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IN CHERNOBYL, A DISASTER PERSISTS

Twenty five years after the worst nuclear accident in history, Ukraine and its neighbours are still dealing with the problems

BY **OLZHAS AUYEZOV AND RICHARD BALMFORTH**
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Any Ukrainian over 35 can tell you where they were when they heard about the accident at the Chernobyl plant.

"I remember calling my husband. There had been rumours for days about a nuclear

accident. We had even hung blankets on the windows to stop radiation because we didn't know what to do," said Natalya, a 46-year-old financial analyst in Kiev, whose husband was a journalist on a daily newspaper.

"He told me there had been a fire at the atomic plant in Chernobyl. That was for me the first confirmation that the reactor had collapsed," she said this week, seated at her

desk in her central Kiev office.

"We had no idea what to expect. It was awful."

As Japan battles to prevent a meltdown at its earthquake-hit Fukushima Daiichi nuclear plant, the people of Ukraine are preparing to mark the 25th anniversary of the world's worst nuclear accident.

The physical and financial legacies of that

disaster are obvious: a 30-km uninhabited ring around the Chernobyl plant, billions of dollars spent cleaning the region and a major new effort to drum up 600 million euros (\$840 million) in fresh funds that Kiev says is needed to build a more durable casement over the stricken reactor.

Just as powerful are the scars that are less easily seen: fear and an abiding suspicion that despite the reassuring reports by authorities and scientific bodies people may still be dying from radiation after-effects.

While debate about the health impact continues, there is little doubt people in Ukraine and neighbouring Belarus carry a psychological burden. Repeated studies have found that "exposed populations had anxiety levels that were twice as high" as people unaffected by the accident, according to a 2006 United Nations report. Those exposed to radiation were also "3-4 times more likely to report multiple unexplained physical symptoms and subjective poor health than were unaffected control groups."

There are, of course, crucial differences between Chernobyl and the disaster unfolding in Japan.

The Chernobyl accident was the product of human error when a test was poorly executed, while the Japanese failure was triggered by an earthquake and tsunami.

Chernobyl occurred in a secretive Soviet society which reformer Mikhail Gorbachev was only just opening up. The authorities embarked on an attempted cover-up and only partly admitted the truth three days later, denying themselves the chance of rapid international aid.

Despite criticisms that Tokyo could be a lot more transparent, Japan's disaster has taken place in a relatively open society and international help has been quick to come.

Most importantly, thick containment walls at the Fukushima Daiichi plant shield the reactor cores so that even if there was a meltdown of the nuclear fuel it's unlikely to lead to a major escape of dangerous radioactive clouds into the atmosphere.

At Chernobyl, there was no containment structure. "When it blew, it blew everything straight out into the atmosphere," said Murray Jennex of San Diego State University.

Despite those differences, though, the Chernobyl experience still contains lessons for Japan and other countries, says Volodymyr Holosha, the top Ukrainian Emergency Ministry official in charge of the area surrounding the Chernobyl plant.

"We were not ready for it -- neither technologically nor financially," Holosha told

ENTOMBED: The sarcophagus around the damaged fourth reactor at the Chernobyl nuclear plant. **REUTERS/ GLEB GARANICH**

reporters in Kiev last month. "This is a priceless experience for other countries."

EXPERIMENT GONE WRONG

IN THE early hours of April 26, 1986, in the model Soviet town of Prypyat, a satellite of the much bigger Chernobyl, workers at a nuclear power plant demobilised the safety systems on the number four reactor, which had come on line only three years previously.

It was a risky experiment to see whether the cooling system could still function using power generated from the reactor alone in the event of a failure in the auxiliary electricity supply.

It could not. There was a massive power surge that blew off the reactor's heavy concrete and metal lid and sent smouldering nuclear material into the atmosphere. Dozens of plant staff died on the spot or immediately afterwards in hospital. Hundreds of thousands of rescue workers, including Soviet Army conscripts, were rushed to the site to put out the fires, decontaminate it and seal off the damaged reactor by building a concrete shell around it.

At first, authorities denied there was a problem. When they finally admitted the truth more than a day later, many thousands of inhabitants simply picked up a few of their belongings and headed off -- many of them to the capital Kiev 80 km (50 miles) to the south, never to return. Iryna Lobanova, 44, a civil servant, was due to get married in Prypyat on the day of the explosion but assumed all ceremonies would be cancelled.

"I thought that war had started," she told



Reuters this week.

"But the local authorities told us go on with all planned ceremonies." Nobody was allowed to leave the town until the official evacuation was announced on the Sunday" -- 36 hours later -- "following an order from Moscow," she said.

Lobanova went ahead with her wedding -- and left the next day with her husband by train.

A LEGACY OF BAD HEALTH

THE MAKE-SHIFT concrete shelter hastily thrown up in the months after the explosion is often referred to as a "sarcophagus", a funeral term made even more fitting by the fact that it houses the body of at least one plant worker who rescuers were unable to recover.

The official short-term death toll from the accident was 31 but many more people died of radiation-related sicknesses such as cancer. The total death toll and long-term health effects remain a subject of intense debate even 25 years after the disaster.

"(The disaster) brought suffering on millions of people," said the Emergency Ministry's Holosha.

"About 600,000 people were involved in

mitigating the consequences of the accident. About 300,000 of them were Ukrainians. Out of those, 100,000 are disabled now."

A 2008 United Nations study cited a "dramatic increase in thyroid cancer incidence" in the Ukraine and just across the border in Belarus. Children seemed to be especially vulnerable because they drank milk with high levels of radioactive iodine.

"One arrives at between 12,000 and 83,000 children born with congenital deformations in the region of Chernobyl, and around 30,000 to 207,000 genetically damaged children worldwide," German physicians' organisation

IPPNW said in a report in 2006.

Those figures are actually far lower than health officials had predicted. Indeed, the UN says that overall health effects were less severe than initially expected and that only a few thousand people had died as a result of the accident.

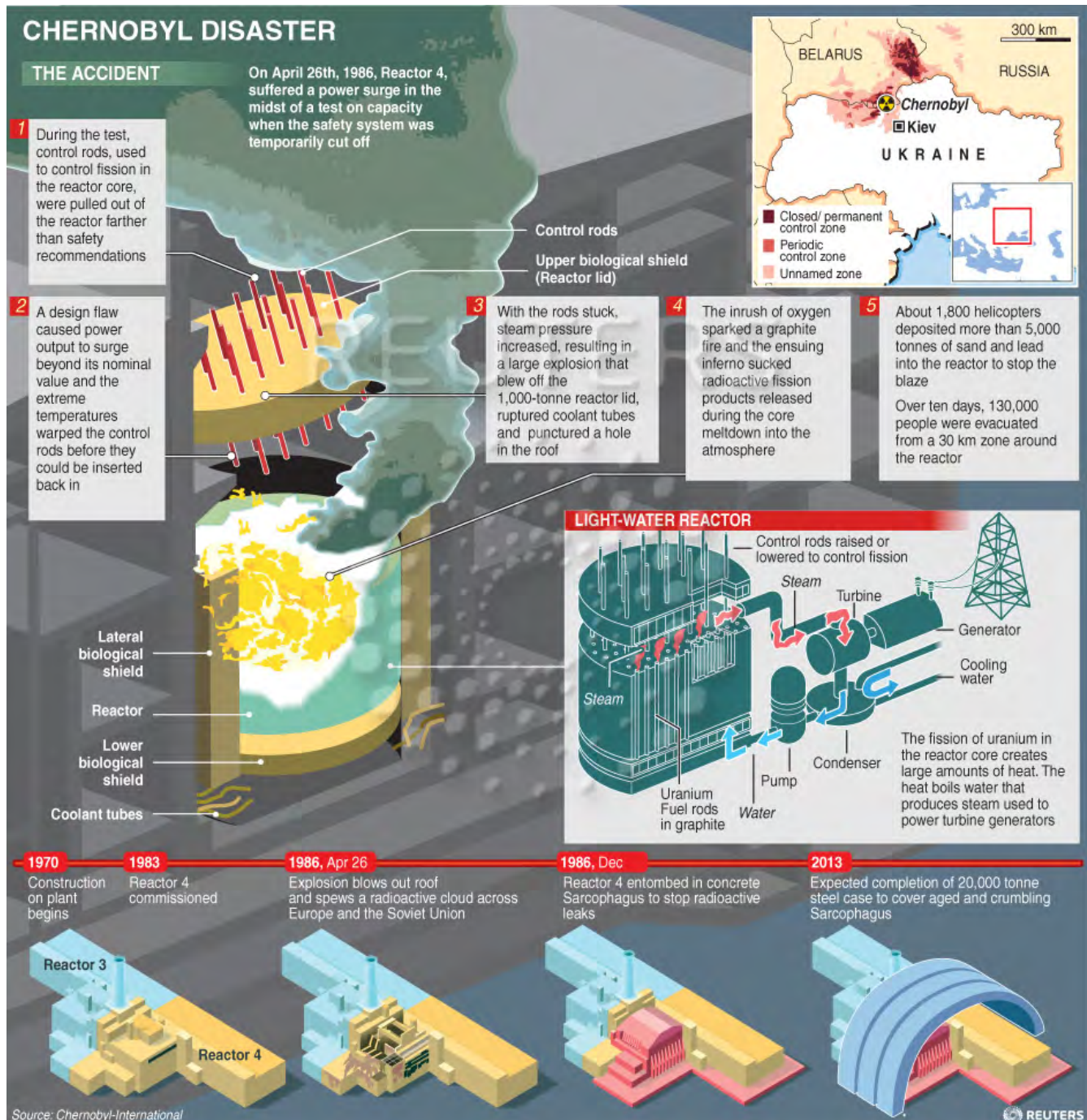
But a 2009 book by a group of Russian and Belarussian scientists published by the New York Academy of Sciences argued that previous studies were misled by rigged Soviet statistics.

"The official position of the Chernobyl Forum (a group of UN agencies) is that about

9,000 related deaths have occurred and some 200,000 people have illnesses caused by the catastrophe," authors Alexei Yablokov, Vasily Nesterenko and Alexei Nesterenko wrote in "Chernobyl: Consequences of the catastrophe for people and the Environment".

"A more accurate number estimates nearly 400 million human beings have been exposed to Chernobyl's radioactive fallout and, for many generations, they and their descendants will suffer the devastating consequences."

The authors argued that the global death toll by 2004 was closer to 1 million and said health effects included birth defects, pregnancy





SOMETHING LOST: In the town of Prypyat, where most of the workers at the Chernobyl plant lived, empty houses and abandoned buildings are poignant reminders of the nuclear disaster. One room contains Soviet placards, while a room where local gymnasts once practiced now stands empty. Outside, a ferris wheel is slowly rusting away. **REUTERS/GLEB GARANICH (3)**

losses, accelerated aging, brain damage, heart, endocrine, kidney, gastrointestinal and lung diseases.

"It is clear that tens of millions of people, not only in Belarus, Ukraine and Russia, but worldwide, will live under measurable chronic radioactive contamination for many decades," they wrote.

SEALED-OFF ZONE

THE MOST SEVERE contamination occurred within the so-called Exclusion Zone, a circular area around the power plant with a radius of 30 kilometres (19 miles) that has been deemed unsuitable for living and is closed to unsanctioned visitors.

Several villages and a whole pine forest in the zone were bulldozed and buried shortly after the disaster. Other small settlements are overgrown with trees and bushes that have made the red and white brick houses barely visible.

Prypyat, built to house Chernobyl power plant workers and their families and with a bright future ahead of it as a model Soviet 'atomgrad' town, had a pre-disaster population of about 50,000.

Now it is a ghost town that greets its rare visitors with eerie silence.

A shop building in the centre is full of rubble and broken furniture -- remnants of years of looting which the government could not prevent and which spread hazardous substances across the country.

A portrait of Soviet state founder Vladimir Lenin lies on the floor, covered by a thick layer of dust.

At a children's amusement park, a Ferris wheel due to be launched less than a week after the disaster is rusting away.

Prypyat's residents, mostly young families, were evacuated in a six-hour operation which began more than 36 hours after the accident.

In the days that followed, as the fallout was driven by a south-east wind across neighbouring Belarus, the Soviet government evacuated thousands of people from other areas under threat.

"We were evacuated on May 4," said Makar Krasovsky, 73, who lived in the Belarussian village of Pogonnoye 27 km (17 miles) from the plant. "Children had been evacuated earlier,

on May 1. Nobody knew anything. Nobody told us anything."

"We were told to take with us clothes for the next three days but nothing else because everything was contaminated. They promised us the reactor would be shut down and we would return in three days," he said by telephone from the town of Khoyniki.

Pogonnoye is still sealed off and visits are only allowed once a year -- on a day when local Orthodox Christians attend the graves of their ancestors.

FINANCIAL BURDEN

THE ACCIDENT prompted former Socialist bloc nations to shut down reactors of the same design. But the Chernobyl plant itself kept running until 2000 when Ukraine agreed to shut it down after Kiev was promised European aid.

The European Commission and international donors have since committed about 2 billion euros to projects aimed at cleaning up the area and securing the plant. Another 740 million euros remains to be raised: 600 million for the new casement and 140 million waste storage facilities.

Holoshka says Ukraine itself has spent much more.

"Since Ukraine gained independence (after the collapse of the Soviet Union), \$12 billion has been spent on dealing with the consequences (of the accident)," he said. "Most of the expenditures were linked to maintaining the exclusion zone and providing healthcare and social assistance to those who had lived in the affected area."

The key new project at the plant is the construction of the so-called New Safe

ON THE EDGE: One of the worst affected areas was in neighbouring Belarus, just across the border. Last month a woman carried her purchases from a mobile shop in the almost abandoned village of Novosiolki near the 30 km (19 mile) exclusion zone around the plant, while Makar Krosovski, 73, (below left) visited the house he abandoned shortly after the blast. **REUTERS/VASILY FEDOSENKO (2)**



Confinement -- a massive convex structure which will be assembled away from the damaged reactor and then slid into place over the existing sarcophagus. The original concrete tomb was built hastily, is supported in part by the damaged walls of the reactor building, and has already had to be reinforced.

The new structure is designed to last 100 years and should allow the reactor to be dismantled without the risk of new contamination.

The project requires 600 million euros (\$840 million) in additional financing and is likely to miss the 2012 completion target by a few years due to problems such as radioactive debris encountered during excavation works.

Ukraine hopes to raise most of the funds at an international donors conference set to take place in Kiev next month on the eve of the 25th anniversary of the grim event.

Officials say Ukraine is likely to spend billions of euros on confinement upkeep costs before it finds a way to bury the reactor components,

perhaps under layers of underground granite rocks. Even then the area around the plant will remain unsuitable for thousands of years. Asked how long before people can settle down and grow crops at the site, Chernobyl power plant director Ihor Gramotkin said: "At least 20,000 years."

Yury Andreyev, shift chief at the plant's number two reactor on the night of the explosions and now head of a non-government body representing the interests of those who fought to control the disaster, sees no danger of the Japan drama taking on the seriousness of Chernobyl.

"The scale of the destruction (in Japan), both nuclear and radiation, is 10,000 times lower than what happened to us in Chernobyl. About 30 tonnes of nuclear fuel were discharged (at Chernobyl). Here (in Japan) there was not the same discharge," he told journalists on Tuesday.

POLITICAL FALLOUT

DESPITE THE SCALE of the Chernobyl disaster, both Ukraine and Belarus still rely heavily on nuclear energy, having no developed hydrocarbon resources. In the coming months, both plan to borrow billion of dollars from Russia to finance the construction of new reactors of Russian design.

But that doesn't mean people have forgotten. Locals in Kiev, 80 km (50 miles) from Chernobyl, will still tell you that they heard no birdsong in the Spring of 1986 and that the leaves of the elegant chestnut trees that line the capital's boulevards turned yellow a month early.

The disaster and the government's handling of it highlighted the shortcomings of the Soviet system with its unaccountable bureaucrats and entrenched culture of secrecy. Journalists

subsequently uncovered evidence that the children of Communist apparatchiks had been evacuated well before others and some staff died at the plant because they had not been given orders to leave.



TWENTY FIVE YEARS OF PAIN

Unlike the nuclear safety alert in Japan which followed tsunami devastation, the explosion and fire at the Chernobyl power plant on April 26, 1986 -- the world's worst nuclear accident -- was caused by human error.

Facility operators, in violation of safety regulations, had switched off important control systems at the Ukrainian plant's reactor number four and allowed it to reach unstable, low-power conditions, according to a United Nations report.

A power surge led to a series of blasts, at 1.24 a.m., which blew off the reactor's heavy steel and concrete lid and sent a cloud of radioactive dust billowing across northern and western Europe, reaching as far as the eastern United States.

Key facts:

* The cloud of radioactive strontium, caesium and plutonium affected mainly Ukraine and neighbouring Belarus, as well as parts of Russia and Europe.

* Estimates for the numbers of direct and indirect deaths from the disaster vary.

* The Chernobyl Forum, a group of eight U.N. agencies, and the governments of Ukraine, Belarus and Russia, have estimated the death toll at only a few thousand as a result of the explosion. U.N. agencies have said some 4,000 people will die in total because of radiation exposure.

* The environmental group Greenpeace puts the eventual death toll far higher than official estimates, with up to 93,000 extra cancer deaths worldwide.

* The Chernobyl Union of Ukraine, a non-government body, estimates the present death toll from the disaster at almost 734,000.

* The disaster was the object of a cover-up

by secretive Soviet authorities who waited three days before admitting to the explosion.

* The accident dented the image of reformist Soviet leader Mikhail Gorbachev who had earlier launched his 'glasnost' policies for greater openness in Soviet society.

* Chernobyl engineers shut down the last functioning reactor, Number Three, in December 2000. Radioactive nuclear fuel is still being removed from the plant.

* A make-shift cover -- the "Sarcophagus" -- was built in six months after the explosion. It covers the stricken reactor to protect the environment from radiation for at least 30 years. This has now developed cracks, triggering an international effort to fund a new encasement.

* Officials say it could be up to 100 years before the station is completely decommissioned.

* A 30-km (19-mile) exclusion zone is in place round the disaster site.

* Wildlife has made a comeback in this area and there are said to be more than 60 different types of mammals living there including wild boar and elk.

* Although research continues, the first reports about long-term radiation damage have been published, and the results are that the radiation did less damage than initially feared. "There is a tendency to attribute increases in the rates of all cancers over time to the Chernobyl accident, but it should be noted that increases were also observed before the accident in the affected areas,"

the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) said in its summer 2010 assessments of the radiation effects in Chernobyl.

"Moreover, a general increase in mortality has been reported in recent years in most areas of the former Soviet Union, and this must be taken into account when interpreting the results of Chernobyl-related studies," the report said.

* In its conclusion, the U.N. report said that "the vast majority of the population need not live in fear

of serious health consequences due to the radiation from the Chernobyl accident".

* The report also said that the majority of the affected population in the region was exposed to radiation levels "comparable to or a few times higher than the natural background levels, and future exposures continue to slowly diminish as the radionuclides decay".

(By Richard Balmforth)



MEMORIAL: Relatives hold portraits of "liquidators" -- workers who fought the blaze at Chernobyl in 1986 -- during a commemorative ceremony in Kiev, December 2010. REUTERS/GLEB GARANICH

* Ukraine is seeking a further 600 million euros (\$840 million) to help finance the new convex structure which will slip over the ageing "Sarcophagus" and allow the old reactor to be dismantled.

* International donors are expected to agree to the funding at a conference in Kiev in April on the eve of the 25th anniversary of the disaster.

Mikhail Gorbachev has since said he considered the disaster one of the main nails in the coffin of the Soviet Union which eventually collapsed in 1991. The nuclear disaster in Japan is unlikely to break the country's political system.

But Tokyo should not underestimate the profound power of a nuclear meltdown -- physical and political.

(Olzhas Auyezov reported from Prypyat, Richard Balmforth from Kiev; additional reporting by Andrei Makhovsky in Minsk, Natalya Zinets and Pavel Polityuk in Kiev, and Elaine Lies in Tokyo; Editing by Simon Robinson)

NO ENTRY: A Belarussian guard opens the gate at the entrance to the state radiation ecology reserve inside the 30 km (18 mile) exclusion zone around the Chernobyl nuclear reactor in neighbouring Ukraine, February 2011. **REUTERS/VASILY FEDOSENKO**



COVER PHOTO: A visitor in the control centre of the damaged fourth reactor at the Chernobyl nuclear power plant, February 2011. **REUTERS/GLEB GARANICH**

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