicious and doubtful with regard to proposals to change the 'status quo' at their institutions. Some experts were debarred and there was suspicion as to what made the Americans not only worry about Ukraine's radioactive sources but even pay for their security... As the programme unfolded, they realised the sincerity of the intentions and necessity for such a service.

Achievements and future plans

Significant achievements were made as a result of the project: broad consultation on counter-action to nuclear terrorism, ionising radiation sources were safeguarded in the clinics and personnel were trained in the operation of security

systems. Yevgen Garin said: "Under the conditions of the ever-present threat of terrorism, the Chornobyl Centre employees explore opportunities for collaboration in other areas of expertise, for example they offer ad hoc training to foreign experts representing security services. You know, the Chornobyl Exclusion Zone is the embodiment of the ruinous impact of a man-made accident on life. We have already delivered theoretical and practical training within the Exclusion Zone for a troop of military firemen from the California National Guard (the USA). Last year, a team of experts from Hungary also expressed a strong interest in this area. Just recently, we also received a large delegation from the Austrian Ministry of Defence".

"I would also like to mention two completely new directions in which I hope the Centre will be involved in the near future. At the moment, we are bidding on the tender announced within the framework of the U.S. Department of Energy's Second Line of Defence Programme. This also involves upgrades of the systems ensuring



▼ **Radioactively contaminated machinery used to eliminate the Chornobyl accident**

radiation detection monitoring, but at other, still more problematic facilities such as, Ukrainian airports, railway stations and seaports. The second possible direction is to study how radioactive sources are controlled at the facilities of the Ministry of Emergencies, where radioactive waste is stored. There are five such places in Ukraine, and American scientists are helping to perform preliminary surveys at these".

▼ **The Exclusion Zone...**





Milestone achievements at Chernobyl in 2006 are expected to include the completion of stabilisation work on the existing shelter

THE INTERNATIONAL COMMUNITY IS COMMITTED TO COMPLETING THE CHORNOBYL PROJECTS

A senior official at the European Bank for Reconstruction and Development (EBRD) has told an international nuclear conference that problems encountered in preparing the Chernobyl shelter implementation plan had been 'more complicated than anticipated', but that the international community is committed to completing the project.

Fabrizio Saccomanni, the EBRD's vice-president of risk management, gave an update on plans to build the arch-shaped confinement over the destroyed Chernobyl the

destroyed Unit 4 during the European Nuclear Assembly meeting in Brussels, Belgium on 29 March 2006.

Mr. Saccomanni said: "Problems at Chernobyl have been more complicated than anticipated such as the confinement shelter at Unit 4. Also the development of the facility for the spent fuel assemblies from the early reactors has been more difficult than anticipated."

However, he said the international community remained committed to the New Safe Confinement (NSC) project and that work was continuing to identify and resolve

all issues that could potentially delay the project and cause cost increases.

In addition, Mr. Saccomanni said that the EBRD was now ready to invest its own money to finance nuclear safety projects in central and Eastern Europe.

At present the bank finances a variety of activities including nuclear safety upgrades and waste management projects out of special funds using government donations. He said the EBRD proposed to offer future financing in the form of loans.

Mr. Saccomanni, who was appointed vice/president of the EBRD in 2003, is responsible for activities at the bank including the Risk Management Department, the Environment Department and the Nuclear Safety Department. He is also chairman of the bank's Technical Cooperation Review Committee and of the Operational Risk Management Group.

His report to the European Nuclear Assembly followed a meeting in Kiev in January 2006 of the Ukraine & EBRD joint committee overseeing the Chornobyl Shelter Fund. That meeting discussed a range of issues including Ukraine's contribution to the fund and provisions in Ukraine's state budget to support the project.

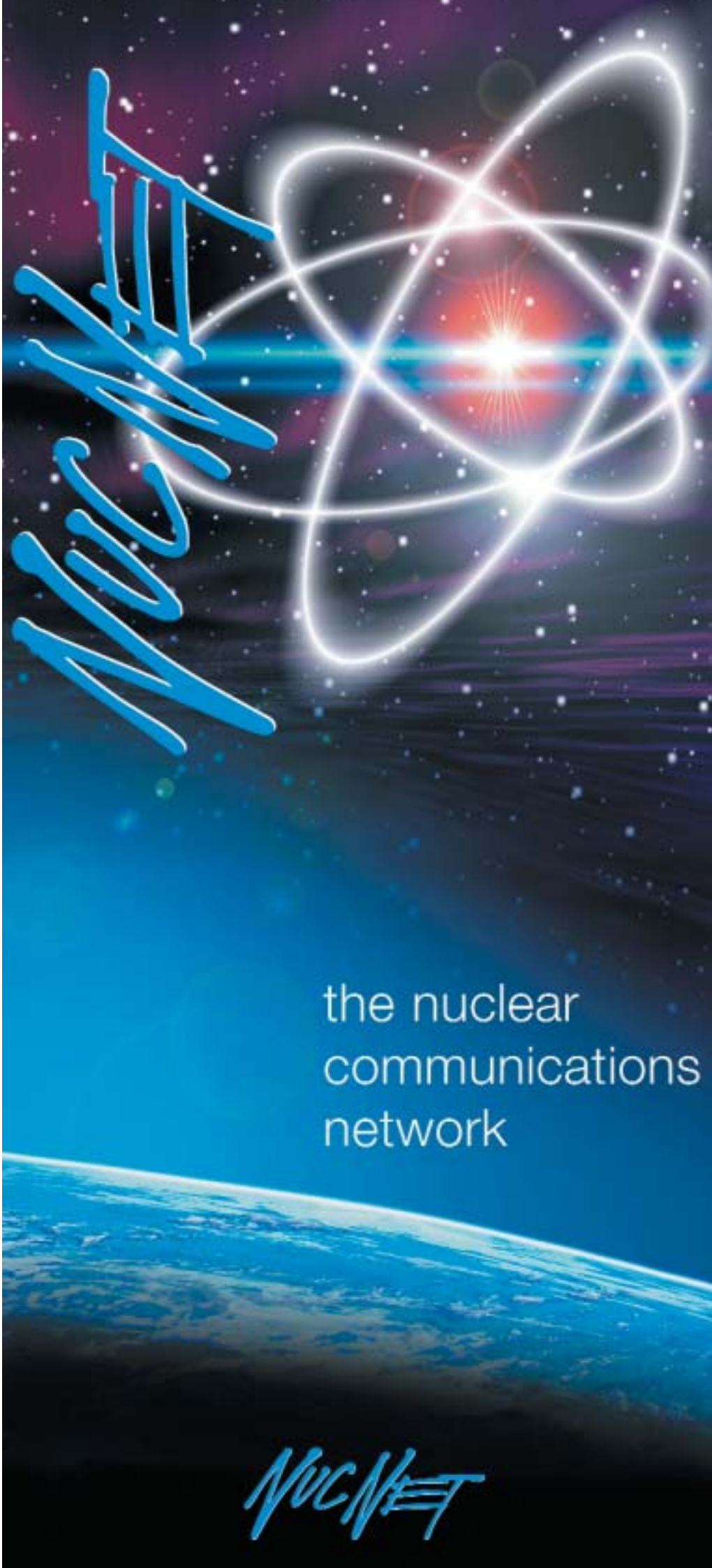
The international community has so far provided more than 650 million euros (EUR) for the fund and pledged another EUR 150 million in May 2005.

The awarding of the contract for the NSC is expected in the near future. The confinement has been designed as a more secure and permanent structure to be built around an original shelter, initially called the sarcophagus that was built in 1986 to enclose the remnants of the destroyed fourth reactor.

The cost of building the confinement is estimated at more than 1 billion US dollars and completion of the main construction projects is scheduled for 2008.

Milestone achievements at Chornobyl in 2006 are expected to include the completion of stabilisation work on the existing shelter, an integrated monitoring system, and physical protection and access control.

Since 2001, shortly after it first established a programme to help tackle the nuclear legacy in the former Soviet Union, the UK spent more than 26 million pounds on the shelter. According to the UK's Department of Trade and Industry, a longer-term priority is to have the new confinement completed by 2009.





1986

April 26, 1986... The severest nuclear disaster in the history of mankind befell Chernobyl NPP Unit 4.

206 days and nights, the toil of more than 200,000 people, 6,000 tons of metal structures, 300,000 tons of concrete will be needed to protect the environment from the severe radiation effects of the destroyed reactor. This herculean effort has been put into the construction of the sarcophagus, which would ultimately be known as the Shelter Object.

Today, the area around the Shelter Object resembles a construction site. This work will guarantee the safety of this unique facility for 100 years, transforming what was a disaster area into an ecologically safe site, thanks to the combined efforts of scientific and engineering professionals world-wide.

2006



EUROPE UNITING FOR SAFETY



▲ *How to prevent accidents, minimise consequences of a natural disaster and protect public from their destructive impact? These issues were at the centre of lively discussions held at the conference 'Chornobyl 20 years after: Local and regional authorities facing catastrophes' organised in Slavutych*

On the eve of the 20th anniversary of the Chornobyl disaster, officials, experts, scientists, parliamentarians and local communities from all over the world gathered in Slavutych to reflect not only on the Chornobyl calamity and its consequences but also to discuss a way of preventing future accidents. More than 100 delegates took part in the international conference 'Chernobyl 20 years after: Local and regional authorities facing catastrophes' held on 2 and 3 March 2006 and organised jointly by the Council of Europe's Congress of Local and Regional Authorities and the Foundation for Local Self-government of Ukraine in Slavutych. Countries represented included Ukraine, Russia, France, Italy, the UK, Turkey, Sweden, the Netherlands and Armenia. Frank and open discussions included ways of interfacing with entrepreneurs and authorities to analyse and avoid accidents, minimise the impact of natural disasters and make society safe from the chaos, panic and regrettable losses which can occur.

'Ukraine is breathing in democracy'

Slavutych Mayor, Volodymyr Udovychenko, a leading member of the Congress of Local and Regional Authorities, was proud to echo these encouraging sentiments in his opening welcome statement, "We still do not know all the consequences of Chornobyl but everything that has been done over the last twenty years has rallied us and now we are more eager to help each other. The world is growing more transparent and frank. This has resulted in greater freedom for our people as they become more confident in their government and we strive to secure more opportunities to overcome the disaster..."

Guest of honour at the conference was Borys Oliinyk, National Deputy of Ukraine and Head of the Ukrainian

Delegation to the Parliamentary Assembly of the Council of Europe. An acclaimed poet and academician, Mr. Oliinyk gave a rather precise and emotional definition of the human scale of the tragedy. "The explosion at Chornobyl has shown human existence in a new light... unfortunately, time has the habit of working against memory. Today's conference is a timely one. I am sure that its participants will not only co-ordinate emergency management efforts of local authorities, but also their involvement at an international level will dispel cynical falsifications regarding the Chornobyl accident, perhaps the most awful disaster since the Deluge."

One of the main lessons learnt from Chornobyl was the need for nuclear legislation that was absent in the former Soviet Union which would allow relations

between authorities and communities to operate at a civilised level, starting from the design of nuclear facilities and ending with their decommissioning. After the accident, existing and totally inadequate emergency plans were thoroughly reviewed. A further positive outcome is that the current emergency plans for Ukrainian nuclear facilities, as per the information provided by officials from the Ministry of Emergencies of Ukraine, are more closely interconnected with communities' action plans, both in terms of notifying the public about potential hazards and taking prompt action.

'We share your pride in your town...'

In spite of some apathy and considerable doubts regarding the town's future after the Chernobyl Nuclear Power Plant (ChNPP) shutdown, Slavutych was able to withstand and even retain its civilised and humane attractiveness. According to the results of research conducted by the Social and Psychological Centre in Slavutych, inhabitants have long forgotten the notion of radiophobia. The majority of the town's residents are power engineers who have made their conscious choice based on their professional knowledge. As for any uneasiness: only five years ago, 93% of Slavutych people considered the ChNPP closure as their major concern and 86% were worried that their life would become worse. Fortunately, these pessimistic concerns were not realised. Small, but nevertheless productive businesses are developing. Currently, 68% of Slavutych people believe that their life-style and environment is better than in other Ukrainian cities. Although, they have concerns over their children's future, the availability of reliable jobs and the economic situation in Ukraine, they live in a town where unemployment is relatively low compared with other parts of the Ukraine and that is second only to Kyiv in terms of per capita investment.

Risk management is the first priority

After the Chernobyl accident, the Council of Europe was not left to stand alone with regard to improving safety in nuclear power plants on the continent and overseas. In 1988, a co-ordinating group was established for alleviating the consequences of natural and technological disasters which painfully affect society. In 1993, the Board of Directors for the European Bank for Reconstruction and Development (EBRD), agreed to set up the Nuclear Safety Account (NSA). Donor states from central and eastern Europe pledged to contribute funds to finance safety improvements in central and eastern Europe that included upgrading the safety of ChNPP. A key contributory factor to improved safety in the power plant industry is the frank and open exchanges of views and information between communities and all levels of governing and managing organisations. This is an issue which cannot be measured by technical improvements or through donor injections. An 'open door' policy of comprehensive and detailed information about potential risks, knowledge of hazardous substances and an efficient system of early notification and response

procedures must surely reduce the concerns of local communities for themselves and their environment.

This very lack of communication resulted in significant human and material losses caused by accidents in a small chemical manufacturing plant in the city of Seveso (Italy) and in an explosives and detonators storage facility in the Netherlands. It was difficult to manage the accidents under the conditions of distrust that existed between authorities and communities; there was no idea about the real situation as information was concealed within the affected companies. This lack of freedom of information contributed to fear and panic among local communities. All these issues were discussed during the conference by the people who had lived through the accidents, including Mr. Inshede Ian Mans, a former Netherlands city mayor, and Mr. Andres Knep (Sweden), chairman of the round table 'Experience of local and regional communities in the Chernobyl accident aftermath elimination'. Bitter lessons were learnt and pain suffered, much of which could have been avoided.

"Catastrophes do not know borders, they 'laugh' at our political and administrative conventionalities, as they do not depend on them and can strike at any country. One should understand risks in order to manage them. Today, over 400 nuclear reactors are operating in the world and though experts forecast a low probability of a disaster similar to the one that happened at ChNPP, we should not bask in a sense of false security. If nuclear engineering wants to be responsible and is demanding total confidence in itself, then local communities have the right to be given comprehensive information about technical and technological risks in order to ensure as timely response to incidents as possible." This was the consensus of participants at the round table, 'Risk management strategy', who also stated that, under the threat of technological and natural disasters, it is vitally important to identify persons responsible and quickly unite the efforts of local, regional and national authorities in order to prevent a greater calamity than necessary.

Over time, individual countries have developed their own systems for emergency planning, prevention and response but it would seem sensible to develop a standardised pan-European model to simplify these procedures. With the objective of promoting this idea in the Council of Europe, governmental bodies and NGOs, conference participants have adopted the 'Slavutych Appeal' which reaffirms the basic principles of preventing and minimising the consequences of accidents and disasters.

In his valedictory speech to the conference delegates, Slavutych Mayor Volodymyr Udovychenko, said, "The Chernobyl disaster has contributed to our unification. You have become closer to Ukraine, you now have a better understanding of our country. And we, in turn, have drawn nearer to Europe, to its standards and life style through you, the authoritative individuals, congressmen and professionals in the studies of social and humanitarian values. The result of all this is that Ukraine will become a key player on the international scene."

PROSPECTS OF THE WORLD'S NUCLEAR INDUSTRY

The events of April 1986 had a drastic impact on the development of nuclear engineering and the public's attitude to it world-wide. Governments, pressured by public opinion, began to back-track on nuclear power and this resulted in a lack of development of a nuclear engineering programme based on improved safety measures and procedures. Some countries such as Austria and Italy, have decided to reject domestic nuclear industry development programmes. According to United Nations' data, in the 1990s, the level of nuclear power plant expansion amounted to 7%. This was in contrast to 24% in the previous decade. The world commissioned only one power reactor in 2001 but there are new-build programmes and preparatory activities underway in Europe (Finland, Romania, France). Meanwhile, other countries, such as the USA, Netherlands and the Czech Republic, are actively considering expanding their domestic nuclear generating capacity.

Opinion may be one issue but scientific facts are another. Scientific analysis of the events following Chernobyl has resulted in the establishment of procedures to prevent any future potential significant nuclear accidents. Today, objective scientific evidence reveals that the post-Chernobyl syndrome was effectively controlled and the world's nuclear engineering industry is moving on to a new development phase in addressing problems associated with nuclear power.

PIME-2006

The two sides of nuclear engineering were discussed at the PIME-2006 Conference (Public Information Materials Exchange) for nuclear communicators from all over the world hosted this year by the IAEA in Austria. This year, about 200 delegates from many countries of the world gathered for five days (12 – 16 February 2006) in Vienna. The future of the nuclear power industry, the aftermath of the

Chernobyl nuclear disaster, the importance of communicating information about nuclear industry to social stakeholders were subjects at the centre of lively debates during the plenary and section sessions. One of the sections was moderated by the representatives of the international public organisation Women In Nuclear (WIN) and dealt with the role of women in nuclear industry. The reports presented at the plenary sessions and their discussions

provided the conference participants with important information about the role of communicating nuclear issues in the present day, and the future.

Future prospects

Delegates were informed that power consumption is expected to rise at an annual rate of approximately 2%. The reason for this is the growth of the Earth's population and increased economic development in many countries. Global climate change caused by an increasing impact of the greenhouse effect, and due to organic fuel consumption in particular, significantly contributes to this end.

The current cost of power generation at nuclear power plants is 10-20% cheaper if compared to production of energy by means of coal or gas. This refers to practically all regions in the world. Resources of uranium and thorium provide for large-scale development of nuclear engineering in a longer-term prospective. Transference to fast-neutron technology allows 60 – 70 – fold increase in the resource base of nuclear power engineering. Today, 17% of electrical energy produced in the world is generated by the nuclear power industry. In accordance with IAEA forecasts, use of nuclear energy will grow rapidly in the near future. Some experts believe that as early as in 2030 this share will amount to 25%.

▼ *Experts believe that nuclear power will account for 25% of energy produced by 2030*





▲ *The International Atomic Energy Agency headquarters in Vienna*

Nuclear power's contribution

About one third of electrical energy in western Europe is produced at nuclear power plants. In some states, such as Lithuania, France, Belgium and Slovakia, the nuclear industry holds the dominate position whilst generating more than a half of the required amount of electric power. In Ukraine, the contribution of nuclear power plants to the whole bulk of electrical power produced amounts to 52% of the total need. A leap forward in the development of nuclear engineering is currently being seen in Canada, Japan and some other developed countries. According to some experts, nuclear power production will actively rise in Asian countries. For example, 22 of the 33 reactors commissioned in the course of the preceding 20 years are located in Asia with China, Japan, and South Korea being the most active nuclear power plant constructors'. Construction of

previously suspended plants in Bulgaria and Slovakia is now being resumed and work has begun on a new plant in Finland (Olkiluoto). Two new nuclear power units are being built in France at the site of Flamanville NPP and there plans to construct plants in Turkey, Poland, Argentina, and Brazil are currently being reviewed.

In the USA, a law on the development of power engineering in the twenty first century has been adopted, assigning a significant role to nuclear engineering. It is envisaged that before 2010 the USA will commence construction of four to six new nuclear power units and the Prime Minister of the United Kingdom, Tony Blair, has said a renewal of domestic nuclear power engineering development remains an option.

Reliability and safety

A crucial component in the further operation of nuclear power units is continuing to improve their safety

and reliability. The world's nuclear power industry, which has obviously vast experience in developing and operating existing reactor facilities, shows preference for power units with pressurised water reactors, i.e. of the PWR/VVER type. Currently, the world is involved in the re-assessment of the units' safety and extending operational life beyond the original design term, if appropriate. For instance, the active lifespan of 20 units in the USA was extended from 40 to 60 years with a proposal to extend operational life for all power units. In Russia, five power units have had their operational life extended.

Nuclear experts believe that the twenty first century will see a renaissance in the world's nuclear engineering industry. This can only be due to improvements in its safety and efficiency, many of which have been achieved from studies following the Chernobyl accident.

INTERNATIONAL CO-OPERATION FOR CHORNOBYL



▲ In 1997, Albert Gore, former US vice-president (centre) visited the Chornobyl NPP

The Chornobyl incident proved that severe nuclear accidents cause ripples which dramatically affects many other parts of the world. The resources needed to eliminate the consequences of such large man-made catastrophes are far greater than the economic and technical opportunities of any one country and require a 'global approach'.

During the first years following the accident (1986 – 1989), the international co-operation for addressing the Chornobyl problems was implemented exclusively under the umbrella of the International Atomic Energy Agency (IAEA) due to a previously long-standing relationship between Ukraine and the IAEA in the area of peaceful uses of nuclear energy.

In August 1986, details of the accident, its consequences and measures taken were reported by Soviet experts at the IAEA expert group meeting in Vienna. They determined the following priorities for an interface between the former USSR and IAEA: define reasons and scale of the accident, assess adequacy of the measures taken to

ensure protection of the public from radiation, improve the level of RBMK reactors' safety as well as all other types of Nuclear Power Plants (NPPs) with Soviet-designed reactors. Collaboration to this crucial end still continues and involves the IAEA, leading institutes in France (IRSN), Germany (GRS), national laboratories in the USA (PNNL, BNNL, ANL, etc.) and other countries.

International Chornobyl project

At the beginning of 1990, the IAEA Secretariat initiated the development of the International Chornobyl Project with the objective for international experts to study and assess radiological implications of the Chornobyl disaster for mankind and the environment. As a result of the project, a selection criteria for the decision-making process for public protection from the effects of incidents such as Chornobyl have been generally confirmed. In April 1990, the permanent Representative Office of Ukraine to the United

Nations (UN) in New York, together with plenipotentiaries of the ex-USSR and Belarus, requested that an additional issue be placed on the agenda of the inaugural meeting of the UN Economic and Social Council in 1990: 'International co-operation aimed at elimination of consequences of the accident at the Chornobyl Nuclear Power Plant'.

This resulted in the beginning of a multilateral international collaboration for Chornobyl which has opened the door for the involvement of international experience and knowledge for studying the aftermath of Chornobyl; rendering technical, medical and social assistance to the affected people and recovering the contaminated areas. The most authoritative international organisations and offices were involved, the UN, European Commission (EC), other governmental and non-governmental institutions; all needed to learn from the Chornobyl experience in overcoming the consequences of a severe nuclear accident in order to improve their own ability to deal with exceptional radiological incidents. The interface between countries was extended in the areas of scientific, technical and humanitarian concerns with key business contacts in scientific centres and laboratories in nuclear power-oriented countries being established.

During 1990 – 1995, the international community's strive towards safety has gradually become a dominating factor in the future of Chornobyl and, indeed, the future of other nuclear plants. The main areas identified to achieve their objectives are: finally shutdown the Chornobyl Nuclear Power Plant (ChNPP); transform the damaged Unit 4 into ecologically safe system and raise the safety level of Ukrainian NPPs to world standards. The Lisbon Initiative, announced in May 1992, was crucial for NPP safety

improvement. The heads of G7 states and governments proposed a versatile action plan to improve the safety levels in the countries which have nuclear power plants with Soviet-designed reactors. The United Kingdom, Germany, France, the USA, Canada, Japan, Sweden are among the countries most actively involved with Ukraine in this bilateral collaboration to address these specific nuclear problems.

In 1993, the Steering Committee of the European Bank for Reconstruction and Development (EBRD) set up the Nuclear Safety Account (NSA). The donor countries allot money to the NSA in order to finance NPP safety improvement initiatives. The European Commission and 14 countries including Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, the UK, and the USA are among the most active donors. The majority of nuclear states concentrated activities aimed at localisation of the damaged Chernobyl NPP Unit 4 and its transformation into an ecologically safe system. This is still one of the most important issues in a series of problems related to elimination of the Chernobyl accident aftermath.

An international tender announced by the Government of Ukraine in 1992 initiated a consideration of engineering solutions to eliminate the problem. In 1995, the Alliance Consortium, as a winner of the competition, developed a report on technical and economic implications. Within the framework of TACIS project 'Chernobyl-4. Short-term and Long-term Measures', the Alliance Consortium has proposed the 'Recommended Policy'. The detailed plan of the Shelter transformation – Shelter Implementation Plan (SIP) – has been developed as a result of a joint initiative of the EC, USA, Ukraine and an international expert group based on the 'Recommended Policy'. The SIP is financed from contributions made by donor countries to the ad hoc Chernobyl Shelter Fund administrated by the EBRD. Joint international research organised by the EC and the

affected CIS countries – Ukraine, Belarus and Russia has significantly contributed to studying post-accident radiological contamination, its effects on human health and aspects of radioecology and radiobiology. The scientific collaboration to this end is still in full force.

International Chernobyl Centre

The establishment of the International Chernobyl Centre (ICC) on 26 April, 1996, further promoted co-ordination of the international effort in the area of studying the consequences of the Chernobyl disaster. Over 140 projects have been implemented within the ICC framework during 10 years of its operation. And its activity now goes far beyond the Chernobyl issues. The French-German Initiative (FGI) for Chernobyl was an important milestone in international co-operation. Its objective was to collect, unify and validate a wide range of scientific data on consequences of the counter-measures and their efficiency. The

following three projects were included into the FGI:

- 'Sarcophagus Safety',
- 'Radioecology Consequences of the Accident',
- 'Health Consequences of the Accident'.

Under the UN aegis, the Chernobyl Forum was set up and involved the World Health Organisation (WHO), IAEA, EC, EBRD and other international institutions and governments of the countries affected by the accident. It was an important step towards solving the problems of Chernobyl. The goal of the Forum is to evaluate knowledge gained after the Chernobyl disaster, assist in better understanding and improvement of activities aimed at eliminating consequences of the accident.

On the 20th anniversary of the Chernobyl disaster we should study and reflect on the results of all this international co-operation: what have we achieved, what more do we need to do and who can help us to ensure that we continue to strive for the safest nuclear engineering achievable – for the sake of future generations and this world.

▼ ***Ukrainian diplomats headed by Boris Tarasiuk, the Minister of Foreign Affairs of Ukraine, at the Chernobyl NPP in 2005***



RESPONSIBILITY OF THE MEDIA



▲ *Mary Donovan, Insight editorial consultant*

It's 1.23 am, April 26, 1986. Imagine the scene, the snow is melting, Spring is emerging and in Ukraine this goes quickly. By the end of April, you can expect to be barbecuing and swimming in the river. Operators at the Chernobyl nuclear power plant thought they were coming to the end of a gruelling 24 hours of running tests. In fact, Chernobyl was just entering a new phase in its history and the history of nuclear engineering. In just four seconds, power surged to 100 times the reactor's capacity. The uranium fuel disintegrated, bursting through its cladding, coming into contact with cooling water. An enormous steam explosion smashed over 1,500 water pipes, throwing aside the reactor's cap, blowing through concrete walls and throwing burning blocks of graphite and fuel into the compound. Radioactive dust rose high into the atmosphere. The rest, as they say, is history.

In May 1987, a National Geographic article, said that Dr. Richard E. Webb, a nuclear engineer, calculated 280,000 possible deaths as a result of the Chernobyl accident contaminating a European area as big as Texas with caesium. Scientists from the International Atomic Energy Agency (IAEA) said that contamination in Western Europe was spotty but figures were still being compiled. Dr. Rosen, the IAEA's safety director, called Chernobyl "an unacceptable accident – but tolerable for society." He argued that smoking and radon gas in homes were more serious threats than nuclear

accidents. Like many scientists, he maintained that if nuclear plants were replaced by generating plants burning coal or oil, the health effects would be more serious as these plants give off sulphur dioxide, nitrous oxide, particulates and carbon dioxide. Western experts, using the limited data available to them, estimated that 24,000 people among the 116,000 evacuated received fairly serious radiation doses of about 45 rem. In general, 5 rem is considered acceptable for a nuclear-plant employee in one year. As of 2004, the total number of fatalities is 50 (IAEA Chernobyl Forum Report).

The Soviet Union did not acknowledge the disaster until two days after it happened, April 28. During this time in Europe, civil defence teams were called up in the midst of fear, panic and chaos caused by a lack of accurate information being quickly communicated. In this issue of *Insight*, we talk on pages 12 – 13 about this precise point. The inability or unwillingness of the Soviet Union to 'own up' to the fact that this accident had happened, to quickly ascertain the facts and to disseminate this information to the rest of the world led to speculation on a grand scale. This led to distrust and confusion about health effects.

In 1989, the World Health Organisation (WHO) first raised concerns that local medical scientists had incorrectly attributed various biological and health effects to radiation exposure. An authoritative UN report in 2000 concluded that there is no scientific evidence of any significant radiation-related health effects to the majority of people exposed. The 2005 Chernobyl Forum study involved over 100 scientists from eight specialist UN agencies and the governments of Ukraine, Belarus and Russia. This is in line with the United Nations Scientific Commission on the Effects of Atomic Radiation (UNSCEAR) 2000 report which said that "there is no scientific evidence of increases in overall cancer incidence or mortality or in non-malignant disorders that could be related to

radiation exposure." Yet exaggerated figures continue to be published regarding the death toll attributable to the Chernobyl accident. One such publication is by the UN Office for the Co-ordination of Humanitarian Affairs (OCHA) entitled 'Chernobyl – a continuing catastrophe'. The UNSCEAR chairman has made it clear that "this report is full of unsubstantiated statements that have no support in scientific assessment."

So, misinformation continues to abound, fuelling misjudgements and misgivings when it comes to nuclear power plants. At this stage in the world's need for power which is accessible and cost-effective, only facts should be used to make decisions. We all have a responsibility to ensure that the true facts based on scientific evidence are presented to the many audiences and decision-makers: governments, public and private organisations but, perhaps most importantly, the general public and, here, the media has a crucial role to play. At the time of writing this article, one headline on an internet news site, read 'Did Chernobyl Blast Kill 1,000 British Babies?' The headline is emotive and based on the claims of a researcher who is to address a local authorities conference in London. It is full of words such as 'apparent', 'claims', 'may have' and 'suggest'; there is not one solid, definite statement on which to base an opinion and yet it poses an alarming question in its headline which can only lead to more speculation in that sector of the public with no access to real scientific data and that is, of course, the general public.

Nuclear power is a clean source of energy with a dirty name due initially to the Soviet Union's unwillingness to wash its soiled linen in public. A fresh look at nuclear power can mean a fresh start for the nuclear industry. The pages of the Chernobyl story have been slowly turning over the last twenty years. There is no final chapter, it's a continuing story which we should all read and learn, and then make up our minds.

SLAVUTYCH NGOs: 'APRIL OF CHORNOBYL'

The Charitable Foundation, 'April of Chornobyl', was established in Slavutych in 2001. The name reflects the goal, to help to achieve the objectives of the public organisations involved: helping people affected by the Chornobyl disaster. The years carry us further and further away from the tragic events of 1986 but the people of Chornobyl today still face many problems. The residents of Slavutych understand this better than others. The Foundation's mission is to combine the efforts of Slavutych citizens in assisting those affected by social, economic or medical issues. Today, there are about 500 members in the Foundation.

Since the five years of its inception, the Foundation has expanded the area of its expertise and is currently working to meet the needs of children with disabilities, as well as those from poorer, single parent and larger families. The organisation's activity is financed by sponsors and member contributions.

Among the initiatives successfully implemented by the Foundation is the Children's Centre 'The World Without Limits', where they study English, Italian, and Spanish languages. Also, the institution manages 'School in Nature', a family club and the rehabilitation of children in Ukraine and overseas. It also provides humanitarian aid.

In 2005, the Foundation was actively involved in a project implemented within the framework of social order and successfully ran the project 'Prophylactic of Alcoholism, Drug Addiction, and Smoking among Teenagers'.

'April of Chornobyl' is successfully collaborating with international charitable foundations and is actively participating in the projects of the Community Development Centre.

Please direct any questions you may have about the Foundation and its activity to the Director, Olena Germanovich at the address given



▲ *The Foundation actively supports the children of Slavutych, particularly children from poorer and single-parent families as well as those children with disabilities*

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▼ *One of the classes organised by active members of 'April of Chornobyl' within the framework of the action 'School in Nature'*



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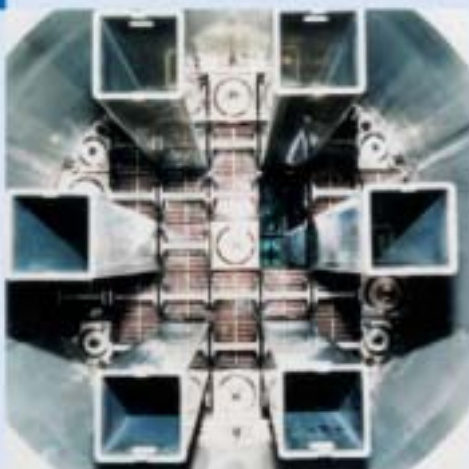
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