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NUCLEAR POWER REACTOR ACCIDENTS AND SAFETY MEASURES

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SUMMARY. The Harrisburg nuclear mishap brings to mind other nuclear accidents which have occurred in the West as well as in Eastern Europe and the USSR. All countries will have to tighten their safety requirements, and the communist countries have even further to go than the West. What is lacking in the communist areas is open public discussion of the problem and public manifestations of concern which would add support for even stricter safety measures.

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America's worst nuclear power plant accident to date (located near Harrisburg, Pennsylvania) has provided a tonic week of anxiety for hundreds of thousands of residents within 32 km. of the plant.

Long before repairs have been made to this crippled and leaking atomic energy power plant and before it is put back into operation, detailed reviews of safety standards as well as their revision will have been made at several levels of government and in industry. Stricter safety standards will be introduced, even though three in effect in the United States are among the highest in the world, simply because the old safety requirements have proved to be inadequate. The Harrisburg event has seriously shaken people's confidence and has increased the general public's skepticism. President Carter's recent visit to the area merely accentuated official concern over recent developments and the consequences of America's worst-ever nuclear power plant failure, even though, to date, no loss of life directly attributable to failures in nuclear plant operation has been experienced in the United States.

Other Nuclear Accidents in the West. Britain, relying on gas-cooled reactors rather than the pressure-water type generally employed in the US and Eastern Europe, has also experienced "meltdowns" accidents where the nuclear fuel was subjected to such heat as to cause the release of radioactive vapors into the atmosphere. The first occurred in 1957, when tons of uranium were subjected to incendiary forces resulting in atmospheric emissions -- however, still below the radiation levels permitted by international regulations. The radioactive vapors were able to escape into the atmosphere were readily because no enveloping dome surrounding the nuclear vessels had originally been built. The Harrisburg nuclear plant has such a safety envelope, because the US national regulations require its inclusion before a license to build is granted by the federal authorities. The first and only nuclear plant to be built in the Soviet Union or, for that matter, in Eastern Europe with a similar steel-reinforced concrete containment dome was the Ruber plant at the Soviet Union's largest nuclear power complex, being built in 1978 in Novovoronezh, some 485 km. south of Moscow on the banks of the River Don. This was, therefore, the first such safety provision included in a Soviet nuclear power project built over the last 24 years. None of the previous 19 reactors had a containment dome. No doubt future Soviet-designed nuclear power plants will have this as a regular safety feature. Some 17 Soviet reactors are now in operation.

When the Soviet Union constructed a nuclear power plant for Finland the firms insisted on the building of a protective envelope.

France also experienced damage to its gas-cooled reactor -- which is much bigger than the one previously built in the UK -- in 1969. As in the United States and the United Kingdom, no losses of life attributable to nuclear power accidents were recorded in France.

Nuclear Accidents in Comecon Countries? In Czechoslovakia and the Soviet Union nuclear accidents involving the loss of lives have occurred, according to unofficial reports from these countries and various Western sources.

Over the last two years or so, according to a recent report of the Czechoslovak Charter 77 group, (1) two serious accidents occurred at the Jaslováka Bohunice reactor in southwestern Slovakia. During the first accident, on 3 January 1976, two technicians suffocated from the gases and radioactive gases were emitted into the atmosphere. On 24 February 1977 the second accident, caused by a fuel rod installation error, led to contamination of the air, and an accidental release of radioactive waste water contaminated the nearby stream. The Prague authorities have asked the International Atomic Energy Agency "categorically to deny" any reports of accidents. A spokesman for the agency in Vienna indicated that, since it had no effective means of checking, the agency was in no position to comment. Strict Czechoslovak official control of the local media and visits to the plant has led to a dead end.

In the Soviet Union three major nuclear accidents have been reported. (2) An accident in the Ural Mountains in the late 1950s (late 1957 or early 1958) is said to have spread radioactive material over about 2,000 sq. kms., but Soviet authorities have never acknowledged this accident. A Soviet dissident biochemist, Sheres Medvedev, was the first to report it in 1972 and he claimed that hundreds of people had been killed by exposure to radiation. A second accident in Kyska, which is said to have taken place in 1960 or 1961, was reported in US central intelligence documents released during 1977, as well as another one reported to have occurred in the early 1970s at the Shevchenko fast-breeder reactor, located on the Murghabishk Peninsula jutting into the Caspian Sea. Failure in the cooling system, forcing a shut-down of the reactor in 1979, was the cause of the accident in the latter case, according to the same source. In 1974 senior Soviet officials denied the occurrence of the accident.

Thermal pollution caused by the operation of a nuclear reactor operating near Rheinsberg, East Germany, has also been reported. (3)

Safety Precautions Adequate in Comecon Countries? Of the two hazards, radioactive and thermal pollution, the former is by far the more serious to human life and health and of longer duration. Western experts have been asserting that the Soviet Union and the East European countries have been less preoccupied with the incorporation of various backup safety features than the Western countries and Japan. They point to the lack of the inclusion of a protective reinforced concrete shield (4) in Soviet-designed nuclear

- (1) "Two Accidents in the Jaslováka Nuclear Power Plant," Czechoslovak Situation Report/40, Radio Free Europe Research, 4 December 1976, Item 1.
- (2) Reviewed in an AP dispatch from Moscow which appeared in the Baltimore Sun of 1 April 1979.
- (3) Der Spiegel, Vol. 32 No. 42, 14 October 1976, pp. 88 and 91 citing Heide Ditzler, an East German journalist writing for the women's magazine Frau Die.
- (4) Adding about 30,000,000 US dollars (almost 20,000,000 rubles) to the construction costs.

plants installed in Eastern Europe until 1976, when the construction of Soviet plant Number 3 located on the River Don was undertaken; to the inclusion of safety provisions only for a single break in the pipe carrying the reactor coolant, while those in the US can handle simultaneous breaks at both ends; as well as to the choice of locations much closer to population centers than has been the practice in noncommunist areas; and to the less strictly regulated handling of nuclear waste. (5) In rebuttal Soviet experts point to their safety record, claiming that no accidents have occurred since the nuclear reactor power program was initiated.

Prior to the Harrisburg failure in the US, as in much of the West and Japan, the Soviet Union's and Eastern Europe's experts had been emphasizing the essentially safe character of thermal nuclear production of electricity. Recently a Hungarian physicist, László Jéki, unlike Soviet and other East European commentators, has said that despite design and operational differences in thermal nuclear power plants, efforts for maximum safety were being made everywhere. (6) He went on to claim that no accident in any nuclear power plant throughout the world, including those operating in socialist countries, had involved radioactive contamination of plant personnel or the unit's environment.

After the Harrisburg event East European and Soviet commentators have continued to stress the essentially safe character of nuclear power production in their countries. In a Soviet television commentary, however, Anatoly Geyarnikow, claimed that the "capitalists" lust for profits compromised safety measures at the Harrisburg plant, (7) thereby presenting the latest accident to the television public with an ideological twist.

While other Western and Japanese experts are arriving in the US to see what they can learn from the Harrisburg mishap, no one from Eastern Europe or the Soviet Union has as far appeared there or apparently even asked whether such a visit were at all permissible. Commentators may fear that the appearance of any of their experts at the Harrisburg site might be construed as an admission on their part of a possible lack of adequate safety requirements at Soviet-designed nuclear power plants.

Official and Unofficial Pressure for Safety

Experts in the Soviet Union and Eastern Europe, however, have indicated concern for improving nuclear safety conditions. Recently a conference on the safety and reliability of nuclear reactors and

(5) See Thomas C'Tools in the Washington Post, 8 October 1978.

(6) Nedice Budapest, 9 December 1978.

(7) Beuter dispatch from Moscow, 3 April 1979.

atomic power stations was attended by 180 experts and scientists from all 10 Comecon countries. The conference, which opened last year on November 14 at Kralupy Vevy in Czechoslovakia, was closed to the public and non-Comecon specialists. Secrecy concerning such expert discussions of safety requirements and experience in Eastern Europe adds to the submerged anxieties of the vast majority of its inhabitants, but official restrictions on any open public manifestations on this issue prevent free public enquiry or expression. Of the socialist countries with operating nuclear power plants, only in Yugoslavia has there been open local -- popular as well as administrative -- opposition, this time to the building of Yugoslav's second thermal nuclear power plant, which is to be located on an island near the Dalmatian city of Zadar. (8)

While in the West European countries and Japan public demonstrations and open discussion have served as a source of additional pressure on public officials and industry for stricter safety regulations, the citizens of the East European countries and the Soviet Union will have to rely primarily on officially generated stimuli for more safety controls. Some help for the inhabitants of Comecon countries, however, has been provided by Western officials, who have instituted various inquiries into nuclear facilities located in Eastern Europe near their border, or by demonstrations arranged by West European residents objecting to the lack of adequate safety provisions in nearby East European plants.

Nuclear Units in Operation and their Future

Currently over 150 nuclear reactors are operating in the world. Of this number, 73 nuclear power plants are located in the US, producing about 13 per cent of total electrical energy; the United Kingdom is second with 13, and relying on nuclear sources to about the same degree as the US; France has 11, and a 9.4 per cent share of energy; West Germany has 14 plants, producing about 11 per cent of the nation's electrical power; and Italy has only 4 nuclear plants, producing about 2 per cent. The East Germans have 4 such power plants; while Bulgaria and Czechoslovakia each have 2 plants; Hungary, with Soviet aid, is building its first nuclear plant. Romania has signed agreements and received credits for the construction of Canadian-designed power plants, concluding, as did Yugoslavia, that Soviet-designed nuclear power plants are less safe.

Growing reluctance has generally been emerging on the nuclear power construction scene, even before the Harrisburg accident. This has been reflected in a drying up of new contracts and even the cancellation of old ones for American, British, and West German nuclear construction firms. Only France is pushing firmly ahead with its nuclear power construction program. Further delays in the near future can be expected in the West and in Japan. This seems to be the case even though the costs of fuel for petroleum-fired power plants have increased significantly this year.

(8) Idenko Artic, "Yugoslav Citizens Oppose Nuclear Power Plant Construction," BAO Background Report/81 (Yugoslavia), EERP, 13 March 1979.

In the Soviet Union and Eastern Europe recent assessments seem to point to little relaxation in the ambitious program outlined for the 1990s. The slow-down in the annual growth rate for Soviet crude petroleum, on which COMECON members rely heavily, as well as COMECON members' headlong drive to exploit lignite coal deposits and even such lower energy hard carbonaceous raw material sources as a stop-gap measure, point to a growing feeling of urgency among COMECON members in the field of energy.

Expanding long-term world-wide energy requirements should restimulate programs for the development of nuclear and other forms of energy in the West and Japan. The further development of nuclear energy sources will, no doubt, begin to move at a much faster pace only after some of the public anxieties restimulated by the recent Harrisburg accident have been dissipated by the application of stricter safety measures. Pre-Harrisburg estimates placed West European and Japanese dependence on thermonuclear generated electric power in the range of 10 to 50 per cent by the 1990s.

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