

The post-Chernobyl outlook for nuclear power

A view on responses to the accident from an international perspective

by Dr Hans Blix

In 1979, the Three Mile Island (TMI) accident had a heavy impact on nuclear power. It made many people sceptical of — and some even hateful — toward it. There is no doubt that the accident slowed down growth in nuclear power, even though an international recession — with a less than predicted need for electricity — was the most important factor in that slowdown.

TMI led to a large number of measures and programmes to improve nuclear safety through engineering devices and — even more — through better management practices and the more competent operation of nuclear power plants. The human factor was often in focus.

Gradually public confidence came back in many countries and we could see in March of this year how some countries in Europe — Finland and the Netherlands — were on the verge of deciding in favour of new nuclear power plants. We also were proud to be able to say that 3800 reactor years of experience had been accumulated without a single fatal radiation accident at a commercial nuclear power plant being reported and that there had never been an accident with large-scale radioactive releases from such plants into the atmosphere.

The situation is now drastically changed. The Chernobyl accident has already cost some 31 lives, other people are in a serious condition and many have received radiation doses that may cause cancer and other health problems. Land in the region around the damaged reactor is contaminated, evacuated, and closed for some time — how long we do not yet know. Indeed, some land and vegetation far away also have been affected.

Public and political reaction

Naturally, public opinion in many countries is again deeply concerned. Thousands of people are demonstrating against nuclear power — not for some ideological reason but because they feel it poses unacceptable risks. The Finnish and Dutch governments have decided to defer any decisions on expansion of their nuclear power programmes. Austria seems now to have decided defini-

tively against its mothballed plant at Zwentendorf. Other governments are faced with demands — sometimes endorsed by political parties — for the phasing out of nuclear power.

The first position taken at a high political level was that of the seven Western leaders meeting in Tokyo at the 1986 economic summit in April. They declared that “properly managed” nuclear power will continue to produce an increasing share of the world’s electricity. Not long thereafter, the Soviet leader, Mr Gorbachyov, declared that the future of the world economy can “hardly be imagined” without the development of nuclear power. The leaders of the world’s strongest countries have thus come out categorically to declare their continued intention to rely on nuclear power. Many other political leaders are rushing forward, however, with demands to stop or phase out nuclear power, seeking to give political form to an anxiety that they see among voters.

Industry response

What response should come from those who construct and use nuclear power stations? It is true that they have a vested interest in the future of nuclear power. This, however, cannot reduce the value of their testimony. They — more often than the average man — live near nuclear installations and work in them. And they — just like other people — feel concern about increased risks of cancer and contamination. They manifestly demonstrate their view that the risks are not unacceptable, just like the crews flying aircrafts all around the world.

In my view, their response, and ours, should be to contribute as much factual information, responsible analysis, and constructive action as possible to further improve nuclear safety and to ensure that the consequences of any nuclear accident, should one occur, are limited with virtually no radioactive releases into the environment. Through the visit that two colleagues and I made to Moscow and Chernobyl after the accident, we have tried to contribute factual information about the recent accident and to further a joint international programme improving nuclear safety.

We may lament — as I sometimes do — that the media tend to come out with headlines based on almost

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any alarming speculation or rumour they may find and that this often creates unnecessary anxiety in the public. We have seen a drastic drop in bookings of flights to Europe and of hotel rooms in Europe, a reaction that appears to many of us here to be an absurd consequence of exaggerated media images of terrorist and nuclear dangers on this continent. The media will not change, however, and we can only try to influence their reporting by, ourselves, contributing reliable data and responsible analysis. Indeed, we have a duty to media and to society to do so, since we often have these data and often can make such analysis. Let me then suggest some responses.

Perspectives and risks

First, it is legitimate in any society to discuss choices of technologies and the question whether any of them would entail unacceptable risks or damage. The assessment of risk is not an easy matter, however, and comparisons of risks are even more difficult. American and other Western analyses have assessed the risk of core melts in the types of nuclear power stations currently used in these countries and concluded that it is extremely low — and so far there have been no core melts from such stations with significant radioactivity releases to the environment.

Following the TMI accident many new measures were taken to reduce such risks further and the record has shown a continuous reduction in the number of accidents and incidents and an improvement in reliability. Good safety and good economics thus go hand in hand. Also through experiments we now know much more about severe accident scenarios and how to manage them.

I do not know whether similar risk assessments have been made for Soviet reactors, but I am confident that — especially after the Chernobyl accident — the same kinds of searching safety analyses will take place in the Soviet Union as we have witnessed in the West. There is no reason to think that the Soviet Government is more willing than others to take conscious risks with the populations of great cities.

No one should belittle the accident at Chernobyl, and the Soviet Union itself is not doing that. But many conclusions should wait until we have a clearer picture of the accident and its physical and health consequences. It is to be welcomed that the Board of Governors of the IAEA has decided — with Soviet agreement — to hold a detailed expert post-accident analysis at the IAEA in Vienna. While not every fact that is of interest will be available at that time, many more facts than we have now will be, and that will enable us to assess better the scope of the accident and place it in proper perspective.

That larger perspective must, of course, include a comparison with the risks and damage connected with other forms of electricity generation: gas explosions, dam bursts, and pollution from coal and oil. Radiation releases are a unique feature of nuclear power. But is the

damage in a broader sense unique? The Chernobyl plants generated 4000 megawatts of electricity. The same amount of electricity produced by coal will cost a certain number of casualties among miners and transport workers, and through pollution it will inflict some death or damage upon woods, lakes, land, and cities and cause a certain number of cancer cases. And this will happen not as a result of an accident, but under quite normal operating circumstances. Even at an excited juncture — perhaps especially at such a time — we must retain a sense of proportion in our judgement.

The comparison between the consequences of using coal and those of using nuclear power is particularly appropriate, as we know that the future choice of energy source for electricity production will in many cases be limited to these two. And we know that electricity consumption shows a strong tendency to increase.

We know now, though not yet in detail, what damage nuclear power plants for electricity generation can inflict when a large accident occurs. We must be equally aware how much sulphur dioxide, nitrogen oxide, and carbon dioxide are produced by power stations generating electricity by coal or oil. To the concern we feel about their contribution to dead forests, acid lakes, and cancer we must now add anxiety about the possible greenhouse effect of the carbon dioxide generation that is inevitably linked with the burning of fossil fuel. An increasing number of serious scientific studies indicate that we are faced not with some theoretical but a very real problem.

Nuclear waste issue

In the comparison of risks and damage — as between nuclear power and coal — we must not, of course, bypass the nuclear waste issue. Before Chernobyl, public concern was stronger on this issue than on the issue of nuclear safety. This concern contrasts strangely with the strong and growing consensus among scientists and engineers that we already have the techniques necessary for the safe ultimate disposal of nuclear wastes and that no major breakthroughs in technology are needed. To convince the public of this requires that spent fuel and waste at all levels be meticulously handled and that adequate installations be planned and built. This is the job of industry, utilities, and national authorities. It must be speeded up.

If I may add one word from an international vantage point, it is that industry should examine the probable advantages achievable through economies of scale from having fewer and larger disposal facilities, and governments should examine their possible advantages from the viewpoint of non-proliferation. In the present climate this may be even more difficult than before Chernobyl, but we should not lose sight of it.

Nuclear power development

The second point I should like to make concerning a response to Chernobyl is that, regardless of how people

view the comparison between nuclear power and other sources of energy and how they view the question of further nuclear expansion, they know that nuclear power is here for a long time. It follows that nuclear safety must be good everywhere in the world and that measures must be taken to ensure that the consequences of any nuclear accident, should one occur, would be limited.

Let me illustrate this. Nuclear power is now providing 15% of the world's electricity supply. Before Chernobyl we had calculated nuclear generating capacity would be some 400 000 megawatts-electric around 1990, by which time some 20% of world electricity generation will be accounted for by nuclear power. It is conceivable that this figure may be affected.

The situation differs from country to country, but in my view nuclear power is well beyond the point of no return in many countries. In France it provides 65% of electricity, in Switzerland 40%. Nuclear power is not a luxury we can drop like a garment. Rather it is a reality we shall continue to live with. The Bhopal disaster, with some 2000 deaths, did not stop the chemical industry; it is indispensable. And the Challenger catastrophe is not stopping the US shuttle programme, whether indispensable or not. Nuclear power responds to very real needs and will also not be stopped.

International measures

Having said this, however, we need to add that a good number of measures must now be taken to avoid another nuclear accident of this magnitude. The main effort to ensure this will be made in individual countries but, given the interdependence of the modern world and the fact that nuclear clouds do not respect national boundaries, it is not surprising that many governments demand today that international co-operation must guarantee that safety standards are high everywhere. A very constructive discussion has already started, and I was encouraged during my visit to Moscow by the fact that the Soviet authorities were the first to urge such international co-operation and to offer their full participation in it. Shortly thereafter the Board of Governors of the IAEA met in special session and, having discussed a number of ideas advanced by the Secretariat, gave directions on several concrete points, and specific proposals for adoption will be considered.

What, concretely, do we propose?

A number of measures would seek to remedy certain weaknesses in international collaboration that we have seen in the Chernobyl case. A multilateral convention is needed on early warning following any nuclear accident that might have transboundary effects. Had such an instrument and related internal implementing provisions existed in this case, the information needed by neighbours would probably have been forthcoming. They would have been alerted earlier and could have taken some precautions. Another multilateral convention, aimed at providing ready machinery for emergency assistance also is being proposed. While the Soviet

Union and other States with large nuclear programmes may be less in need of such assistance, many countries with smaller nuclear programmes might be more dependent upon it. Also we need a global network that will continuously transmit figures about levels of radiation in various parts of the world so as to enable authorities to take proper action. And there needs to be harmonization of different countries' regulations concerning intervention levels. The response we have seen in the past weeks was very heterogeneous. Many countries — and especially developing countries — need assistance in improving their capability to monitor radioactivity and in formulating safety regulations.

All these measures, useful and necessary as they are, have in common that they address the type of problems just confronted. We should be better prepared if radioactive releases were to recur. We hope they do not.

Of a different kind are measures that will further reduce the risk of future accidents occurring and reduce the risk of radioactive releases in any accident that does occur. Let me discuss the latter case first.

Given that we can never reduce to zero the risk of a severe accident at a nuclear power plant, and that the risk could become reality again tomorrow, accident management and limitation are vitally important. Much has been learned in this regard since TMI and the lessons need to be further discussed and disseminated. We need, in particular, I think, arrange for discussions of such features as strong containment buildings, big filters outside containment buildings to trap radioactive releases that would otherwise escape into the environment, and recombiners to avoid hydrogen buildup.

Safety standards, inspections

To reduce further the risk of accidents occurring, a number of measures can be taken internationally. In the light of TMI and Chernobyl the question has been raised by some governments whether parts of the IAEA Nuclear Safety Standards (NUSS) should be reviewed and updated. There also is the more far-reaching question whether some of these standards can be transformed into generally binding minimum rules. The main argument, which is a convincing one, is that radioactivity does not respect national boundaries, national sovereignties. Rules ensuring the safe use of large-scale nuclear activities should therefore be worked out internationally and accepted to apply everywhere. Such rules must not, of course, relieve national governments of their fundamental responsibility for nuclear safety — only require of them that they apply certain standards. They are the repositories of legislative and executive power and are responsible vis-à-vis their citizens.

Obligatory international safety inspections of nuclear installations — a parallel to safeguards — are not likely to be introduced. However, a pragmatic approach by governments might result in a much larger number of invitations for international teams to review the safety of nuclear power stations. For some time now the IAEA

has been sending out such teams (called Operational Safety Review Teams, or OSART) at the request of Member States. Governments may wish to have more such international verification of the safety of nuclear power plants on their territories, in order to satisfy both internal opinion and neighbouring countries.

I shall go no further in cataloguing possible safety measures, but I would mention, lastly, that, in my view, increased attention should be devoted to the next generation of nuclear reactors having greater intrinsic safety. The less forgiving the public and authorities are vis-à-vis nuclear installations — and no one can blame them for taking the view that Chernobyl type accidents are unacceptable — the more forgiving, fool proof, reactor designs must be. And the sooner we see such designs in operation, the better.

Nuclear power and non-proliferation

I hesitate somewhat to turn to another subject than Chernobyl and nuclear safety, but this accident is not the only thing that is affecting the acceptability of nuclear power in the world. Besides the economics of nuclear power, there are the non-proliferation aspects, which many may view as a mine field into which technicians, scientists, and business people should not stray. My view, however, is that you should be fully aware of them, for they very directly affect the world of nuclear power.

Part of the opposition to nuclear power stems from the view — held by some — that more nuclear power inevitably means more nuclear-weapon States. Furthermore, restrictions that impede international nuclear trade have their origin, to a great extent, in non-proliferation concerns. The nuclear industry accordingly has very direct reasons to interest itself in the problem of nuclear proliferation, more particularly in what can be done to reduce even further the risks of proliferation. What is the problem?

The basic contention that experience in the civilian nuclear field may be of assistance to a State bent on making nuclear weapons cannot be rejected, even though all the existing nuclear-weapon States first developed nuclear weapons and only then went for nuclear power. Also, it must be recognized that nuclear weapons technology is sufficiently well known today for any State with a developed industrial and scientific infrastructure to manufacture such weapons, if it is prepared to devote the necessary time and resources to their manufacture. The denial of nuclear technology to a non-nuclear-weapon State may certainly retard a programme for the manufacture of nuclear weapons, but such denial does not raise an insuperable barrier. The first and foremost barrier to horizontal proliferation thus lies in the political will of governments to forego the nuclear weapons option and their readiness to enter commitments to that effect.

How is this political will to be stimulated and maintained? I shall not tire you with a long discussion of the

importance for this question of such matters as nuclear disarmament measures and security arrangements. But I would like to remind you that, while opponents of nuclear power are likely to contend that the spread of nuclear science and technology to further countries raises a proliferation risk, the basic approach during 30 years of effort has been to make nuclear material and technology available in return for non-proliferation commitments and the verification of compliance with those commitments. The question has not been whether nuclear technology should spread or not spread in the world. The question has been whether it spreads through national endeavours without non-proliferation commitments or through international transfers coupled with non-proliferation commitments. It is fair to say that this "Atoms for Peace" approach has been reasonably successful — at least if we compare the situation now with what many people once feared. The number of nuclear-weapon States has for many years remained at five, far less than was feared. However, this is no reason for complacency.

Today, the single most effective measure in support of non-proliferation might well be an agreement on a complete nuclear test ban. A number of States that have so far not been willing to adhere to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) might prove to be willing to accept a complete nuclear test ban, thereby not only impeding a further qualitative nuclear arms race between nuclear-weapon States, but also depriving themselves of the possibility of testing even nuclear explosive devices.

While, regrettably, non-proliferation stimulants of this magnitude have so far been lacking, it is to be welcomed that the parties to the NPT at last year's Review Conference succeeded in adopting a consensus declaration on ways and means of strengthening the treaty. The declaration underlines the crucial role that States parties to the NPT ascribe to the safeguards system operated by the IAEA. While the political will of States is expressed in non-proliferation pledges, verification of compliance with those pledges — which is vital for confidence — comes through safeguards. It is no exaggeration to say that without safeguards international nuclear trade would be crippled.

Let me conclude by saying that it is gratifying that the nuclear industry, which on the whole was rather lukewarm towards the conclusion of the NPT and the emergence of the safeguards system, has come around to fully supporting these institutions. My submission is that it has very good reasons for doing so. Enlightened self-interest should prompt the industry to contribute actively and constructively to the smooth functioning of the safeguards system and to the non-proliferation effort.

The non-proliferation aspect may not impress some as being as decisive a question for nuclear power as safety. However, it is when things go wrong that we discover how important they are. Let us make sure that in the future neither safety nor non-proliferation will go wrong.