
CHERNOBYL' FOUR YEARS ON

ENERGY & ENVIRONMENT

A Retrospective of a Nuclear Accident

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Following the explosion at unit 4 of the Chernobyl' nuclear power station on April 26, 1986, a long-term scientific inquiry, which is still continuing today, was undertaken to investigate the causes of the accident. Although some of the scientists' initial conclusions about the disaster may have been premature, the reviews have led to the official halting of the construction of graphite-moderated (RBMK) reactors in the Soviet Union and to the shutdown or modification of a number of existing stations of that design. After the accident, the authorities designated a zone with a radius of thirty kilometers around the damaged reactor as the chief cause of concern. This zone also includes the town of Chernobyl'. Although the civilian population was evacuated in the months immediately following the accident, the zone has become the center of scientific activities and is the site of the new Chernobyl' Center for International Research.

Post-Accident Scientific Review

Much of the initiative in the post-accident inquiry has been transferred to the International Atomic Energy Agency (IAEA) in Vienna. Although the IAEA was not permitted to inspect Soviet reactors until 1985, it has played an active role since the Chernobyl' disaster not only in assessing the potential and real inadequacies of RBMK reactors but also in attempting to safeguard the future of nuclear power in the Soviet Union. Members of the agency have thus visited various reactors thought to be dangerous by the population and in almost every case have declared that there is little or no cause for anxiety. The organization's initial report on the Chernobyl' accident, based on the presentation of the Soviet delegation, appeared in August, 1986, with a supplementary account issued in October, 1987, after a second meeting of the IAEA. The general consensus was that the accident was caused by operator error made during an accidental reduction of power in the middle of a safety experiment.

Western analyses have, however, raised doubts about the validity of this judgment and have even suggested that the structure of the safety rods of the reactor—all of which were inserted during an attempted shutdown to stop the

sudden power surge—was the main cause of the Chernobyl' disaster.¹ In addition, Soviet specialists have acknowledged that the design of the RBMK contains an inherent flaw—i.e., that the reactor becomes unstable at low power. The reaction of the USSR Ministry of Nuclear Power, established in July, 1986, and renamed the USSR Ministry of Nuclear Power and Industry in 1989, has been mixed. Programs to build new RBMKs at Smolensk and Kostroma have been curtailed. In the latter case, the reactor type has simply been switched to the water-pressurized (VVER) variety. In other areas, however, controversial reactors have remained in service.

Thus, Chernobyl' itself currently has three reactors, two of which were restarted by October 1, 1986, and the third in December, 1987. The Leningrad and Kursk stations remain in service. Construction at the RBMK-1500 station at Ignalina in Lithuania has now evidently been halted, but the two existing reactors remain a bone of contention between the new government in Lithuania and the Soviet authorities.² In short, the electricity requirements of the USSR have precluded the shutdown of all existing RBMKs, and proposals that the Chernobyl' station itself be phased out by 1995 have not yet received official approval. Above all, disputes have centered around the fact that control over reactors in Soviet republics remains exclusively in the hands of ministries based in Moscow.

At Chernobyl' itself, most of the staff appears to be new—at least 75 percent has been changed since the accident. Operators have undergone retraining, safety regulations are more rigorous, and the time required to shutdown the reactor in an emergency has been reduced from twenty to about four seconds. The plant came under the sphere of activities of the Kombinat production association in 1986, along with the city of Pripjat' and a new town being built for plant operatives, Slavutich. In late 1989, the name of this association was changed to the Pripjat' Industrial and Research Association. This move followed several months of rivalry between Kombinat and

¹ See Victor G. Snell, "Introduction," in David R. Marples, *The Social Impact of the Chernobyl Disaster*, London, The Macmillan Press, 1988.

² David R. Marples, "Lithuania's Power Problems," *Edmonton Journal*, March 29, 1990.

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the emergency aid crew "Spetsatom," also based in the town of Chernobyl', and strong criticism of Kombinat's achievements by the authorities. Nevertheless, the staff of the association remains largely unchanged. In its defense, it should be pointed out that the organization does not always receive sufficient financial and material resources to cover its wide range of activities.³

Between April, 1986, and the summer of 1989, the principal source of anxiety in the thirty-kilometer zone remained the "sarcophagus," or covering, of the damaged reactor. A makeshift structure, the weight above the reactor is excessive and it is inadequately supported from below. In other words, it is possible that the reactor could be pushed downwards unless some new structure is erected beneath it. It has been virtually impossible to take steps to reinforce the edifice, however, because of the very high radiation levels at the site, which in mid-1989 were about 1,000 times higher than the natural radiation background. It was at about this time that proposals to establish a center for international research at Chernobyl' were first advanced.⁴

The establishment of the Chernobyl' Center for International Research followed active research work in the zone by some eighty national institutes, assisted by several foreign specialists. Today, scientists maintain that the reactor and its environs represent a unique region for scientific inquiry. The draft program for the center indicates that once again the IAEA is to play a supervisory role. The IAEA is therefore outlining the general conditions under which research projects may be undertaken. Further, the IAEA will also be responsible for publishing the results of the various projects and holding meetings and conferences under what is termed an "umbrella" agreement with the Soviet Union. Any institutions or groups that wish to participate in research projects must therefore abide by this umbrella agreement and, it is implied, provide their own financing.

The center is to consist of a director and administrative, operational, and maintenance personnel, all provided by the Soviet Union, along with a research council, whose members will be appointed by the Soviet authorities and will include an IAEA representative. The USSR is to finance all the initial expenditures, but it has been suggested that, subsequently, members of projects will operate on a cost-sharing basis. Because of the potentially large number of scientific projects, no distinction is made between what could be termed "emergency projects," such as replacing the sarcophagus or building a reprocessing plant for nuclear waste, and more peripheral areas of scientific inquiry. It is also quite clear that, although the center is located on Ukrainian territory, it is to be an exclusively all-Union concern.

³ Personal correspondence with Yuri Risovanny, Pripjat' Industrial and Research Association.

⁴ *Background Information on the Establishment of a Chernobyl Centre for International Research*, Moscow, September 19, 1989.

The center's draft program suggests seven possible scientific and technical projects:

- (1) Dealing with the sealed reactor, including an examination of its internal components and the migration of nuclides.
- (2) Decontamination work and related issues, such as the kind of techniques and equipment to be employed.
- (3) Decommissioning the damaged nuclear reactor, entailing an analysis of the long-term problems arising from unit 4.
- (4) Environmental and agricultural studies of the accident's consequences, such as the movement of radionuclides in the food chain and ground water.
- (5) Radiation safety, including protective equipment, radiation monitoring, and the impact of radiation on health.
- (6) Molecular radiobiological studies on human health problems, especially radiation-induced cancer.
- (7) Ecology and chemistry, such as sampling and measuring methods and mobile laboratories.

There appear to be two principal difficulties with regard to the reorganization of activities in the zone that are not dealt with in the draft program. First, a new and massive influx of personnel into the Chernobyl' zone seems somewhat risky from a health perspective. The zone remains sealed, and radiation levels are still well above normal, thus making a long-term sojourn by personnel unlikely. It is not clear why the decision was taken to establish the center in the zone rather than in a city such as Kiev whence periodic trips into the zone could be organized. The second problem is related to overall control over the post-accident analysis. One of the main criticisms in the Soviet Union about the post-accident studies has been that information has been limited to a restricted group. The establishment of the Soviet-IAEA Center appears to continue that policy. Access to the center, it would seem, will be limited to selected scientific bodies, and there is little indication that the published results will be available or—perhaps more important—comprehensible to the average Soviet citizen who is obliged to live with the accident's consequences.

The "Cover-Up"

Over the past four years, Soviet citizens, particularly those living in the southern regions of Belorussia, northern Ukraine, and the Bryansk Oblast of the Russian republic have become increasingly concerned about the Chernobyl' disaster and its aftermath. The biggest source of anxiety has been the alleged failure of the authorities to provide full and accurate information about the conse-

quences of the accident. Similar accusations were made against the British government after the accident at the Windscale nuclear plant in Cumbria in 1957 and, to a lesser extent, against the US government following the radiation leak at the Three Mile Island plant in Pennsylvania in 1979. How valid are allegations that Chernobyl', clearly the most serious accident of the three, was the subject of an official cover-up, despite the newly proclaimed policy of *glasnost*'?

From the very outset, there were attempts to control the amount of information released. As an accident at a station under all-Union control, the initial inquiry was restricted to the USSR Ministries of Power and Electrification, Health, and Medium Machine-Building and to the Academy of Medical Sciences of the USSR, represented by Vice President Leonid Il'in. Offers of medical and material help from abroad were initially refused, with the exception of that of Dr. Robert P. Gale, who was permitted to fly to Moscow to carry out bone marrow transplants on the first victims, who had been exposed to radiation at levels of around 600–800 rems.

There then followed a bewildering number of reassuring statements from Il'in, Ukrainian Minister of Health Anatolii Romanenko, and others, who claimed that the impact of Chernobyl' would be considerably less serious than had initially been feared. After May, 1986, decontamination work in the zone was carried out largely by military reservists. It has been established that no official record was kept of the identities of the young soldiers who served in the zone, and thus it has not been possible to monitor health problems among them. Yet, the incidence of illness among reservists today is said to be exceptionally high.⁵ The thirty-kilometer zone, from which the population was evacuated, was a very arbitrary delineation, but little or no attention was paid to neighboring regions where the inhabitants were assured that they were in no danger.

The CPSU Politburo sent two representatives to Chernobyl' on May 2, 1986—Egor Ligachev and Nikolai Ryzhkov. It was reported that, on their orders, the ten-kilometer zone that had initially been slated for evacuation was extended to thirty. General Secretary Mikhail Gorbachev made only one television appearance dealing specifically with the ramifications of Chernobyl'. This was on May 14, 1986, and he confined his remarks largely to "the heap of lies" about the accident in the Western media and to the indirect support that the nuclear disaster provided for his avowed policy of removing all nuclear weapons from the earth by the year 2000. In turn, the Ukrainian Party leaders in Kiev played almost no role in the accident's aftermath, appearing to regard it as a matter of either all-Union or oblast jurisdiction. Thus, the Ukrainian Party official who visited the scene of the disaster most frequently was First Secretary of Kiev Oblast Party Committee Grigorii Revenko.

⁵ See, for example, *Atmoda*, December 11, 1989, on cleanup workers from Latvia.

By October, 1986, the All-Union Center for Radiation Medicine of the USSR Academy of Medical Sciences had been established in Kiev. It was nominally headed by Anatolii Romanenko but in reality came under the supervision of Il'in. Ostensibly set up to monitor the effects of radiation on the population, the center, or a higher authority, then proceeded to classify most of the information about the disaster, and the organization's public statements were confined to platitudes. Requests by more "acceptable" Western medical experts to visit the center—by Robert Gale, for example—were rejected. The center compiled a register of those affected by the accident, but this list was later revealed to be very incomplete. It now contains less than 25 percent of the population officially acknowledged to have been affected. Within the center, the Institute of Clinical Radiology, headed by Dr. B. G. Bebeshko, which is monitoring the first radiation victims, has been considered the most secretive department of all.

In May, 1988, in Kiev, an international conference was held on the medical consequences of the disaster. Western experts at that time appeared to accept at face value many of the statements released by the center, and the book based on the proceedings of the conference was notable for its omissions and one-sided account of the subject matter. Further, many of the papers published in the book were too technical to be understood by the average citizen. At the same time, because of the increasing number of journalistic inquiries about the effects of Chernobyl', the center began to react against what it called "emotional" press accounts that, it claimed, failed to take into consideration "expert" opinion. On several occasions, the comments of Western scientists were used to support official statements, while Westerners who predicted high future casualties were swiftly and roundly denounced.⁶

It seems evident today that information was systematically concealed, but the question remains: why did this happen in a period of *glasnost*? Some critics, such as the Ukrainian doctor Yuri Shcherbak have maintained that certain groups in Soviet society, such as the armchair bureaucrats in Moscow ministries who were unaccustomed to public inquiries and a demand for accurate information, remained immune to the effects of *perestroika*. In Belorussia, in the spring of 1989, when the radioactive fallout was declared to have been much more extensive than previously admitted, the slow progress of *perestroika* in the republic was blamed for the earlier erroneous reports. It might equally well be maintained, however, that, whatever the general level of *glasnost*', the nuclear power industry had remained shrouded in secrecy. The extensive accounts of heroism and bravery in the cleanup campaign had served to conceal fundamental issues such as the extent of radiation contamination and the impact on public health.

⁶ One example is Professor Richard Wilson of the Department of Physics at Harvard University.

In fairness, it should also be acknowledged that, like the Western scientific community, the Soviet authorities were horrified by the initial reaction of the Western media to Chernobyl'. At some point, it was decided to withhold most of the salient facts about the disaster. This practice, however, imposed a lamentable psychological burden on the affected population, who began to reject official sources of information. The Radiation Center was again at the heart of the problem. In the summer of 1989, several patients in a Moscow hospital, all of whom had been involved in the cleanup campaign, complained that their illnesses had not been attributed to radiation sickness; a similar complaint was registered by eighteen hunger strikers at the center in February, 1990.⁷ Il'in also incurred disapproval when he defended a new norm for radiation exposure stipulating a maximum lifetime dose of thirty-five rems. This went into effect in January, 1990, and is used as the criterion for determining whether villages should be evacuated.

The unfortunate truth is that the public has no confidence in domestic health authorities and experts, with the result that even accurate information is rarely believed. Under these circumstances, the burden of disseminating reliable information has fallen on Western organizations, particularly the International Red Cross, the World Health Organization, and Greenpeace. Yet, such groups are only effective insofar as they operate independently of Soviet "host" organizations, such as the Center for Radiation Medicine.

The bibliography on Chernobyl' is extensive, both within and outside the Soviet Union.⁸ Yet, according to the Red Cross, the affected population has lacked pamphlets providing basic information about living conditions and the environment, symptoms of radiation sickness, and other fundamental issues.⁹ Regional discontent has been attributed to public "radiophobia," and there has been a notable lack of regard for the predicament of individuals. The average rural dweller in areas affected by radioactive fallout simply has no access to any reliable sources of information other than the press. Hence, while not all illnesses are attributable to radiation, it is difficult for the average person to determine the difference between radiation- and nonradiation-related sicknesses. Official secrecy has unfortunately given the impression that the effects of Chernobyl' are practically all-encompassing. The Red Cross account, cited

⁷ Information provided by the Ukrainian Press Agency, London.

⁸ A few examples illustrate the wide scope of such works. Graham Rickard, *The Chernobyl Catastrophe*, New York, Bookwright Press, 1989; J. F. Diehl, *Radioaktivität in Lebensmitteln: Tschernobyl und die Folgen*, Karlsruhe, 1986; *Chernobyl and the Safety of Nuclear Reactors in OECD Countries; Report by an NEA Group of Experts*, Paris, Nuclear Energy Agency, 1987.

⁹ League of Red Cross and Red Crescent Societies, *Report on Assessment Mission to the Areas Affected by the Chernobyl Disaster*, U.S.S.R., 1990.

above, also indicates that medical expertise on the effects of high-level radiation in the affected areas remains primitive.

The events of the past four years have taught the population that an inquiry into a tragedy of this nature cannot simply be left to "the experts" but requires instead a more general dissemination of simple information and warnings. The Soviet authorities failed from the very outset to alert the population about the scale of the accident. Western experts, for their part, have appeared to overlook the fact that many of the country's rural inhabitants have a far more limited knowledge of nuclear power and the effects of radiation than has the general public in the West. In other words, the gap in the Soviet Union between those rather misleadingly termed "experts" and the average rural resident is wider. Thus, the long-term tradition of official secrecy in the realm of nuclear power has served both to destroy the credibility of health officials in the eyes of the public and to offset the progress made by *glasnost'* in developing a more open society.

The Scope of the Disaster

Over the past two years, it has been admitted that the disaster had far more extensive consequences than was at first revealed. Fresh inquiries have been launched into the medical effects of radiation contamination in regions outside the official thirty-kilometer zone. Scientific studies have been made by institutions and individuals unconnected with the Soviet health and nuclear energy authorities. They are said to have found mutations in livestock and plants, an alarming rise in the incidence of sickness among the population, and contamination of areas in the western regions of Belorussia and Ukraine, several hundred miles from Chernobyl'. Representatives of both the Red Cross and Greenpeace have visited these areas this year, and in the West a campaign to provide medical aid has been initiated under the name "Children of Chernobyl'."

Although the first evidence of radioactivity well beyond the thirty-kilometer zone was discovered in Belorussia, it was in the Narodichi Raion of Zhitomir Oblast in Ukraine that what can be termed the first post-Chernobyl' "crisis" broke. Local residents, concerned by the high incidence of sickness in the raion, appealed for help to politicians and journalists, complaining that their plight was being ignored by the health authorities in Kiev. There followed several high-level visits to Narodichi, but the attention of the general public was really drawn to the problem only after the release of three films about the situation: *Pomih* (Threshold), *Mi-kro-fon!* (Microphone), and *Zapredel* (Beyond the Limits). Made between the fall of 1988 and the summer of 1989, these films claimed that high levels of radiation in the raion that had previously been ignored had caused widespread sickness among children and mutations in livestock.

Several newspapers in Kiev seized on the story—in particular, the weekly *Literaturna Ukraina* and two dailies, *Molod' Ukrainy* and *Radyans'ka Ukraina*. Articles written by V. Kolin'ko, V. Skoropads'ka, and L.

Kovalevs'ka demanded that there be greater frankness about Chernobyl' and that more attention be paid to the plight of people who had been subjected to high levels of radiation. At a public meeting in Narodichi, representatives of the Center for Radiation Medicine reluctantly agreed that there had been serious cesium contamination of the soil in twelve villages in the raion and also in two other villages in the Poleskoe Raion of Kiev Oblast. It was subsequently announced that these villages would be evacuated, together with more than 100 villages in the Gomel Oblast of Belorussia.

The health authorities nevertheless ridiculed the three films, maintaining that there were no links between radioactive fallout and deformities in newborn livestock. The illnesses among children were attributed to an iodine deficiency in the area. A dispute also arose about just how much radiation Zhitomir Oblast had been subjected to in the disaster. The authorities in Kiev cast doubts on a figure of three rems per hour radiation background recorded in the town of Narodichi by civil defense authorities. In the summer of 1989, the journalist Eduard Pershyn took a geiger counter into the forests around Narodichi and obtained readings that were much higher than in Prip'yat and Chernobyl' at the time, leading to the surmise that it had been this region that had borne the brunt of the radioactive fallout.

Independent scientific analysis also began to undermine the official denials. Dmytro Grodzinsky, a corresponding member of the Ukrainian Academy of Biological Sciences, advanced the theory that radioactive hotspots might have been carried great distances by the wind and caused the livestock mutations. He took issue with studies that placed reliance on comparisons with Hiroshima on the grounds that the total volume of radioactive material released after the accident at Chernobyl' was some ninety times that released in Japan in 1945. Grodzinsky, like some of his compatriots, also has doubts about the relative harmlessness of low-level radiation.

In a more recent study, Grodzinsky notes that the main radionuclides now causing concern are cesium-137, strontium-90, ruthenium-106, and serium-144. Strontium-90, which emits beta radiation, is particularly worrying because it is virtually undetectable by gamma-monitoring Soviet geiger counters.¹⁰ The early releases of iodine-131, which has a half-life of only eight days, may have severely weakened the immune systems of people both in the vicinity and in more distant regions, thus making the public more susceptible to a variety of illnesses.

In the spring of 1990, a more detailed study of the radiation background and cesium levels in the soil in the northern raions of Zhitomir Oblast was published. Three raions were shown to be facing extensive problems. In Luginy Raion, nineteen villages had levels of cesium contamination well above the norm; in Narodichi Raion, the figure was eighteen; and in Ovruch Raion, it was eight. Altogether, more than fifty settlements had readings that

were in excess of the maximum norm of fifteen curies per square kilometer; in some cases, the figure was as high as 170 curies.¹¹ These settlements, it should be emphasized, had taken little or no action for almost three years and lacked supplies of uncontaminated food and water. As a recent Red Cross report has indicated, the poor diet of the local residents is currently contributing to the rise in the incidence of illness.

At first, it was generally denied that there would be any serious health problems in the aftermath of Chernobyl'. Since 1988, more information has been forthcoming, though it is still far from complete. It is known, for example, that in 1988 the incidence of disorders such as hypertension, diabetes, chronic bronchitis, and nervous complaints in Gomel Oblast was three to five times as high as in earlier years; 5 percent of children in the area concerned had been subjected to doses of radiation to the thyroid of more than 1,000 rems, and 20 percent to doses of more than 200 rems.¹² The Ukrainian Supreme Soviet recently discussed the health consequences of the accident for Ukraine.¹³

Some 3 million Ukrainians and Belorussians are living in areas that were subjected to a high level of fallout. The forest regions have been especially hard hit.¹⁴ In Belorussia and Ukraine, approximately 12 million hectares of land are being specially monitored, in addition to a smaller area in the Bryansk Oblast of the RSFSR.¹⁵ What are termed "primary measures" to alleviate the effects of Chernobyl' are already reported to have cost the all-Union government 2.3 billion rubles, while more general expenses have run to 8 billion rubles. The general expenses include the cost of providing public utilities for new villages built for evacuees, surfacing roads, and providing basic amenities. Much of the cost of ensuring uncontaminated supplies of food for communities such as Narodichi and of carrying out future evacuations has fallen on the governments of Belorussia and Ukraine. Narodichi itself is to be placed on the "emergency" list for speedy evacuation.¹⁶

Political Consequences

Since July, 1987, when the former director of the Chernobyl' plant, its chief engineer, and certain other staff were put on trial for "criminal negligence," there have been few direct political repercussions of the accident. In November, 1989, the unpopular Ukrainian minister of health, Anatolii Romanenko, was removed from office, though he appears to have retained his position as director of the

¹⁰ *Zelenyi svit*, No. 1, October, 1989.

¹¹ *Molod' Ukrainy*, February 15 and 18, 1990.

¹² League of Red Cross and Red Crescent Societies, *Report on Assessment Mission to the Areas Affected by the Chernobyl' Disaster*, U.S.S.R., 1990.

¹³ See David Marples, "One Million Ukrainians Affected by Chernobyl'," *Report on the USSR*, No. 13, 1990, pp. 19-21.

¹⁴ On the situation in forests, see *Lesnaya promysblennost'*, January 27, 1990.

¹⁵ See *Bryansky rabochii*, August 23, 1989.

¹⁶ *Radyans'ka Ukraina*, February 13, 1990.

Center for Radiation Medicine in Kiev. Several ministries with responsibility for the Chernobyl' power station have shed leading personnel, both shortly after the accident (the Ministries of Power and Electrification and Medium Machine-Building) and more recently (the Ministry of Nuclear Power).

Within the Party hierarchy, Chernobyl' seems to have claimed few victims. The Ukrainian Party first secretary at the time, Volodymyr Shcherbitsky, was criticized for holding the May Day celebrations in Kiev only one week after the accident, but this would seem to have had nothing to do with his ultimate retirement in September, 1989. The Belorussian first secretary, Nikolai Slyun'kov, was subsequently elevated to the CPSU Central Committee Politburo. As the Chernobyl' plant was under the control of ministries in Moscow, the Party leaderships in Ukraine and Belorussia seem to have survived the accident unscathed.

At the popular level, however, Chernobyl' sparked not only a debate on the wisdom of building nuclear power stations but also much greater concern about the environment generally. Throughout the Soviet Union, protests were mounted in 1987-88 against nuclear power plants

already in operation and under construction, and it seems undeniable that Chernobyl' served as a unifying factor. In Ukraine, the ecological association "Zelenyi svit" (Green World) was founded in late 1987. Its chairman, Yurii Shcherbak, has made numerous visits to Chernobyl' and also featured in the film *Mi-kro-fo-n!* In Ukraine and Belorussia, the general public has made its feelings about Chernobyl' known through "Rukh" and the Popular Front of Belorussia.

Chernobyl' has divided Soviet society. It has nurtured a popular distrust of scientists and of Party leaders. The suffering of the population in Ukraine has strengthened the belief that Ukrainians should have the final word about which industries are located on their territory. But even now, four years later, for the average citizen there remain too many unanswered questions: How many people have in fact died as a result of the accident? The official figure is still thirty-one, but unofficial estimates range as high as 250. How many areas have been affected? What casualty toll is still to come? And have the lessons of Chernobyl' been learned?

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