



EIRNS

A cutaway model of part of the Laguna Verde nuclear reactor. The two Laguna Verde reactors supply 6.25% of Mexico's total energy consumption.

wouldn't let you leave until you were free of contamination. Having exited the building with a radiation reading of .01 millirem, we burst into our now-famous song on nuclear energy.

The guides were thrilled with our songs, and it appears that we gave them back the hope of having more nuclear reactors in the country. Contrary to the urban myths that Laguna Verde is obsolete, that it pollutes, that it is old and unsafe, and so on, the fact is that the Laguna Verde nuclear plant is the safest, cleanest, and most carefully monitored site in all of Mexico!

Some of the most striking points about the plant include:

- It is located in the state of Veracruz, on the coast of the Gulf of Mexico;
- It has two BWR-5 reactors of the Mark 2 direct-cycle type;
- The plant generates 6.25% of the total energy consumed in Mexico;
- The plant has two turbo generators made by Mitsubishi Heavy Industries, of 682.44 megawatts each.

And so, once again, we are generating the critical mass so that the Mexico LYM can ensure that the nation will have sufficient energy for the 21st Century!

What We Really Know About Chernobyl Today

by Marjorie Mazel Hecht

It has been 20 years since the Chernobyl nuclear explosion on April 28, 1986. The accident shocked the entire world and continues to keep most of the population in the area around Chernobyl frightened about what happened and about their future, while worldwide, anti-nuclear organizations and media keep fanning the flames of fear, without regard for science or truth.

What do we really know after 20 years about the effects of the radiation released from Chernobyl?

The most competent analysis is the official report of the United Nations Scientific Committee on Atomic Radiation (UNSCEAR), issued in 2000, which determined that there was *no* increase in the incidence of solid cancers and leukemia in the highly contaminated areas, except for thyroid cancers (which are the result of the screening effect—see below), and *no* increase in genetic diseases. More recently, the UNSCEAR assessment was echoed by the 2006 report of the United Nations Chernobyl Forum, which is composed of representatives of eight UN organizations, the World Bank, and the governments of Belarus, Russia, and Ukraine.

Both reports have come under fire from the unscientific special interest groups, which prefer to proliferate the idea that radiation at any dose is “dangerous.” Greenpeace, for example, claims that 200,000 people will die as a result of the Chernobyl radiation, and the German-language *Der Spiegel* calls Chernobyl “The Pompeii of the Nuclear Age,” in an April 17 article that highlights alleged radiation-caused genetic aberrations (such as deformed limbs) in children born after the accident.

Radiation in Perspective

Dr. Zbigniew Jaworowski, a physician and radiation scientist at the Central Laboratory for Radiation Protection in Warsaw, Poland, and a former chairman of UNSCEAR, presents a most informed, thorough, and sobering assessment. Writing for the Spring 2006 issue of *21st Century & Technology*, as well as for the current issue of the Polish-language edition of *Scientific American*, Jaworowski puts the Chernobyl radiation in perspective. The enormous amount of radioactive dust from the burning reactor, he says, was *200 times less* than the atmospheric radioactivity from the previous generations of nuclear bomb tests. From these tests, he says, the highest radiation dose was in 1963, at 0.1133 milli-sievert, to the world population. The Chernobyl radiation dose, in the

first year after the accident, was 0.045 milli-sievert, not only lower than the radiation from testing in 1963, but only 2% of the average annual dose of *natural* radiation (which is 2.4 milli-sieverts per year).

Furthermore, Jaworowski says, this average dose is dwarfed by the dose that populations receive in regions with higher natural radiation; for example in Brazil, or in southwestern France, where the natural radiation dose is more than 700 *milli-sieverts* per year. "No harmful health effects were ever detected in such high natural background areas," he says. On the contrary, people living in those areas show evidence of better health.

Jaworowski stresses that the worst harm to those exposed to Chernobyl fallout "was caused not by radiation, and not to flesh, but to minds." Indeed, as he describes it, for the 5 million people living in the contaminated regions of Belarus and Russia, the real adverse health effect is an epidemic of psychosomatic diseases of the digestive and circulatory systems, and other post-traumatic stress disorders, such as sleep disturbance, headache, depression, anxiety, escapism, "learned helplessness," overdependence, alcohol and drug abuse, and suicides.

This terrible situation is caused not by radiation, Jaworowski states, but by *radiophobia*, an irrational fear of radiation, and a combination of governmental and administrative decisions that convinced several million people that they are "victims of Chernobyl," even though the radiation dose they received was only one-third of the average annual dose of natural radiation worldwide. He notes one of the most lethal effects of the accident: Some 100,000 to 200,000 wanted pregnancies in Western Europe were willfully aborted soon after the accident, when physicians wrongly advised patients that the Chernobyl radiation was a health risk to unborn children.

The Death Toll

There were 31 early deaths of the 134 rescue workers and power station employees who received very high radiation doses, and 3 deaths for other reasons. Among the 103 survivors of this group, 19 others had died as of 2004, mostly, according to Jaworowski, of ailments that cannot be attributed to ionizing radiation. It is interesting that even this group of people, who received very high radiation doses, have lower mortality rates than the general Russian population by 15 to 30%. This is also true of the population in the most contaminated Russian region near Chernobyl.

Jaworowski takes exception to the Chernobyl Forum report on three points. First, in terms of the increased number of thyroid cancers among children in the highly contaminated areas, he believes that this is due to what's called the "screening effect." There is a very high level of "occult" thyroid cancer in the general population, he explains, where there are no clinical symptoms and the cancer is found in post mortems, or in special health screenings. The U.S. incidence of occult

thyroid cancers is 13%; in Japan it is 28%, and in Finland it is 35%. In Finland, in fact, occult cancers are observed in 2.4% of the children, which is some 90 times higher than the maximum found in the highly contaminated region of Bryansk in Russia. In this region, and other contaminated regions, the thyroids of all people who were less than 18 years old in 1986 are screened yearly. "It is obvious that such a vast scale screening resulted in finding the 'occult' cancers," he says.

Jaworowski further notes that these thyroid cancers began to appear in 1987, only one year after the accident, "too early to be in agreement with what we know about radiation-induced cancers."

A second point on which Jaworowski criticizes the Chernobyl Forum is that the report projects future cancer fatalities caused by the low-level radiation of "4,000 to exactly 9,935 deaths." "This projection is not based on trends in cancer mortality or incidence observed during the past 20 years," he says, because as the Chernobyl Forum itself reports, epidemiological studies show a *decrease* in cancer mortality and incidence among exposed people. These are the trends that should be used for realistic projections of future health, he says.

Instead, as he describes it, the Chernobyl Forum performed an arithmetic exercise, "multiplying a tiny dose of about 2 milli-sieverts, by a great number of people, and a radiation risk factor deduced from Hiroshima and Nagasaki studies." These studies, as Jaworowski has shown in detail, are based on "an outdated concept of collective dose and a linear no-threshold assumption, which states that even a near-zero dose of radiation can induce harm." "This assumption was never proved by scientific evidence," he stresses, and in fact, it is known that low-level radiation has beneficial effects for human health.

Jaworowski describes his own reaction in Warsaw in 1986, when he learned the news of the increased radiation at 7 a.m. on April 28. He now reflects that although he was an expert in radiation protection, and fully aware of the facts about natural background radiation, he got caught up in the frenzy of the moment himself. He describes how decision-makers were panicked, and how ridiculous radiation standards were set ad hoc, which had no bearing on human health, but were enormously costly. "The most nonsensical action, however, was the evacuation of 336,000 people from the contaminated regions of the former Soviet Union, where the radiation dose from Chernobyl fallout was about twice the natural radiation dose." Later, the limit of radiation ruled acceptable was decreased to *below* the natural background radiation (!), and "was some five times lower than radiation at New York City's Grand Central Station."

Compared with other industrial accidents, Jaworowski concludes, "In centuries to come, the [Chernobyl] catastrophe will be remembered as proof that nuclear power is a safe means of energy production."