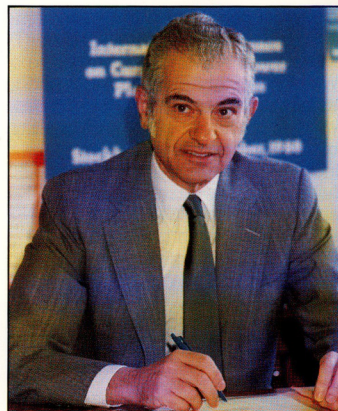


POWER PROFILE: MORRIS ROSEN OF THE INTERNATIONAL ATOMIC ENERGY AGENCY



In 1957, when the International Atomic Energy Agency (IAEA) was established to advance the peaceful use of nuclear energy, Duquesne Light Company, a U.S. utility located in Pennsylvania, was gearing up to put the world's first nuclear plant — Beaver Valley — into operation.

Today, as the IAEA approaches its 30th anniversary, more than 370 nuclear reactors are in operation in 26 countries. While each country acts independently in regulating the operation of its plants, each is actually a small part of a very large international nuclear community. The IAEA plays a vital role in that community, promoting good operating practices, safety enhancement, and information exchange among its member-nations.

As Director of the Division of Nuclear Safety for the IAEA, Dr. Morris Rosen is instrumental in carrying out the objectives of the IAEA. Since joining the agency in 1974, he has had the opportunity to work with virtually every nation that operates a nuclear plant. He has helped lead the IAEA in many of its most important activities — including the development of a

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large set of nuclear safety standards and the application of various operational and safety review programs. His tenure with the IAEA spans a very active nuclear era: one that included improvements and innovations — and, unfortunately, one that also included the accidents at Three Mile Island and Chernobyl.

Within a week of the April 26 nuclear accident at the Soviet Union's Chernobyl Unit 4, Dr. Rosen, along with IAEA Director General Hans Blix and Deputy Director General Leonid Konstantinov, visited the nearby city of Kiev. Together, they met with Soviet leaders and tried to identify areas for possible assistance and future international cooperation.

In this interview, Dr. Rosen shares his views on the state of the nuclear industry following the Chernobyl accident. He also discusses the IAEA's past and present dealings with the Soviet Union. His observations suggest a future for commercial nuclear projects, despite the controversy surrounding the accident.

Q As one of the few Westerners to have actually visited the Chernobyl site following the accident, what can you tell us about the Soviet government's intentions to work with the international nuclear community?

A I have very little doubt that the Soviet Union is prepared to cooperate with the international com-

munity in the area of nuclear power safety. The Soviets have a very large nuclear program; therefore, they have a lot to gain by an international exchange of ideas and technology.

In the weeks following the accident, Soviet leader Mikhail Gorbachev indicated that he would like to see more cooperation between the Soviet Union and other countries. He indicated to the IAEA and other international organizations that he sees a need to improve safety in particular areas. He also mentioned the possibility of looking into the safety features of the new reactor designs.

Many governments and individuals offered their assistance to the Soviet Union following the accident. In fact, the IAEA helped facilitate assistance to the Soviets. The Soviets accepted many offers of help from individuals and groups; however, they appeared not to accept offers made directly by governments.

Q Prior to the accident, what was the nature of the IAEA's relationship with the Soviets? To what extent does the Soviet Union comply with international nuclear safety standards?

A The agency was very fortunate in that it had had contact with many of the Soviets involved with Chernobyl before the accident. We were not complete strangers, as many may have thought. The IAEA has had relations with the Soviets for many years. The Soviets participated

continuously in the development of our standards and have participated in many meetings.

So, they *are* in contact with international standards. Of course, we have never performed a country-by-country review to see who meets or who doesn't meet standards. But without question, the Soviets *did* participate in the generation of the IAEA's safety documents. For that reason, we are quite familiar with a number of people from the Soviet nuclear community.

The Soviets take part in the IAEA's Incident Reporting System and have presented incidents on a regular basis. Their input has been valuable in terms of developing safety policies.

We have had safety discussions in Russia, Czechoslovakia, Hungary, and many other socialist countries. In terms of man-months, I'm sure that many of the Western nations have been more involved in these types of safety discussions. But, in all, I would certainly say that the Soviets have a commitment to international safety efforts.

We eventually hope to conduct some OSART (Operational Safety Review Team) reviews of the Soviet-type pressurized water reactor. These reviews will not necessarily be conducted in the Soviet Union initially; we may visit some of the neighboring countries — like Czechoslovakia and Hungary — that have Soviet-designed PWRs. Bulgaria and Poland are constructing Soviet-designed PWRs, also.

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Q Based on your first-hand glimpse, what was the mood of the Soviet citizens following the accident? Were they aware of the seriousness of the accident?

A When we arrived in Moscow on May 5, it was clear, from the conversations we had, that the population was aware that a serious accident had occurred. There was a lot of television coverage of the accident. In many instances, the televi-

sion scenes showed life going on normally in Kiev. At the time, that may have been the most appropriate approach to presenting the situation. You have to realize that when you have two and a half million people who are reasonably close to a nuclear accident, you certainly don't want undue panic. The detrimental results from undue panic may be greater than those of the reactor accident itself.

During our stay in Kiev, we drove through the city to witness, as much as possible, the public's reaction, and we found that there was no obvious panic. The automobile traffic looked relatively normal. Of course, I had never been to Kiev before, so I didn't have a direct comparison. But it certainly looked like a living city. There was, however, an extensive washing of city streets, buildings, and trees. But in general, the population certainly showed no signs of panic.

The Soviet scientists we spoke to showed no hesitation about continuing with the nuclear power program. As for the general public, it's hard to tell. It is very difficult for an outsider to go into a country and try and assess public or political sentiment. However, I think there is bound to be concern among any population that is near a nuclear reactor that has just had an accident.

Q What have been the effects of Chernobyl on established and developing nuclear programs throughout the world?

A It varies from country to country, depending on the political and economic need for nuclear power. But overall, countries like France and Japan have stated that they clearly intend to proceed with their nuclear programs. In fact, the nuclear issue did not seem to play a strong part in the recent election results in certain European countries like Germany and the Netherlands.

Certainly no operating reactors have been taken out of service as a result of the accident. There *has* been some slow down of nuclear activities and programs in countries such as Finland and the Netherlands, which were ready to move ahead with their nuclear programs prior to Chernobyl.

Yet, these countries have not cancelled their plans to develop nuclear power; they are simply *postponing* activities until they have more information.

Perhaps the public is beginning to realize that the nuclear industry is only a small part of the whole industrial picture. As industries develop and expand, there is, of course, potential for accidents which will involve people and property.

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Given that, the public has to consider the risks associated with non-nuclear electricity generation, as well. In Europe, for instance, many people still feel that the risk of environmental consequences of fossil-fired plants is far more serious than that of the potential for a nuclear accident.

In summary, I would say that the general response to Chernobyl has been rather muted. I would have expected a more heightened reaction.

Q In the months following the Chernobyl accident, there has been increased emphasis and attention on nuclear safety. As one who is quite familiar with the nuclear safety standards of nuclear reactors in many countries, how do you rate overall plant performance? Do you see any need for new plant designs, or for improvements in operability and construction practices?

A Today's nuclear plant designs have certainly undergone much review during the past 30 years. Of course, that doesn't mean that designs can't be improved. In fact, there have been many efforts going on for a number of years to develop improved, safer, and more efficient designs — one example being the Advanced PWR that Westinghouse and Mitsubishi Heavy Industries are developing. There is also a lot of talk about inherently safe reactor designs which could more easily compensate for human error. However, in general, I would say that the designs of the world's present nuclear power reactors are essentially adequate.

Quality of construction — particularly in regard to schedules and costs — can always be improved; this is true of any industry. But operation is really the bottom line. I think that future attention will focus on improved operations, including better maintenance. There will probably also be increased emphasis on improved operator training and human performance.

Despite the good overall operating record of nuclear plants, two serious accidents have occurred within seven years. The industry will need to *demonstrate* that significant safety improvements are being made. It may not be totally for safety's sake itself, but also to speak to public concerns.

Q How do you rate the ability of developing countries to construct and operate nuclear power plants?

A In my experience with developing countries, I've found that ability stems from commitment. If you have a country that recognizes that nuclear generation requires special consideration and supervision, then I think you can avoid trouble.

"I don't think there is any reason to believe that you cannot construct and operate a nuclear power plant in a developing country."

For a developing country dealing with a new technology like nuclear power, one of the most important steps involves training, and I believe that developing countries, with the assistance of suppliers, can be trained to operate nuclear power plants. Korea, Taiwan, Yugoslavia, Brazil, and the Philippines are examples. The IAEA has been involved with the Philippines for the last ten years. During a hearing in 1985 I was asked, "Why do you believe the Filipinos can operate a nuclear power plant?" I pointed out the fact that they *do* run an airline, which is a very complex operation. The Philippine airline has a safety record that is certainly comparable to airlines in developed countries.

As for constructing a plant in a developing country, there may be some special circumstances. While the country will usually want to use its local resources for economic reasons, the local supply organizations may not initially be accustomed to the level of quality required to build the plant. Again, it requires a commitment on the part of the utility or the government to build the plant to high quality standards. The resources can be made available.

In summary, I don't think there is any reason to believe that you cannot construct and operate a nuclear power plant in a developing country. There are specific problems that you have to address initially; but we have found, in general, that they are surmountable — they are not intrinsic to the developing country.

Q As the turnkey supplier of Philippines Nuclear Power Plant Unit 1, Westinghouse is very proud of what it accomplished; unfortunately the government has delayed the operation of the plant indefinitely. Following the audits that the IAEA conducted at the Philippines plant, how did you rate the quality of construction that was going on there?

A The agency has a long history of participation in the project, beginning with the original site survey. We kept abreast of all construction activities by placing permanent experts on long-term assignments continuously from about the mid-1970s to the completion of the project.

We performed two pre-operational OSART reviews at the Philippines plant. The first OSART identified a number of open items — things that would be present in any large project. The second OSART concentrated on addressing any remaining open items and weaknesses.

At the completion of these reviews in early 1985, we concluded that the design of the reactor, as well as the systems, were essentially no different than what we found in plants in many other countries. We determined that previous problems had been dealt with, and that the utility was qualified to operate the plant.

We concluded that, in our opinion, the reactor was ready for fuel loading and startup testing. We also pointed out that we thought a strong regulatory organization was necessary in the Philippines; we recommended that the government support the regulatory organization so that it could follow the operation of the plant.

I should point out that we only *advise*, we don't make decisions for these countries. So the results of our reviews were basically given to the Philippine government, and it was up to the government to make the final decisions.

". . . in our opinion, the [Philippine] reactor was ready for fuel loading and startup testing."

Q To what extent do the standards of various regulatory organizations influence the IAEA's programs?

A In general, we use the input and advice of regulatory organizations as much as possible in developing our standards and programs. We try to identify the best practices from all of the regulatory groups we deal with. We then factor these into our overall approach to safety and operation.

Although the U.S. NRC is one of the largest regulatory organizations, it is only *one* of many regulatory groups we work with. We occasionally use NRC experts in our OSART programs; one or two NRC experts participated in the Philippine review, for instance. But in all honesty, we simply factor in its advice as we do the advice of many other regulatory groups.

I should indicate that the Soviet Union has recently established a separate regulatory organization for the operation of its nuclear power plants. It's about three years old and it evolved from the Soviet Union's State Committee on Atomic Energy. We are beginning to use individuals from the Soviet regulatory organization, as well as other Soviet agencies, as participants in our programs.

Soviets Release Information At Vienna Conference

In one of its most important information exchange activities following the Chernobyl accident, the IAEA organized a five-day international conference in Vienna at the end of August to allow world nuclear energy experts to review the accident, its causes and effects. The conference attracted over 600 nuclear energy experts from 47 countries and international organizations, plus over 200 members of the international press.

A very detailed report of the accident, presented by key Soviet officials, provided the international nuclear community with its first real account of the accident. In their report, the Soviets explained how poor operator judgments and faulty test procedures during a turbine-inertia experiment on the evening of April 25 led up to the accident. The Soviets also pointed out the vulnerabilities of the RBMK reactor design itself, and cited plans to improve the safety of other such reactors.

According to various reports of the Vienna conference, the majority of attendees praised the Soviets for their candor in presenting their information.

Valeri A. Legasov, first deputy director of the Kurchatov Institute and head of the 28-member Soviet delegation, expressed the Soviets' desire to cooperate with the international nuclear community so that a better understanding of the accident and the mitigation of its effects can be achieved. He stated that, despite the accident, the USSR will continue to rely heavily on nuclear energy, but will seek "active international collaboration" to improve safety and operational procedures in "the whole of [nuclear] installations," including the fuel cycle.

Q How do the regulatory standards of one country affect another?

A The regulations of one country are not always applicable or necessary in another country. Many cultural and economic factors determine the standards that are developed in specific countries. One country may find it necessary to make certain regulatory changes that another may not wish to implement. For instance, in the U.S., Three Mile Island caused many design and operational changes. Yet, in some countries, the effects of TMI had a smaller impact on regulation.

From an international perspective, countries can learn a lot from each other in regard to plant operation. The good practices of one country may well be applicable to another. However, we do not recommend that one country necessarily *duplicate* the regulations or standards of another country. Rather, we offer the country our best advice — based on what we've seen and the reviews we've conducted — as to standards and principles that may be useful under the given circumstances. We recommend that the regulatory bodies of these countries carefully weigh the costs and benefits of making regulatory changes before actually implementing changes in designs and standards. Implementing unnecessary changes can be costly and even have a *negative* effect on safety.

Q In comparison to the regulatory bodies of other countries, why do you suppose the U.S. NRC has so many more written regulations?

A The large number of plant orders in the late 1960s and early 1970s required a large regulatory effort. You have to bear in mind that there are over 50 utilities operating nuclear plants in the U.S.

In other countries, where nuclear programs are not as large, utilities are often government-owned. Yet, in the U.S., almost all utilities are investor-owned. They each have different approaches and varying levels of experience with nuclear power. Because of that diversity, there possibly was a need to have more regulation and to set more standards for

designing, constructing, and operating reactors.

Q The Chernobyl accident made it clear that the international nuclear community must maintain open communication and cooperation in areas regarding safety, operation, and incident reporting. What are the IAEA's goals for increasing that kind of cooperation?

A As I said earlier, countries can learn a lot from each other, in terms of how they operate their plants. One of the IAEA's major objectives is to try and make good practices available to whomever requires them — not because we feel that any particular nuclear program is inefficient, but because it is natural for an international organization to facilitate the exchange of information between countries. Therefore, we are planning a significant expansion of exchange activities.

We feel we can serve a valuable function by bringing people together and allowing them to discuss areas of concern and importance — such as new reactor designs and ways to improve the safety and efficiency of nuclear plants.

Following the Chernobyl accident, we planned a number of meetings for the purpose of drafting international agreements on information exchange, emergency assistance, and early response to accidents. We also made plans for a special session of our General Conference to allow the energy ministers of IAEA's member-states to address specific ways to strengthen safety standards.

And, of course, we also organized a special international conference — for the purpose of reviewing Chernobyl and its consequences — to take place in Vienna at the end of August.

We are making increased efforts to make the nuclear industry's views known and will continuously strengthen interactions with industries and research organizations as well. But overall, there appears to be a good deal of cooperation between nations, especially in the area of safety.