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MONITORED THIS ISSUE:

THE CHERNOBYL LEGACY

"Chornobyl is a word we would all like to erase from our memory. It opened a Pandora's box of invisible enemies and nameless anxieties in people's minds, but which most of us probably now think of as safely relegated to the past. Yet there are two compelling reasons why this tragedy must not be forgotten. First, if we forget Chornobyl, we increase the risk of more such technological and environmental disasters in the future. Second, more than seven million of our fellow human beings do not have the luxury of forgetting. They are still suffering, every day, as a result of what happened 14 years ago. Indeed, the legacy of Chernobyl will be with us, and with our descendants, for generations to come."

Kofi Annan, April 2000

(645-646.5752) Rebecca Harms, MEP

- According to the UK's Food Standard Agency, in 2005 there were still 379 British farms - covering over 74,000 hectares - and a total of 200,000 sheep that remain under post-Chernobyl restriction orders. Last year I asked the European Commission to confirm those numbers and the Commission not only confirmed the impact on British farmers, but also provided other alarming information. It stated that over the next decade, there would be no significant change in the degree of contamination being experienced. The farmers will have no choice but to live with the restrictions for many years to come.

In other European countries like Germany, Austria, Italy, Sweden, Finland, Lithuania and Poland, the levels of contamination found in certain mushrooms and berries in some areas still exceed the permitted maximum.

Many Western European countries still suffer notable economic costs from the accident. In Germany for example, 159 million Euros (almost US\$194 million) was paid in compensation to milk and

vegetable farmers in 1989 alone. The treatment of contaminated whey cost another 35.8 million Euros (US\$43.7 million) and even now, two decades after the accident, Germany is still paying compensation to hunters for contaminated game animals. Overall the economic costs to Germany have reached approximately 250 million Euros (US\$305 million).

This example pales into insignificance when compared with the ongoing tragedy in the Ukraine, Russia and Belarus - the countries mostly affected by the Chernobyl fallout. It is difficult to grasp the full impact of the Chernobyl disaster - especially for those of us living thousands of kilometres away from the exclusion zone.

At the IAEA conference in Vienna last autumn, World Health Organisation (WHO) expert Dr. Bernett told a story about the life in the villages of one of the most affected areas. He recalled seeing children on their way to school crossing the street at the exact same spot every morning. When asked why, the children stated that this was quite

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obvious - they had to cross the street because of a contamination hot spot. Dr. Bennett used this example to show that people are able to cope with the consequences of the disaster; that the consequences have become part of people's every day life and that the necessary changes in behaviour have been integrated into their daily routine. Had Dr. Bennett been describing children in his own hometown crossing the street to avoid a contamination hot spot, it is unlikely that he would have painted quite the same picture.

The message being sent by the IAEA and WHO experts like Dr. Bennett since the Vienna conference has been quite clear. They acknowledge that the Chernobyl disaster was the worst nuclear accident in the industrialized world, and accept that the number of deaths is higher than first assumed - probably 4,000 deaths worldwide - or compared with the assumptions of other experts, "only" 4,000 deaths as IAEA puts it. However, their argument is that although this is bad, the time has now come to move on and to "Look into the future!" - as demanded in the title of the IAEA conference to be held in Kiev on the 20th anniversary of the disaster. We cannot and shall not accept that! The legacy of Chernobyl does not lie in the past - it is not over yet.

People are still suffering from the consequences of the disaster every day and the lives of many will continue to be affected for decades and generations to come. Many of the consequences are only now starting to emerge as some types of cancer and genetic malformations take years to develop. The large and increasing number of thyroid cancers, even if many of the victims survive, shows the severe consequences of exposure to the radiation released by Chernobyl.

Stress, being uprooted, fatalism and self-abandonment are also among the consequences of the catastrophe. In Belarus 135,000 people had to leave their villages, their homes, right after the accident and even recently, evacuation measures still had to be taken. 2.2 million people were living in the contaminated area before 1989 but today the number has gone down to 1.5

million people. These people have not only left all their possessions behind but also their former lives, familiar surroundings and history.

Economic costs

With regard to the economic costs associated with the Chernobyl nuclear accident, even the IAEA, whose function it is to promote nuclear power, states that the impact of the catastrophe was strong enough to accelerate the break up of the Soviet Union.

Huge costs were imposed on the Soviet Union and three successor countries, Belarus, Russia and the Ukraine. These costs are impossible to calculate precisely owing to the non-market conditions prevailing at the time of the disaster and the high inflation and volatile exchange rates of the transition period that followed the break-up of the Soviet Union in 1991. However the magnitude is quite clear - hundreds of billions of dollars of costs were incurred as a result of:

- Direct damage caused by the accident;
- The actions taken to seal off the reactor and mitigate the consequences in the exclusion zone;
- The resettlement of people and the construction of new housing and infrastructure to accommodate them;
- Social protection and health care provided to the affected population;
- Research on the environment, health and the production of clean food;
- The radiation monitoring of the environment;
- The disposal of radioactive waste
- The losses relating to the incidental cost of withdrawing agricultural land and forests from use and the closure of agricultural and industrial facilities.

In Belarus, for example, 7,000 km² was declared blocked or a strict control zone and 23% of the country's land is still highly contaminated - including 40% of the land used for agricultural purposes.

The economic damage to the country is estimated to be around 192 billion Euros (US\$235 billion) - ten times Belarus' gross national budget in 1997 and approximately six times the yearly state budget. This figure assumes that

Chernobyl's consequences can be removed within 30 years but it is highly unlikely that this will prove to be the case by 2015 so this projected cost can be expected to rise.

Belarus' economic situation continues to suffer and with almost one quarter of the population living beneath the poverty level, according to the World Bank, life expectancy is approximately 10 years less than the Western European average.

In Ukraine the situation is just as bad. 30,000 km² was contaminated and 160,000 people were relocated. Ukrainian experts estimate the economic damage to be in the region of 164 billion Euros (US\$201 billion). In 1992 15% of the state budget was used to cope with the catastrophe, and in 2003 the sum had been reduced to 6% of the budget. Due to the long economic crisis in the country, the Ukrainian government still owed almost 115 million Euros (US\$140 million) to the victims of the disaster in April 1999.

"Shelter Implementation Plan"

The sarcophagus built - under a lot of time pressure and in the most difficult circumstances - to enclose the reactor debris is now dilapidated and fragile. Ukraine and the then G7 countries signed the "Shelter Implementation Plan" in 1997 with the aim of stabilising and improving the sarcophagus. The European Bank for Reconstruction and Development (EBRD) estimated the overall costs for this project to be US\$768 million (630 million Euros) and this amount was subsequently paid into the "Chernobyl Shelter Fund" by 37 countries. In 2003 the Ukrainian energy minister stated that, due to employment protection measures, the costs would be higher than expected. Today the costs are estimated to be close to US\$1 billion (820 million Euros) - a 30% cost increase. An expert at the Russian Nuclear Institute has since suggested that the costs will instead be closer to US\$2.5 billion (over 2 billion Euros).

Another Chernobyl?

IAEA experts want us to believe that a disaster like Chernobyl was only

possible under the circumstances existing in the Soviet Union in 1986 and would never happen again.

Unfortunately several nuclear incidents in recent years have shown that these assertions cannot be relied upon. A World Association of Nuclear Operators (WANO) list includes the following incidents with potentially disastrous consequences:

- Overheating of radioactive material outside the concrete-walled safety containment of the Paks reactor in Hungary (2003)
- Leaking control rods at the newest British reactor Sizewell B (started operating in 1995);
- Insufficient boron concentration in the emergency cooling system of the Philippsburg-2 reactor in Baden-Württemberg;

- Fuel assembly damage of a type never seen before, in block 3 of the French Cattenom power plant;
- A serious hydrogen explosion in a pipe at the Brunsbüttel boiling water reactor, in the immediate vicinity of a reactor pressure vessel;
- Massive corrosion on a reactor pressure vessel at the Davis-Besse plant in the USA, long overlooked, where only the thin stainless steel liner prevented a massive leak;
- Falsification of safety data at the British reprocessing facility in Sellafield;
- Similar data falsification associated with the Japanese operator Tepco

These serious engineering and human failures show that a Chernobyl type

disaster could happen again - anywhere and at any time. We must not rely on a technology that poses these threats to society. We have to stop nuclear energy production - now!

Rebecca Harms is a German Green MEP and a member of the Parliament's Committee on Industry, Research and Energy, and the Delegation to the EU-Ukraine Parliamentary Cooperation Committee.

This is an extract from a paper delivered to the 8th Joint Irish & UK Local Authorities Conference on Nuclear Hazards, City Hall, London, March 23 2006. For a copy of the conference documentation please contact Jo Southall, Nuclear Free Local Authorities Secretariat, Town Hall, Manchester, M60 2NY, UK. Email: j.southall@manchester.gov.uk

CHERNOBYL - 20 YEARS, 20 LIVES

The twentieth anniversary of the worst nuclear accident to date has been observed around the world and reported by all sections of the media yet it would appear that, on the whole, we are still unable to fully grasp its significance or the impact it continues to have on our lives and our environment.

(645.5753) WISE Amsterdam - Reports have been released by various global agencies reassuring us that fears of widespread contamination, deaths and long-term illnesses linked to radiation released from Chernobyl have been greatly exaggerated by hysterical environmentalists. We have been told that there is no longer any need to be wary of Chernobyl or indeed nuclear power plants, which we are now expected to believe are safe and clean enough to be re-branded as renewable sources of electricity. We are now being encouraged to view nuclear power as our greatest ally in the war against climate change and if some reports are to be believed, the majority of us are now willing to accept new nuclear capacity in order to maintain our unsustainable lifestyles.

In such a climate, it is more important than ever to re-tell the story of the Chernobyl disaster from the perspective of those who experienced the accident at first hand, and those who continue to live with the consequences on a daily basis. It is more important than ever to remember that two decades on, millions

of people still continue to suffer the consequences and will continue to do so for the remainder of their lives. April 26 marked the twentieth anniversary of the explosion but the disaster did not end on that date, there is no end.

The "Chernobyl - 20 Years, 20 Lives" project conceived by Danish photographer Mads Eskesen is a photo documentary journey through the experiences of twenty people whose lives have been forever altered by the devastating nuclear explosion at the Chernobyl nuclear power plant on April 26, 1986. The project documents the activities undertaken by people in order to adapt to the reality of life after the Chernobyl disaster. From villagers in Belarus soaking mushrooms in water and vinegar to reduce the amount of radiation they contain to a Welsh farmer whose sheep must be scanned before they can be passed fit for slaughter and human consumption. We are introduced to a Belarusian professor who measures the accumulated radiation in school children in the South of Belarus and also to the former director of the Chernobyl nuclear power plant who

believes that a positive attitude has stopped him from becoming sick. Each person interviewed expresses their own views on the importance of the explosion and its impacts, some believing that Chernobyl ruined their lives, while others still believe that the health effects are negligible. Each was given the same opportunity to have their perceptions recorded.

An exhibition based on the stories of the twenty has been travelling around the world in an effort to offer some insight into the fate of a few of the many victims and reveal some of the impacts of the continuing catastrophe. The stories of these 20 people from all walks of life can help us to absorb the significance of the accident and its impact on humanity.

The personal stories brought to life in this project took three years to compile and took Eskesen on a journey through the Ukraine, Belarus, Russia, Latvia, Sweden, France, and the UK. The following is a snapshot of each of the twenty stories featured.



Hanna Kozlova
Housewife, Founder of the
organisation 'Marked by Chernobyl
Atom', Kiev, Ukraine.

"I realised that nobody was concerned about us and nobody would take care of us after the disaster. It was our own problem and we were the only ones who could deal with it. At that point I felt very lonely. It was only through me that my child could be heard."

Hanna Kozlova bursts into tears as she tells of her family's misfortune. She clearly is marked by Chernobyl.

In the early 1980s Hanna lived in Pripjat and her husband worked at the nuclear power plant three kilometres away. Right after the explosion on April 26, Hanna went outside with their four-year-old son Viktor, ignoring a man on the street who had advised her to stay indoors. She noticed that men wearing masks were washing the streets and wondered what was going on. There was a strange metallic taste in her mouth. Iodine pills were handed out but Hanna did not take any. She simply could not believe that anything serious could have happened.

Hanna belatedly came to understand the events of that night when her son developed thyroid cancer. "When I heard my son's diagnosis the first time I did not believe it. It could happen to anyone else but me. I screamed at the top of my voice. When I was told that there was nothing they could do, I refused to believe it. When my child had an operation I was told that the result was not yet certain. I refused to believe

that too."

Hanna fought courageously in order to get the right medical treatment for her son and decided to form the organisation 'Marked by Chernobyl Atom'. The name referred to the post-operative scars the children have on their necks. Many similarly disheartened mothers contacted her for advice. Hanna and the other women demonstrated in front of government buildings in Kiev demanding radioactive iodine treatment and medicine for all children. The group also organised rehabilitation trips abroad for the kids but with time it became more difficult to obtain money for all the activities and eventually the organisation was disbanded.

Grigoriy Sorikov
Pensioner, Bartolomeevka village,
Belarus

"The day after the accident there was an old aeroplane, an E2 I think, flying very low, about 300 metres above ground, to and fro, to and fro. It seeded something on the clouds and then it rained here. I myself saw how it did it. The plane flew to and fro. First there was a cloud and then it disappeared. The clouds fell down to earth as rain and the sky cleared."

Grigoriy rolls a cigarette from a piece of torn newspaper and his homemade tobacco, leans back and looks out over his radioactive garden. He is a born optimist, and despite the lack of electricity he loves living in his peaceful place. "It costs nothing to live here and

there is water in the well nearby. All the food is grown in the garden." In the forest there are mushrooms and berries to be picked and sold to people passing by on the main road.

Bartolomeevka is a village situated in southern Belarus. It is just as contaminated as the area around the Chernobyl plant 200 kilometres away. In contrast to the closed zone around the nuclear power plant, access to the village is not restricted.

Since 1986 there has been much secrecy and mystery concerning the reason why the area is so contaminated. Grigoriy's story could offer one explanation as he tells of the morning in April 1986 when he noticed that the water in the puddles was green - a fighter plane had shot chemicals into the air so that the radioactive cloud from Chernobyl rained down, thereby preventing it from continuing on its way to populous Moscow.

The radioactive cloud was heading for a city with millions of inhabitants therefore urgent action was necessary. The people who would instead suffer the consequences were neither warned nor offered any explanations. At that point nobody knew that the Soviet Union would disintegrate some years later and leave the huge challenge of clearing up to a small totalitarian country with limited economic means.

It was not until 1989 that the scientific community in the West received information about how serious the contamination of southern Belarus was. For many years no one concerned themselves with the people living there, nobody was analysing the soil and no human rights organisations arrived to complain about how radioactive rain had been allowed to fall on the local population.

Igor Komisarenko
Director of the Komisarenko Institute
for Endocrinology and Metabolism,
Kiev, Ukraine

"If you visit different medical institutes here, they will tell you that they have noticed an increase in some disease or other. Why is there such an increase? You can assume whatever you like. Chernobyl is just like a big laboratory in the Ukraine, where people were used as guinea pigs."

For Igor Komisarenko time is split into two periods, before and after Chernobyl. Before Chernobyl there were one or two cases of thyroid cancer per year but by 1989 the number had increased to up to seven per year. In 1991, he saw 21 new cases and by 1994, there were around 41 new cases. "It was the endocrine organs, e.g. the thyroid gland and reproductive system, that were affected first," Igor remembers. "Also the mucous membranes, stomach and bowel, blood and other organs are influenced by radioactivity. We will continue to be affected out here in this country because we still have many radioactive elements that are active and influence our bodies."

The thyroid gland produces vital hormones that regulate the body. They affect the brain of the foetus, the development of the skeleton, human intelligence and so on. After birth the hormones continue to control all the body's processes. The hormones produced by the thyroid gland controls fundamental aspects of a person's life. They contain iodine but iodine is also found in a radioactive form, which affects the development of the cells in the thyroid gland - and this can cause tumours. "Several million curies of radioactive iodine escaped into the atmosphere. We failed to take preventive measures with supplementary iodine. The thyroid gland is the very first to be affected" says Igor. Before Chernobyl thyroid cancer did not appear in the statistics and the few cases that occurred were registered under 'other types'. Today it has its own column heading. The latent period is three to four years for children and seven to ten years for adults. Therefore the illness manifests itself only several years after the exposure.

In 1981 there were 0.05% children with cancer cases, in 1996 this proportion increased to 0.5%. 50% of all the cancer patients came from the regions closest to Chernobyl. A significant rise that is due to the fact that those who were children and teenagers at the time of the accident are now adults. Igor expects the figure to continue rising as the group ages.

In order for society to be able to respond to the conclusions of the scientific community, you first have to 'adapt science to politics', as Igor expresses it. The increase in the number of cases of thyroid cancer was not officially recognised as a

consequence of Chernobyl until 1996.

**Georgiy Reichman
State Inspector for Radiation Safety,
Ukrainian Committee for Nuclear
Regulation, Slavutich, Ukraine**

"When people say that the operators were not good enough, it is not true. They were experienced enough to work at the plant under normal conditions. But the reactor was in such a state that it was difficult to predict anything. They did not have enough information to foresee events and make decisions. It would not be decent of me to say that I would have done things differently. It is not decent towards those who died that night."

In 1986 there were four reactors at the Chernobyl nuclear power plant. The fifth reactor was supposed to start operating by the end of the year. At that time Reichmann was responsible for training new employees in the control rooms.

Looking back at the accident, he says that the reactor should have been constructed so that it could not explode irrespective of the operators' actions. "I believe that the reason for the accident lies in the design defects. Since such a situation was not predicted, the operators did not have any chance." As a vice-manager of the fourth reactor Reichman coordinated the construction of the concrete encapsulation of the damaged reactor. The project has been described as one of the most difficult construction tasks ever undertaken. First a tunnel was made under the ruined reactor, where a square concrete slab was built. Afterwards, an inner wall separated the third and fourth reactors.

The high radiation levels impeded detailed inspection of the stability of the existing structures. Concrete constructions were lifted into position by remotely controlled cranes. All efforts were put into finishing the 'sarcophagus' as soon as possible. The monstrous task was completed in a record time of seven months. All the equipment used was then transported and dumped with other highly radioactive waste.

A concrete lid was laid over the reactor, but the discussions in the international community raged on. Chernobyl became a discussion forum where passions ran high and accusations were exchanged back and forth. Some

pointed out that the sarcophagus was not built well enough. Others accused the Ukrainians of using it as a money machine. In 1997 the 'Chernobyl Shelter Fund' was established with the purpose of building a more permanent containment. With the budget of 870 million Euros, the plan is to build a gigantic self-supporting bow-shaped construction that will contain both the destroyed reactor and the concrete sarcophagus.

Reichman's next task is to ensure radiation safety for the employees working on this mega project. "If one includes all the systems, I believe it will cost about 1-1,5 billion dollars. Who knows whether it is the right decision? All the constructions that we built in 1986 were finished in seven months and expected to last 30 years. The quality could have been better, but after 20 years I can say that they were better than nothing."

**Glyn Roberts
Sheep farmer, Betws-y-Coed, Wales,
United Kingdom**

"We were very surprised at the idea that Chernobyl could influence us here. The first year was awful. We could not sell any of our lamb. Everything came to a standstill. I was terrified, as I had started breeding sheep only three years earlier. We did not get any compensation until the end of the year. I was furious. If the government wants to have that nuclear energy, then it had better have some kind of backup-plan for when something like this happens."

Six days after the Chernobyl accident a radioactive cloud reached the British Isles, where it rained its contents over Wales, Cumbria and southern Scotland. At first the officials believed that the level of contamination was low. Farmers continued at their own steady pace and the Welsh sheep kept on eating the grass that had been showered with a solution of radioactive caesium. It was the end of June before it was discovered that in the mountains there were areas where contamination exceeded the permitted levels. "I was in the market, when the announcement from the agricultural secretary came." says Glyn. "We were not allowed to move or sell our animals due to the possibility of our sheep being contaminated".

The restrictions were applied to an area of 4,100 km² in northern Wales in order to prevent further spreading of radioactive elements into the food chain. However no information about the Government's long-term plans was forthcoming.

Sheep farmers were used to selling lambs when they were ready to be slaughtered but in 1986 they were forced to keep all their animals and apply for additional bank loans to keep businesses going.

Following a meeting between 300 angry sheep farmers and a representative of the Welsh Government on September 3, a system was established allowing farmers to scan sheep before selling them. However the consumers' faith in Welsh lamb had been shaken and the prices fell by over 50%.

Still, 20 years on, selling or slaughtering sheep is a complicated procedure for farmers. "I ask for a permit and people from the Ministry come to count and scan the animals," Glyn explains about the process. "We use red paint to mark the sheep that should be slaughtered. Afterwards we scan them. If the sheep is fine and can be eaten, it gets tagged in the ear." "The problem is the type of soil that we have here," says Glyn. "It contains a lot of peat. Due to some scientific reason caesium tends to circulate in that kind of soil."

Vasiliy Nesterenko
Director of the Belarusian Institute for Radiation Safety, Minsk, Belarus

"I could see that this technology was very risky. It is not possible to combine nuclear power with modern set of ethics. In truth it is a technology of the future for people with higher morals. It was painful for me to acknowledge that. I had to revise everything I believed in and occupied myself with up till then. I decided to work towards protecting children from radioactivity. They were the ones who suffered most back then."

Vasiliy Nesterenko has endured constant pressure from authorities because of his efforts to help the Belarusian people live with radiation. When the Soviet government began gathering all its specialists to attempt extinguishing the fire at the Chernobyl reactor, Nesterenko was taken to the site of the catastrophe. His institute was

given the task of compiling the first map on the contamination of Belarus. Just like other documentation, the population only got to see it after 1989.

"We had around 3,700 contaminated villages. There were 2,500,000 people living in them. 500,000 of them were children," says Nesterenko. In the early 1990s Nesterenko established the independent Belarusian Institute for Radiation Safety (BELRAD). Its aim was to create a network of public centres that could monitor foodstuffs, measure the accumulation of radioactivity in children and educate people on how to protect themselves. 370 centres were opened however in 1993 the government cut their number to 160. Today only 40 remain and western donors now finance all those.

Although the Belarusian government has expressed the desire to deal with the situation in the country it lacks the capacity. It has been calculated that the damage inflicted due to Chernobyl is almost 32 times the national budget over a period of 30 years. According to Nesterenko the government spends up to 20% of its annual budget on various Chernobyl-related programmes, but this is equivalent to just 10% of what is necessary.

Since the population of Belarus is forced to live with a permanently higher radiation level, BELRAD recommends a specific diet to help improve the health in the region. The Institute developed a dietary supplement powder, based on apple pectin, which it claims cleanses



the body of heavy metals and radioactive nuclides. A child on the diet is advised to take pectin for 15-20 days every month. BELRAD states that on this regime 50-80% of the radioactive nuclides can be eliminated from the body. The whole treatment cycle costs no more than 110 Euros annually per child.

Sergey Volkovs
Liquidator - clean-up worker at Chernobyl, Jecabpils, Latvia

"In the Soviet Union humans counted for nothing. They were zero to the officials. They could have recruited people in their middle age, who already had families and children. One should not have sent young people like me to Chernobyl. The government put an end to our lives. It destroyed our future."

Sergey's anger about the way the Soviet system treated its people has turned against Russia nowadays, even though his family has Russian roots. After the Chernobyl accident young people from the entire Soviet Union were mobilised to help. It is still unclear how many people participated in the clean up, but estimates suggest several hundreds of thousands. Many of them came from the Baltic countries situated near to Chernobyl.

In May 1986 Sergey became a driver of an armoured vehicle transporting 'reactor guards'. They were military engineers who monitored the processes in the reactors. In between these transport tasks Sergey patrolled the town of Pripyat to prevent looters from robbing the abandoned houses. After one week in Chernobyl, Sergey began feeling disoriented. "We understood everything but reacted very slowly," he says. When they parked cars, their feet would not press the break pedal at the right time and they would bump into other cars. Many drivers experienced the same difficulties and it became quite dangerous with the intensive traffic in the zone.

Sergey says that the officers he transported calculated the radiation level that he accumulated as well above permissible levels. Unfortunately, his superior was not interested in hearing about the high radiation dose or about his deteriorating reaction capabilities. All the documents registering radiation levels were discarded.

Initially the soldiers were promised financial support, holidays and shorter military service upon their return from Chernobyl. Sergey got free telephone installation, but otherwise received no special benefits when he returned home.

Today he is 38 years of age with the physique of a 55 year old. He used to be a strong young man, but now he gets nosebleeds several times a month and suffers from serious migraines. Occasionally his breathing stops during a migraine attack. According to Sergey's doctor in Riga, Chernobyl liquidators age 10-15 years earlier than other people.

Sergey cannot get any government jobs. It is never stated directly, but as soon as he reveals that he worked at Chernobyl, his applications are declined. Private companies underpay him, because they think that he gets money from the state and many extra benefits.

**Constantine Checherov,
Nuclear Physicist, Kurchatov
Institute, Moscow, Russia / Slavutich,
Ukraine**

"Nobody orders me to do this, nobody forces me to do it. When I enter the fourth reactor nobody and nothing can disturb me. There are no people around checking the radiation dose that I get there. I am in another world, a world of freedom - of pure euphoria and joy. I was the very first person in the world to see the reactor from the inside."

Checherov is one of the very few people in the world who make expeditions into the exploded reactor encapsulated in concrete at the Chernobyl Nuclear Power Plant. In April 1986 he and his colleagues from the Kurchatov Institute in Moscow were asked to de-activate the buses used to transport the first victims from Moscow airport to the hospital in the city. The sick people had made the buses radioactive. In June Checherov arrived at the scene of the accident, which was to become his working place for many years on.

Based on his own observations of the destroyed reactor Checherov maintains that some of its parts simply melted and turned into plasma. When the plasma flowed out there was an explosion of

such a force that it blew the reactor's uppermost plate off 15-17 meters upwards. But it was not the only thing to fly out. In contrast to the more 'official versions', Checherov is convinced that most of 'the active zone' was blasted out of the reactor and exploded while it was in the air. According to him, about 95% of the fuel and the products of the nuclear fission came *out* and were spread across the entire planet. Checherov's version is a 'worst case scenario' and many environmental organisations disagree. They believe that more than 97% of the radioactive materials are still inside the reactor and that only 3% are dispersed outside.

**George Lepin
Nuclear Scientist, International
Ecological Academy, Minsk, Belarus**

"It was a political decision to re-start the third reactor. It was possible to do so only because there were some people, who did the hazardous work. Someone tried to prove that nothing dangerous happened in Chernobyl and that our country could manage everything. There was even a military leader who gathered his staff after the accident and inquired how much time they needed to re-build the fourth reactor. If it had been physically possible, I don't think anyone would have spared human lives to do it."

Delivering results and following plans without deviation, no matter what, were most important to the Soviet system. While Lepin worked as a liquidator at Chernobyl, he came across a poster showing when various parts of the power plant were built and put into operation. Everything was finished much earlier than planned. The fourth reactor was started three months earlier than expected. Three months that could have been used to check the safety of the plant.

In those days Lepin was still a patriot. He heard of soldiers - called 'bio-robots' - working on the roof of the reactor. In some areas people were only allowed to work for very short periods of time but even then they still received doses that were much higher than permitted. This hazardous and foolhardy work was done manually. Soldiers were given a lead apron and a shovel. During one minute they were supposed to shovel as much rubble as possible from the

roof into the open reactor. Most of them got sick and were taken to the hospital.

Lepin proposed to mechanize the soldiers' work, but few robots could function due to high radioactivity. His team managed to install some machines but they were never used. The project was stopped, because there was a rush to report the completion of the work. Those places that were still contaminated were covered with a thick layer of concrete. Nevertheless the radiation level in the building did not decrease and many people were still working there.

Lepin worked in the zone for six years and can relate many stories. He says that even before the accident people occasionally noticed that the streets of Pripjat were suddenly washed with soapy water or that new asphalt would be put on the roads. Later on the asphalt was examined and found to resemble a layer cake, consisting of 'clean' and contaminated layers.

"Everything points towards other accidents at Chernobyl before April 1986" concludes Lepin. "Some years ago a newspaper published a story that there was an accident in Chernobyl in 1982. It was revealed that the KGB controlled the nuclear power plant and wrote regular reports on the state of the plant. There were indications that one should have been especially careful regarding the plant. But since everything was secret, no actions were taken."

**Galina Bandazhevskaya
Paediatrician, Minsk, Belarus**

"Every scientist must be able to publicise the results of his/her work so that it can be debated. It is important that there are those who agree or disagree with the work. One should enter into a good scientific dialogue in order to reach the truth. Unfortunately this is not possible for us."

Galina has an ambitious project in mind - to set up an independent research laboratory in Belarus. Even though it would be a modestly sized laboratory, it is a courageous initiative in a country, where everything is managed by the State. She wants to continue with the work for which her husband, Yuriy Bandazhevsky, was imprisoned. In 1989, while most of the doctors were moving away from the contaminated area in the south of Belarus, Yuriy and

Galina moved there in order to study the effects of radioactivity on the human body.

In a few years their research produced evidence that international norms for radiation exposure were deficient. Their research revealed that the prolonged influence of low dose radiation on a human body is much more dangerous than previously believed and that the heart and the kidneys were especially affected by radiation. They found that a contamination level of as little as 50 Becquerels of radioactivity per kilo of body weight could cause a child serious health problems. The research was critical of the official response to radioactivity contamination.

Shortly after the research was published, Galina's husband Yuriy, in his capacity as Director of the Gomel Medical Institute, was arrested. He was charged and sentenced to eight years imprisonment for supposedly accepting bribes from students.

Amnesty International took up his case, classifying him as a 'prisoner of conscience', the EU Commission visited to check on his well being and the Council of Europe lobbied for his release. He was transferred to a cell with only three other prisoners after sharing with 80.

"Now that my husband and I have been through our system I can say that there is no justice in this country." Galina laments. "If a person does not fit into the system and he says something different, then his freedom can be taken away with no justification. He can be accused of anything at all and will never be able to contradict it or find any kind of justice."

On August 5 2005 Professor Yuriy Bandazhevsky was released after serving half his term. He and Galina are now working on establishing their own independent research laboratory.

Volodimir Usatenko Energy Engineer, Kiev, Ukraine

"We have a problem - but nobody tries to understand its essence. If you have a destroyed reactor to deal with, you need money - lots of money. 'We can solve the problem only over 20 years' one would say. But then it is important to revive the problem at appropriate times. If someone came along and solved

the problem at once in a very simple way then only few people would be grateful to him, because he might do away with thousands of jobs."

Before Chernobyl Usatenko was a chief engineer at a Ukrainian energy company. The Soviet energy sector was a high government priority and nuclear power was seen as the ultimate solution to the problem of energy supply.

At the beginning of May 1986, Volodimir heard that an accident had occurred at Chernobyl but that the radioactive leak was insignificant and that the reactor had not been destroyed. However, when he looked through his manuals and found out which type of reactor was involved he immediately realised that it must have been completely destroyed. The Chernobyl reactor had a layer of protection around the fuel elements, but the protection around the reactor itself was very vulnerable and not suited to a powerful increase in pressure.

In October Volodimir was called in and ordered to go to the accident area. His team was to build a separation wall between the third and fourth units. "I was a bio-robot who did all sorts of work," says Volodimir. "It was interesting how the body reacted to high doses of radiation. First and foremost the metabolism was stimulated enormously. When there was a lot of beta-radiation we felt it in our eyes. It felt like they were being cut. In that way we had a sense of the doses we were getting." There were many immediate illnesses in Volodimir's team - intestinal, stomach, heart, eye and tooth problems. It took six years before he himself felt well again.

As a member of the National Radiation Safety Commission he became involved in the discussions on what to do with the radioactive waste at Chernobyl. Volodimir thinks that all the clearing up work could be done over the course of about 12 years. In his opinion all the processes should be carefully prepared and then the work should be brought to an end. But if that was done it would also mean the introduction of new norms for the entire nuclear industry and that would be impossible to get support for.

He suspects the people responsible for clean up of stretching the process in order to keep on receiving funding from both national and international investors. "They know that if they finish

the work there will be no more money. So we hear of various miracles they are performing over there. The Chernobyl problem has been turned into one fantastic business venture."

Natalia Ivanova Deputy Director, Vesnova Orphanage, Mogilev region, Belarus

"It was terrible having to knock on the door or window in the middle of the night to tell the parents that their children should be evacuated the next morning. We said it was because of the radioactivity, which could have had consequences for all of them. We arranged a place for everyone to gather to be put on buses. It was a dreadful sight."

On April 26 1986 Natalia was working in the garden. It was not until the evening that the news reached her about the accident 27 kilometres away. Natalia was not worried because neither she nor her family knew anything about nuclear power and they did not realise there was any danger.

At midnight two or three days after the accident, all the employees of the school were gathered together. The director told them to go round warning people in the villages. The children were to be evacuated the next day at 6 a.m.

During the night they managed to assemble most of the children. They were put on buses and driven away. Nobody really understood the gravity of the situation. "People were panicking. It was just like wartime," Natalia remembers. "We also evacuated pregnant women, but that was just the first evacuation." The last residents were evacuated from the village six months after the accident.

Natalia got a job in an orphanage for mentally and physically handicapped children in the town of Vesnova. There were 15 nurses and teachers for 150 children, of who 87 required constant care. Approximately 30% of the children came from the contaminated areas but there was no record kept of what connection their family had to the accident.

Today there are more institutionalised children in Belarus than after World War Two. The strong increase in congenital deformities after the Chernobyl accident has meant an increase in the number of

children in orphanages, partly because of the rejection of deformed children and partly because the economic situation makes it practically impossible for families to look after sick children.

Sergei Parashin
Former Director of the Chernobyl Power Station, Kiev, Ukraine

"You can reduce the consequences if you do not give people negative information about radioactivity. It is a fact that the workers at the power station who began working there before the disaster do not get sick as often as those who came after the accident. There are consequences caused by the radioactivity but most of the consequences are psychological."

In 1986 Parashin was second in command at the Chernobyl power plant. Since then he has had many years to analyse what happened. He is convinced that such an accident cannot happen again and that society has learnt from its mistakes. As if to convince himself, he repeats over and over that there are only a few long-term effects and that they can be overcome with a positive attitude towards the future.

"The most crucial thing for a person's health is their psychological state, which also affects the immune system," says Parashin. "The positive and optimistic people whom I knew in Chernobyl could tolerate high doses of radioactivity and remain in good health. People with a negative attitude died much quicker than others."

Right after the explosion on April 26, all the managers gathered in a bunker from where the decisions were taken. It gradually became apparent that the reactor was destroyed, but the extent of the disaster did not become clear to Parashin until daylight when he was able to see the enormous crater revealing the radioactive reactor.

For those who had been there that night, the question arose how things could have gone so wrong. "There were many factors at play. The power station had many construction faults. Furthermore, we prioritised financial profit over safety," says Parashin. "It was a problem of the whole Soviet Union. Quantity was prioritised over quality".

In 1994 Sergey advanced to the position of director for the entire power plant complex. He set out to improve Chernobyl's image and had the place spruced up and painted. The workers' canteen got napkins and stainless cutlery replaced the old Soviet aluminium. The staff received nicer clothing, flowers were planted and a fountain was built. Parashin also modernised the railway line, which ran to the new town of Slavutich, where the workers then lived. Cultural events were arranged in the town. Staff moral improved and productivity rose slightly. In 1995 the Ukraine agreed to close down the remaining Chernobyl reactors and that was achieved in 2000.

It is Parashin's view that Chernobyl affected safety at power stations in the West. "After Chernobyl many countries stopped the construction of new nuclear power stations and instead improved the safety of existing reactors. I think more money was invested than was necessary, but as a result nuclear energy has become safer. So countries in the West owe thanks to the Ukraine".

Danilo Vezhichanin,
Mayor of the village of Yelno, Rivne Oblast, the Ukraine

"What is it you need if you live in a village? You need land, water and roads. Then it is a good life! In our village you do not complain of having no gas or the like. Here you hope at least to get some good land so that you can plant potatoes and get some 'clean' hay. Our children must be able to drink 'clean' milk. Now it is contaminated with radioactivity. Without Chernobyl our land would have been 'clean'. It would have been easier for people to live here."

The village of Yelno, where Danilo lives, is 300 km west of Chernobyl and was among the places hardest hit by the radioactive fallout. Danilo explains that the village is surrounded by sand and peat bogs, resulting in a high mobility of radioactive elements from the soil into the plants. Scientists believe that 97% of the radioactivity circulates between the peat soil and the plants.

The 700 people living in Yelno were not informed about the accident in 1986. A whole year passed before the information reached them. Not until people began getting headaches and pains in their joints during the winter of

1987 did they contact the health authorities. There was an attempt to evacuate the population, but most inhabitants soon returned. It is typical of people in Polesie that they are intimately connected with the rhythms of nature and the land.

Most of the villagers live off their own production of milk, potatoes and vegetables. 80-90% of the contamination reaches people through their food. Just 5-20% comes from external radiation. Milk is eight to ten times more contaminated than permitted. The same goes for meat and potatoes.

The cows graze in meadows of grass with high caesium content. The radioactivity lies in the upper layers of the soil where the roots of the grass are. The IAEA runs a project in Yelno, where fields are ploughed so that the radioactive elements in the upper 5 cm are instead spread over 20 cm. As a result the concentration of radioactivity is diluted threefold and the food is less radioactive.

In radiobiology there is a rule of thumb that it takes about 10 half-life periods before a radioactive element is safe. The half-life period of caesium is 30 years. Applying this rule of thumb suggests that it will take 300 years before the problems of Yelno have dissipated.

Marita Stinnerbom,
Reindeer farmer, Klimpfjäll, Lapland, Sweden

"Reindeer farming is our life. We have lived off it for hundreds of years. I believe we shall continue reindeer farming no matter what. But we also think about what has happened and what the future will bring. After we began feeding our reindeer with the special forage, the taste of the meat had changed. It did not have its natural taste anymore."

Marita drives a cross-country vehicle in the mountain valley. She throws her lasso into the reindeer flock that has been driven down through the valley. "We have managed to keep our traditions because we live them. I got my first reindeer from my parents, when I was small. It is impossible to start reindeer farming at the age of 20. One has to build up the flock when still a child."

Lapland, the country of the Samies, stretches from northern Russia, over Finland, Sweden and Norway. In Sweden, where Marita lives, there are approximately 20,000 Samies, 10-15% of whom work with reindeer. They do not own the land, but have the right to use it.

In spring 1986, a few days after the Chernobyl accident, it rained over Scandinavia and large areas got contaminated with radiation. Lichen, which comprises the main part of the reindeer's nutrition, became radioactive and so did the animals. They were all slaughtered and buried in a dump. "The Swedish Government paid us for the reindeer as it is responsible for the well-being of the population of its country." The Samies were compensated for the loss and could buy new reindeer in the North. However it was not just an economic loss that they suffered. Their indigenous culture was at stake.

Samies' life had always been centred on the reindeer. After 1986 slaughtering could only happen at a certain point in the year. The animals were scanned for radiation and given special forage to prevent them from absorbing too much caesium. Everything was to be planned according to a totally new pattern.

The problem with radiation has not disappeared. In 2003 the amounts of caesium in Lapland valleys increased suddenly and many Samies had to bury their reindeer again but on that occasion no compensation was given. The scientists believed that the reason for the sudden increase was due to the vast number of mushrooms that accumulated radioactive elements but

the Samies point out that fish were also affected, even though fish do not eat mushrooms.

"We could always eat reindeer meat, but now we have to bury them sometimes and that hurts," says Marita. "I cannot stop thinking that caesium is in our bodies and that we pass it over to our children. In 2003 we were very worried and we are still concerned about what awaits us in the autumn. It can come back any time."

Alexander Filippov
Retired school teacher, Babichi village, Belarus

"Today school children only get four hours of lessons in radioactivity. Who teaches these four hours? It is usually general class teachers, who are normally not specialists in the subject. They can be very specialised in mathematics, biology or a million of other things. But there is a high degree of ignorance about radioactivity among them and even amongst people who have high positions in society, which never ceases to surprise me."

For many years after the accident nobody in the affected areas knew what they should do in their everyday lives. Courses on radioactivity safety were arranged in the schools, but there were no teaching materials. Filippov wrote five manuals on agriculture and radioactivity aimed at teachers in rural schools. The books were published in a limited edition and the government did not provide any additional materials. He set up an 'ecological centre' in a small room at the school with apparatus that could measure the level of caesium in foodstuffs. He acquired some instruments to measure nitrates, pH values, potassium and phosphorus. In this way he was able to get a rather detailed idea of what foods were most dangerous to eat.

The pupils were involved in identifying the cleanest and the most contaminated zones around the village. Radioactivity levels of the local forest and nearby fields were charted on maps. By knowing where the invisible pollution was located, they could recommend where berries and mushrooms could be gathered more safely.

"All our recommendations were geared towards teaching children how to get 'completely' clean food from 'relatively'

clean food using technology," says Alexander of the teaching project, which was closed after he retired. No other teacher was willing to take over this important education.

In southern Belarus radioactivity has been a fixed part of everyday life for the last 20 years. Alexander thinks that if people in the ministries knew more about the subject, then their knowledge would spread downwards in this authoritarian country. "We obey the law. We do the things we are expected to do."

In agriculture, attempts are made to prevent radioactivity getting into foodstuffs by spreading calcium, dolomite and potassium on the fields. This serves to block strontium and caesium but, on the other hand, these elements remain in the soil. Alexander's opinion is that the soil can be completely rid of radioactive elements through the use of plants.

An experiment that lasted four years has proved that plants from the legume family almost completely clean the soil. The problem is that it is not profitable to cultivate legumes and no external funding is available therefore the local population continues eating radioactive food.

"Nobody tells us anything and it is difficult to prove anything. People die of ordinary illnesses. If the authorities admit that a person dies because of radioactivity then they have to award compensation afterwards. Who wants to do that?"

Boris Sorochinskiy
Researcher, Institute for Cell Biology and Genetics, Kiev, the Ukraine

"After Chernobyl I studied biochemical, physiological, and cytological changes in human beings and plants. In official reports from WHO and IAEA there were only accounts about Chernobyl causing an increase in cataracts and thyroid cancers. All other possible consequences were rejected due to the lack of statistic data or information about the health situation prior to the accident and thus the absence of a basis for comparison."

Sorochinskiy ventures into the unknown in a somewhat messy office in the outskirts of Kiev, where he explains about his research. When scientists



research something new, it can be compared to a trip to outer space. Everything is so different that before the trip, one cannot imagine what one will encounter.

"To be able to do genetic studies it is necessary to examine several generations. Right now we have only a second generation of people since the Chernobyl accident. For a long time there was a popular opinion, which was almost regarded as official, that there were no genetic consequences of the catastrophe and that one should stop regarding Chernobyl as a possible source of danger."

When Boris came to the Chernobyl zone for the first time, it was exciting for him to study the subject of his master's thesis directly in the field, beyond the limiting laboratory environment. He noticed deformed and yellowish plants. "Deciduous trees had bigger leaves," he reports. "Some oak tree leaves were ten times bigger than normal and pine tree needles - three or four times smaller. I do not have any doubts that Chernobyl caused some genetic changes. The question is how to find them." According to Boris the scientists can only say that the problem of genetic mutations exists but are not able to point out the specific ones. It is possible to examine several generations of plants in the course of a relatively short time. Therefore they serve as a good model for researching some processes that are difficult to study among people and animals. "People want to see the results at once, but mutations take some time to manifest. It took billions of years for these processes to happen on Earth."

Another issue for Sorochinskiy is the connection between chronic radiation and health. He believes that the effect of long-lasting low doses can sometimes compare to that of high doses. "If a person experiences a *chronic* dose of one roentgen, it can be equal over time to a radiation dose of 100-120 roentgens received at once. If there is funding, it is possible to study the genetic consequences and the risks associated with chronic radiation. If there is no money for that, then one can only say that there exist no problems."

Svetlana Polganovskaya
Activist, Chechersk, Belarus

"The administration was 'laundering money'. They were funded to

decontaminate the area and evacuate people but they had their own agenda. Instead of removing the contaminated villages the money was spent on something else. The local authorities tried to put me in jail because I invited an independent commission to examine what was going on. It revealed that four clean villages with new houses had been evacuated to Chechersk and other places nearby while the authorities transported all the houses to the Black Sea and sold them as holiday cottages."

After the accident at Chernobyl, the inhabitants of Chechersk noted that puddles of rainwater were green in colour. They were told that it was pollen from the trees, but did not believe it. They had never seen anything like it. Svetlana went to the local administration office to get an explanation but she was told to keep her mouth shut.

That was the beginning of a war she has been waging for 20 years. She arranged a sit-in in Moscow and pointed out to international humanitarian organizations that people in the contaminated areas of Belarus were being ignored. She revealed documents proving that although the town was supposed to be evacuated, people continued living there. Her flat was burnt down and she was arrested several times.

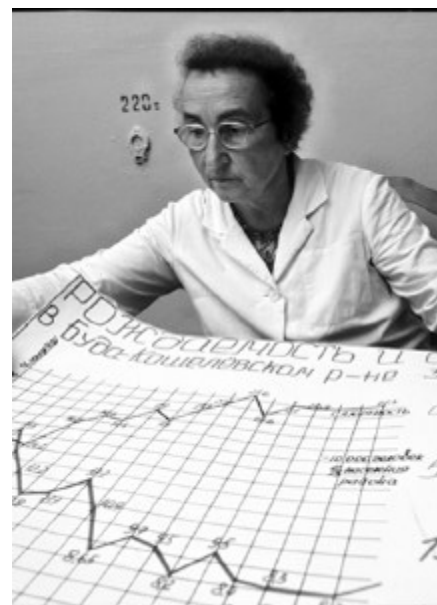
It was only two years after the accident that it was prohibited to eat food from Chechersk district. The military officials coming from Russia to decontaminate the area were very surprised to find a lively town still functioning.

Svetlana approached the regional administration to ask why the neighbouring region of Vetkovsk had been recognized as contaminated, whereas there was no recognised problem in Chechersk. She organised a group of the locals to measure the area for radiation.

In 1990 Svetlana participated in an international Chernobyl conference in Kiev and even though Svetlana was not due to make a speech, she took the microphone and declared that only three regions in Belarus had been evacuated and that many people still lived in contaminated areas. People in the West had believed that all the population evacuation had been done.

The same year she arranged a demonstration in front of the Parliament in Minsk. For two months they protested with posters demanding the evacuation of the zone, better medical treatment and vitamins for children.

Svetlana managed to bring an IAEA delegation to the town but the visit it turned into a farce. People had been gathered in the community centre and given lots of vodka - villagers played the accordion and danced in the square. By the time the IAEA delegation arrived, everyone was partying and no one brought forward any complaints. Today, Svetlana cooperates with an Irish humanitarian aid organization. When the lorries filled with aid arrive, Svetlana distributes the aid to the village people who need it, but the bureaucracy makes it difficult.



Valentina Smolnikova
Paediatrician, Buda-Koshelevo, Belarus

"It is very lucrative for the authorities to hide information from the public. If nobody knows about the problem, one does not have to invest any money into solving it. We gathered lots of data on radiation level in people's thyroid gland. The authorities said that our data was incorrect and should be destroyed. Afterwards the scientists invented new figures. This is the crime committed by our government."

Smolnikova heard the news about the accident only in the beginning of May 1986 on the forbidden radio station "Svoboda". As a Soviet medical worker

Valentina was liable to be called up for military service in case of war. If the enemy had dropped nuclear bombs, her team would be the first in the area to deal with the situation. They were equipped with Geiger counters and various military instruments.

Only after the official announcement of the accident could the medical team travel to the local villages to examine people for radiation. Many of these villages were later demolished and buried because the radioactivity levels were too high.

The official scientists never requested the results of the examinations - instead the results were destroyed and the team's instruments were confiscated. While the authorities were busy concealing the scientific results Valentina was busy as a paediatrician, working with the medical complications that appeared in the years following the accident. Next to her daily duties she continued gathering as much statistical data as she was capable of.

She found out that 40% of young men had illnesses preventing them from doing military service. A further 30% were declared partly fit for the service. Since 1986 there has been a constant increase in the number of invalids among the people. In 2003 there was a total of 477,000 invalids in Belarus, which equated to 4.8% of the population.

"Children should not have contamination of the body greater than 20 becquerels per kilogram. And that is a high figure," says Valentina. "If you accept a larger dose the numbers of sick and dying children will increase. We have a large proportion of children who are invalids. Previously we have never had children aged 14 and 15 being declared invalids."

As opposed to many of her colleagues Valentina constantly tries to get the public interested in the real problems of the country. In August 2004 she ran for Parliament to have a chance to debate the problems that are otherwise not discussed in the country's media.

"Chernobyl was the reason for the USSR falling apart," says Valentina. "It was the beginning of the end for the Soviet Union. We knew nothing for five years, even though we were living on contaminated soil. Nobody said we were living in an affected area, despite the fact that the government knew it."

Chantale Garnier Housewife/activist, Jura, France

"In some ways France is 20 years behind other countries. There are still many censored things here. Even in the medical system. In order to see a specialist I need to first visit the family physician. We have the right to vote but we're not free. In 2001 my organisation went to court. We reported that we had been poisoned. We complained that our thyroid cancers were Chernobyl collateral damage"

When it became known that an accident happened in a nuclear power plant in the USSR, people in many European countries were advised to stay indoors. In southern Germany cows were not allowed to graze outside. But not in France.

"When we heard it on television, they said there was no danger. We wondered why the neighbouring countries took precautions, while we did not have to do anything." Garnier recalls thinking at the time that those precautions elsewhere were an over-reaction. Only when she developed thyroid cancer one year later did she understand that something was wrong. After her thyroid operation it took Garnier 5 years to regain control of her life. She wanted to find out why she got sick at all. She was told that 90% of cases of the kind of cancer she had were caused by radiation. Therefore she was convinced that the cause of her disease was the rain with radioactive particles from Chernobyl. To find evidence of a cover-up Garnier and her colleagues from the Association of Thyroid Patients filed a complaint with the French Courts in 2001. "We do not accuse politicians, we accuse the scientists, who were aware of the consequences of the accident but who would not say anything."

A contingent of policemen searched ministries and public offices for the documents that could identify people who knew the degree of contamination after the accident and yet failed to warn the public. The court wanted to learn about the decisions that lead to France not taking any fallout precautions in 1986.

"These documents showed that there was a falsification of weather forecasts right after the accident" says Garnier. "The system denied Chernobyl. All the information about the real levels of

contamination was classified." It was revealed that the contamination map France submitted to the EU was falsified, claims Garnier. It showed 0.5 Becquerel in those places where real contamination was 500,000.

Garnier makes the point that it is difficult to accept that a country like France, with its fine food traditions, produces its raw products in fields with a high content of radioactive caesium. It is even harder to understand that one of the largest countries in the democratic European Union functioned in ways similar to the Soviet system that made the Chernobyl catastrophe possible. "We are still continuing with our work since we have not achieved our goal. Right now we have only been to the local courts, but we are ready to go to the final French court of appeal or to the EU if necessary. We will prove that the state lied to us."

For information about how to bring the exhibition to your town or city or to order the book (published in Danish and English) please contact Mads Eskesen - profits from the book will be donated to the BELRAD Institute of Belarus.

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The next issue (647) will be mailed out on June 16, 2006.

Dear reader,

Apologies for the recent disruption to the *Nuclear Monitor* service. We will endeavour to ensure that we catch you up on the news and stories missed (due to successive special issues, absence and illness) over the next few issues.

Best wishes,
WISE

CONSEQUENCES OF THE CHERNOBYL CATASTROPHE

Even after 20 years it is still not possible to give an exact account of the effects that Chernobyl caused throughout the world. Much of the available information is subject to heated discussions representing various views on the accident.

The list below is compiled based on data from Children of Chernobyl International, Children of Chornobyl Relief and Development Fund and www.chernobyl.info.

HEALTH

- Shortly after the explosion, thousands of children and adults in Ukraine and Belarus were stricken with acute radiation sickness. Symptoms included vomiting, hair loss, severe rashes; this contradicts the original official public estimates of 100 people affected.
- In 1994 experts from the University of Hiroshima analysed data on newborns and 30,000 stillborn fetuses in Belarus; researchers concluded that birth defects have nearly doubled since 1986.
- More than 10,000 Ukrainian children have travelled to Cuba for treatment of leukaemia and other illnesses.
- Overall, oncological illnesses (cancers) among children in Ukraine have tripled since 1986.
- In 2001, a joint Israeli-Ukrainian study published in the Royal Society of Medicine in London found that the children of Chernobyl liquidators born after the 1986 disaster have a rate of chromosome damage seven times higher than their siblings born prior to the nuclear accident.
- Fifty percent of all Ukrainian men between the ages of 13 and 29 have fertility problems - the highest rate of infertility in the world.
- According to radiation health experts most cancers that result from radiation exposure do not develop until 10 - 20 years after exposure. Therefore no accurate assessment of Chernobyl's overall impact can be made until this period has elapsed.
- A 2001 study by American and Ukrainian scientists identified a significantly higher rate of acute lymphoblastic leukaemia among children in northern Ukraine, as compared to the relatively uncontaminated Eastern Ukraine. Blood tests of the children showed that they had been exposed to radiation *in utero*. This study was re-confirmed after several international peer reviews.
- Since 2005, local paediatric oncologists in the northern Ukrainian region of Rivne, have been reporting a noticeable increase in acute lymphoblastic leukaemia among young children. All these children are from the most isolated contaminated villages along the Belarusian border.
- In Belarus there has been a 2,400 % increase in the rates of thyroid cancer. Before Chernobyl, on average, there was less than one case of thyroid cancer per year.
- In the Gomel region of Belarus, the region closest to Chernobyl, there was a 100-fold increase in thyroid cancer.
- Throughout Belarus, the incidence of thyroid cancer in 1990 was already 30 times higher than in the years before the accident
- In the Gomel region of Belarus, the incidence of leukaemia increased 50 % in children and adults.
- UNICEF reports that between 1990 and 1994, nervous system disorders increased by 43 %; cardiovascular diseases by 43 %; bone and muscle disorders by 62 %; and diabetes by 28 %. UNICEF cautioned that it is difficult to prove whether these increases were caused by radiation or another unknown factor.
- A Swiss study shows a 40 % increase in all kinds of cancers in Belarus between 1990 and 2000.
- Tumour specialists fear that a variety of new cancers will only emerge 20 - 30 years after the disaster.
- Five years after the disaster, the Ukrainian Ministry of Health reported three times the normal rate of deformities and

developmental abnormalities in newborn children, as well as an increased number of miscarriages, premature births, and stillbirths.

- Heart disease in Belarus has quadrupled since the accident, caused by the accumulation of radioactive caesium in the cardiac muscle. Doctors report a high incidence of multiple defects of the heart - a condition coined "Chernobyl Heart."

Many radioactive elements are similar to the natural and vital minerals that our bodies need. For example:

- Plutonium is the most toxic substance man has ever produced, and it does not exist in nature. The body treats it as iron, due to the chemical similarity. It gets distributed by the blood system to feed growing cells. It can cause a variety of cancers and blood disorders.
- Caesium-137 is mistaken for potassium, which is needed by every living cell, by the body. It then concentrates in the muscles.
- Iodine-131 is absorbed by the thyroid gland, which cannot determine whether it is natural or radioactive iodine. The thyroid gland makes important hormones to help the body function. Iodine 131 causes cancer and other disorders in the thyroid gland.
- Strontium-90 fools the body into accepting this element as calcium. It gets distributed throughout the bone structure and can cause leukaemia and a number of cancers, along with numerous other health problems.

ENVIRONMENTAL

- In the first weeks after the explosion excessive levels of radiation were recorded in northern Scandinavia, Wales, Ireland, Northern Italy, Greece and coastal Alaska.
- As a result of prevailing winds and rains, the heaviest radioactive fallout was in southeast Belarus and northern Ukraine.
- In Ukraine, over 4.6 million hectares of some of the most productive agricultural land in the world became contaminated.
- The total amount of radiation released was originally reported as 50 million curies by Soviet authorities. During the past decade, subsequent research and new calculations have resulted in revised estimated of up to 260 million curies.
- A permanent zone where human habitation and agricultural use is forbidden was established around the power station. North, east and south of the power plant the 'exclusion-zone' extends about 30 km, and about 60 km to the west.
- Gradual seepage of radiation into the water table, especially the Dnieper River and its tributaries, threatens the water supply for millions of people in coming decades.
- Twenty-one percent of prime Belarusian farmland remains dangerously contaminated from the decaying components of plutonium.
- Radiation concentrated in sediments at the bottoms of lakes and ponds - the population continues to contaminate itself by fishing there. The average concentration of radionuclides in the groundwater has risen 10 to 100 fold.
- Although the air outside the exclusion zone is generally safe, ploughing, summer forest fires, and wind erosion continue to put the air at risk.
- In 2006, veterinarians in Rivne province, Ukraine, issued warnings to the northern contaminated villages that nearly two-thirds of the dairy cows in these villages are suffering from bovine leukaemia caused by radioactive elements, and that milk and other dairy products from these cows should not be consumed.

SOCIAL

- About 500,000 people were evacuated after the accident. 140,000 of them are not allowed to return.
- People from all Soviet Republics were sent to the disaster area between 1986 and 1990 to assist with the clean up efforts. Their tasks included evacuating contaminated villages, bulldozing contaminated houses, and fighting the fires at the Chernobyl plant itself. These men unknowingly exposed themselves to horrific amounts of radiation and are now paying a terrible price. It is still unclear exactly how many people took part. Figures vary between 300,000 and 900,000 depending on the source.
- During the past decade, approximately 40,000 clean up workers have died, mostly men in their 30s and 40s. 1.2 million

people continue to live on lands contaminated by ' low-level ' radiation, outside the exclusion zone; approximately 1,800 villages effected.

- After the Chernobyl accident, almost 400,000 were forced to leave their homes as 'environmental refugees'. Over 2,000 towns and villages were bulldozed to the ground, and hundreds more stand abandoned.
- Some deserted villages have been reoccupied by refugees from places as far away as Kazakhstan, Uzbekistan and Azerbaijan. These refugees would rather live in a contaminated area than risk being shot in the wars and conflicts in their own homelands. For the original inhabitants of these villages, seeing people move into their ancestral homes and lands only adds to their heartache.
- Many Belarusians live in fear, uncertain about the extent to which their health and that of their children is at risk, and not knowing where to turn for information. This fear is exacerbated by the fact that the extent of the accident was not openly disclosed for many years. "Radiophobia" makes it hard for many in the community to move on with their lives and help themselves.

ECONOMIC

- The Institute of Economics of the Belarusian National Academy of Sciences estimates that the country's economic damage over 30 years (1986 - 2015) will be \$235 billion, or over 32 annual national budgets. Chernobyl-related costs accounted for 16.8 per cent of the country's national budget in 1991, and in 1996 it was still 10.9 per cent. Currently the republic is investing about 6 per cent of its budget in the official Chernobyl programme.
- According to a survey by UNDP and UNICEF, in the contaminated territories of Belarus, 54 large agricultural and forestry enterprises and nine industrial enterprises had to be closed. 22 raw material deposits could no longer be used. In the contaminated territories of Ukraine, 20 collective farms and 13 companies had to be abandoned.
- Belarus and Ukraine levy an emergency tax, or Chernobyl tax, for dealing with the disaster. Initially, all companies, except for those in the agricultural sector, had to pay 18 or 19 per cent of their salary costs to the State. This tax is still levied in both countries, but has now dropped to only four per cent in Belarus. Russia never levied a Chernobyl tax. There, government borrowing funded the State's costs.
- In 1997 the international community entrusted the EBRD with managing the Chernobyl Shelter Fund. The G7 countries, the European Union, Ukraine and other countries have so far pledged approximately € 720 million to the fund. The CSF finances a comprehensive programme to deal with the long-term dangers posed by Chernobyl. Along with constructing the new containment shelter, the programme includes stabilising the existing shelter and providing an integrated monitoring system to report on radiation, structural stability and seismic events, among other things.

CHERNOBYL, IN BRIEF

Russia considers uprating RBMK reactors. Despite universal calls for the closure of these reactors following the explosion at Chernobyl, Moscow is said to be deliberating lifetime extensions and uprates for its eleven operating RBMK reactors. Units at Leningrad, Kursk and Smolensk are expected to be uprated by 5%. Since Chernobyl, 'significant' design modifications have been made and extensive refurbishment undertaken

WNA Weekly Digest, May 5 2006

8,000 Russians killed. Officials at Russia's Ministry of Health have revealed that 7,000 to 8,000 Russians are known to have died as a result of the Chernobyl accident and some 60,000 have been declared disabled due to the sustained damage to their health. This contradicts UN reports that have suggested that the total number of people expected to die from cancers as a result of the disaster in Russia, Ukraine and Belarus would be around 9,000.

www.ZeeNews.com, April 24 2006

Whitewash. Viktor Bryukhanov, former Chernobyl director jailed for negligence over the explosion, told Russia's *Profil* magazine that the world has not learnt the lessons of Chernobyl because scientists covered up details about the design faults and official investigations ended in whitewash to protect the nuclear industry. According to Bryukhanov, this was part of an international cover up of the risks of nuclear power. He also accused the U.S., France, Japan and the UK of hiding the real causes of accidents at their own nuclear power plants although he did not provide any evidence to support such claims.

Reuters, April 26 2006

UN death toll rejected. The official figures released by the UN in the controversial Chernobyl Forum report released in October 2005 predicted between four and nine thousand extra Chernobyl-related cancer deaths but a new report released in April estimates the number of deaths to be as high as 93,000. According to Nikolai Omelyanets, deputy head of the National Commission for Radiation Protection in Ukraine, up to 500,000 people have already perished as a result of radiation exposure and 34,499 people who took part in clean up efforts at Chernobyl have also since died - cancer deaths from this group are three times higher than the rest of the population and infant mortality also increased by 20-30%. Omelyanets stated that information on cancer deaths were sent to both the IAEA and the World Health Organization (WHO) twice in 2005 but that neither acknowledged the studies. The Scientific Centre for Radiation Medicine in the Ukraine agreed that thyroid cancers, leukaemia and previously unseen genetic mutations have overwhelmed the country since the Chernobyl accident and questioned the reasons why the WHO continues to ignore the data.

BBC News, April 18 2006; The Guardian, March 25, 2006

4,000 Russian villages contaminated. Russia's chief public health official and member of the Russian Academy of Medical Sciences, Gennady Onishchenko, said that around 4,343 towns and villages in 14 regions remain within the radioactive contamination zone. Some 1.4 million people live in these villages. Although the 'permissible' level of radiation is exceeded in just four of the fourteen regions, the population is still forced to risk internal contamination from radionuclides because of contaminated foodstuffs.

Itar-Tass, April 4, 2006

Infant deaths in UK linked. The results of a study - Chernobyl: How Many Children Died? - conducted by statistician John Urquhart were presented to participants at the March 2006 Nuclear Free Local Authorities conference held in London. The study showed that infant deaths in areas of the UK hardest hit by radioactive fallout from the explosion increased by 11% between 1986 and 1989 - up to 1,000 baby deaths. Radiation carried in the 'black rain' that fell in certain parts of the UK is said to be responsible - it is thought that the rain increased the risk of deadly respiratory problems and cancers in vulnerable infants. Urquhart tracked health records and official weather reports and studied 50,000 infant deaths in 11 areas from 1983 to 1992. Prior to the explosion, infant mortality had been declining by around 4% a year. Urquhart's report can be downloaded at www.healthandenvironment.com

The Sun, March 23, 2006

Fallout still affecting British farms. The Department of Health admitted that 200,000 sheep still graze on land contaminated by Chernobyl fallout 20 years ago. Emergency orders still apply to 355 Welsh, eleven Scottish and nine English farms - much of the contaminated land in Wales lies within the Snowdonia National Park. Under restrictions imposed in 1986, no sheep can be moved from any of these areas without a special license. Sheep with higher than permissible levels of radiation are marked with permanent dye and moved to graze on uncontaminated grass for several months before they can be passed fit to enter the food chain. Farmers were initially told that such restrictions would last for around 30 days but two decades later, there is apparently still no end in sight.

The Independent, March 14 2006

IN BRIEF

Yucca scientists not charged. Federal prosecutors have decided not to charge several scientists accused of falsifying documents relating to the proposed Yucca Mountain nuclear waste site. The U.S. Attorney's office in Nevada discovered a series of emails dating from 1998 to 2000 suggesting that government hydrologists had falsified dates and other documentation as part of their review of technical data before the Department of Energy sought a license from the Nuclear Regulatory Commission. The DOE is said to be re-creating the technical work done and checking some 14 million emails. Senator Reid from Nevada said, "The science that DOE claims is supporting Yucca Mountain is sloppy, and in some cases it's actually false".

The Salt Lake Tribune, April 26 2006

Finnish plant behind schedule. The experimental EPR nuclear power plant under construction in Finland has already fallen nine months behind schedule - the project started just a year ago. The delays have been caused by safety concerns over the quality of concrete used for the base of the reactor. It was discovered that too much water had been used in the cement mix, making the concrete too porous, and some steel forgings were also found to be of poor quality.

The Guardian, April 24 2006

Turkey selects site. The Black Sea province of Sinop has been chosen as the site for the construction of the country's first nuclear power plants. Within the next three to four years, Turkey plans to build a small pilot reactor of around 100 megawatts. Eventually three power plants with a total capacity of 5,000 MW will be built. Previous attempts to build a nuclear plant in Turkey have been thwarted due to strong opposition and costs.

Reuters, April 13 2006

Leak at Rokkasho. Japan Nuclear Fuel Ltd broke news of a radioactive water leakage at the Rokkasho nuclear reprocessing plant where the latest round of trial operations started on March 31. Some 40 litres of water containing plutonium and uranium leaked inside a concrete-lined cell when a worker apparently made a mistake in a remote-controlled process. The JNFL spokesperson said that no radiation was released. The operator had signed safety agreements with Aomori Prefecture and the village of Rokkasho before the train run was allowed to begin.

Reuters, April 13 2006

China-Australia uranium deal. Australia has signed a bilateral safeguards agreement (Nuclear Transfer Agreement) with China to enable the export of uranium to that country. A nuclear technology agreement was signed at the same time.

WNA Weekly Digest, April 7 2006

Canadian nuclear cooperation. Atomic Energy of Canada Ltd. (AECL) has joined forces with four other nuclear technology and engineering companies (Babcock & Wilcox Canada, General Electric Canada, Hitachi Canada and SNC-Lavalin Nuclear) to offer fixed-price nuclear power plants on a turnkey basis. The plants will be the 700 MWe Candu 6 and eventually the new 1200 MWe ACR-1000.

WNA Weekly Digest, March 31 2006

Head of Arab League pushes nukes. The Egyptian head of the Arab League, Amr Moussa, has urged Arab nations to work toward joining the nuclear club by developing nuclear energy as soon as possible. Moussa's comments came at the League's summit meeting aimed at tackling the crises of Iraq and the Palestinian peace process. As yet, no Arab country is thought to have a significant nuclear energy program and most have shown no interest in taking this route.

AP, March 28 2006

UN finds against U.S. The United Nations Committee on the Elimination of Racial Discrimination has found the U.S. guilty of violating the human rights of the Western Shoshone peoples. Western Shoshone ancestral lands - from the south of Snake River, Idaho, across central and eastern Nevada and west through Death Valley in California - host the Nevada Test Site and the proposed Yucca Mountain waste dump site. The UN Committee has urged the U.S. to freeze all plans to privatise Western Shoshone lands and resources, desist from all activities on the ancestral lands that its owners have not been consulted on and to stop all harassment of the people. The U.S. must respond to the Committee's concerns by July 15.

CCNS News Update, March 24 2006

Fire at Japanese plant. On March 22, a fire occurred at the Oi nuclear power plant in Fukui Prefecture in western Japan. The fire broke out in a waste disposal unit between the No 3 and No 4 reactors. Officials with the plant's operator Kansai Electric Power Co. said that no radiation was released. Two workers were treated for smoke inhalation.

EFN Newsletter, March 23 2006

Mexico plans new capacity. Mexico's Federal Electricity Commission is to spend US\$150 million on upgrading both 675 MWe reactors at the Laguna Verde plant, which currently provides 5% of the country's electricity. The Commission is also planning to build a new US\$4 billion nuclear power plant by 2020.

WNA Weekly Digest, March 24 2006

New Japanese reactor opens and closes. The second unit at Hokuriku Electric's Shika nuclear power plant in Ishikawa, northern Japan started commercial operation on March 15 after initially being connected to the grid in July 2005. But less than two weeks later, a panel of Kanazawa City judges ruled that the 1358 MWe advanced boiling water reactor, the country's second largest, should close because there is a danger of radiation being released following an earthquake. The judges decided that inadequate precautions had been taken and that those [precautions] were also based on out-of-date science. Chief judge Kenichi Ido said, "An earthquake larger than what the electricity company had anticipated could occur, resulting in a nuclear accident and exposing residents to radiation." The plant is situated near the Ochigata fault line and a research committee appointed by the Japanese government has warned that several quakes could occur simultaneously and trigger one reaching 7.6 on the Richter scale, which would severely shake the plant. This is yet another blow to the Japanese nuclear industry which has struggled to improve its image with the public following accidents that have resulted in the deaths of seven workers in as many years, injuries to hundreds of workers and several falsification scandals.

Times Online & BBC News, March 24 2006; Reuters, March 10 2006

Groundwater contaminated by Indian Point, U.S. High levels of radioactive material - almost three times the level permitted in drinking water - were found in groundwater near the Hudson River beneath the Indian Point nuclear complex. The strontium-90 reached the Hudson but contaminated groundwater did not enter drinking supplies according to the spokesperson for Entergy Nuclear Northeast. Indian Point is about 30 miles north of Manhattan. The contaminated water was first discovered in August 2005. Several wells were dug in efforts to locate the leak and the nuclear complex was found to be the source. In high doses strontium

can cause cancer - tritium, another carcinogen, was also found in samples taken. The Nuclear Regulatory Commission has announced an investigation into tritium releases from Indian Point and other plants.

AP, March 21 2006

Earthlife Africa appeal denied. An application to the South African High Court made by Earthlife (ELA) for leave to appeal an earlier judgement has been denied. The environmental group was seeking access to board meeting minutes pertaining to Eskom's PBMR developments under the Access to Information Act. ELA was also ordered to pay all court costs.

ELA press release, March 20 2006

Indian group urges end to construction. Following an earthquake in the Kanyakumari district in the south of India on March 19, The People's Movement Against Nuclear Energy and local citizen groups have called for the halt of construction work at the Koodankulam nuclear power plant in the nearby district of Tirunelveli. India's Department of Atomic Energy is building two 1,000 MW nuclear power plants using Russian technology at Koodankulam and has announced plans for four more. This despite the fact that the project sits in an earthquake zone and no environmental impact assessments have ever being done - or if they have, the results have never been publicly released. PMANE wants the government to stop the build and start a public debate about the safety of the project.

PMANE press release, March 20 2006

U.S. firm sued over nuclear spills. A federal lawsuit involving 14,000 residents has been filed charging Exelon Corp. with failing to maintain a pipeline that spilled tritium-laced waste from its Braidwood nuclear plant in Illinois. Exelon has admitted several leaks, two leaks of three million gallons in 1998 and 2000, but has said that, although ground water beyond the plant boundary was contaminated, there is no significant risk posed to local water wells. Exposure to tritium can increase risk of cancer, birth defects and genetic damage - tritium is a by-product of nuclear generation and can enter the body through ingestion, absorption or inhalation. Given that the first spillage from the plant occurred in 1996, Exelon has been accused of perpetrating a cover up - the disclosures came only after the company was pressured to test for contamination by the Illinois Environmental Protection Agency. Public records from 2001 and 2002 show that Exelon officials opposed public discussion of tritium, the release of documents about tritium spills, legislation to mandate groundwater monitoring at nuclear plants and permit reviews.

The Tribune, March 19 2006; Reuters, March 15 2006

G8 to push new nukes. A draft of the "G8 Communique on Energy Security" due to be released on July 16 at the G8 Summit to be held in St. Petersburg, Russia from July 15-17 calls for a huge new global expansion of nuclear power. It also urges trillions of dollars of new investment to escalate oil, gas and coal production globally. One sentence reads, "We believe that development of nuclear energy would promote global energy security..." another, "We intend to make additional joint efforts to ensure non-discriminatory access to this energy source." [Cue the swift resolution of the Iran 'crisis'...] U.S. Energy Secretary Samuel Bodman after a G8 energy ministers meeting in March said, "We are hopeful of a very substantial rebirth for the global nuclear industry." The push for new nuclear is reportedly headed by the U.S. and Russia but Germany for one is known to be against the plan.

Reclaim the Commons alert, March 17 2006

New reactor for Lithuania. An agreement was signed between power companies from Estonia, Latvia and Lithuania to conduct a feasibility study for a new nuclear reactor to be built at the existing Ignalina site in Lithuania - the Soviet-era unit at the site is due to close by 2009. The cost of the new reactor is estimated at 2-3 billion Euros and should to be completed by 2015. The move comes after Baltic prime ministers announced plans to increase independence from Russian energy, integrate energy markets by 2009 and connect the Baltic energy networks with other European countries.

WNA Weekly Digest, March 10 2006

French nuke deal with Libya. France and Libya signed a cooperation agreement on 'peaceful' uses of nuclear energy on March 15 - Tripoli said the deal would allow it to generate nuclear power to desalinate seawater. Libya will need to continue cooperating with the IAEA as a condition of the agreement. The country renounced its nuclear weapons programme in December 2003.

Reuters, March 16, 2006; The Financial Times, March 7 2006

UK Commission rejects new nuclear. The British government's watchdog on sustainable development issues, the Sustainable Development Commission, has said that the UK does not need to build a new generation of nuclear plants to meet future electricity needs. The government advisory group said that more renewable sources and greater energy efficiency were more favourable options than replacing old nuclear plants.

Reuters, March 7 2006

EP committee rejects Euratom funding. The European Parliament Environment Committee has voted to oppose public funding for Euratom nuclear fission and fusion research in support of a proposal from the Greens to limit nuclear research to radiation protection, waste and safety. Satu Hassi, vice chair of the committee said, "We have to prioritise technology that can have an immediate impact on protecting our climate and cutting emissions, namely energy efficiency and renewables."

The Greens/EFA in the European Parliament press release, February 23 2006

Fines for U.S. plutonium leaks. A federal jury has ruled that two Department of Energy contractors allowed plutonium from the now defunct Rocky Flats weapons plant to contaminate neighbouring land. Dow Chemical and the former Rockwell International were negligent in their actions and exposed thousands of property owners to plutonium, increasing their risk of health problems. The suit was filed 16 years ago on behalf of 13,000 people. Jurors awarded the plaintiffs US\$553.9 million in damages - the government will also face an estimated US\$58 million in legal fees. It is thought that state and federal laws will eventually limit the payout to US\$352 million - DOE and the companies are to appeal.

AP, February 16 2006

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WISE/NIRS NUCLEAR MONITOR

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