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A Worker Perspective on Nuclear Safety

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by

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Summary

The majority of the 15,000 members of the Power Workers Union (PWU) are employed in electricity production at Ontario Power Generation's nuclear generating stations and in nuclear technology research at the Chalk River Laboratories of Atomic Energy of Canada Limited. Our members therefore have an obvious vested interest in any discussion related to their jobs.

Workers in nuclear power plants have a clearly defined responsibility to ensure a safe working environment for themselves and their fellow workers. They have an overwhelming vested interest in ensuring that the plants are constructed, maintained, and operated safely. As will be detailed in the presentation to the CNS, all workers are required to learn and demonstrate knowledge of the hazards as an integral part of employment initiation and subsequent training.

As their union, the PWU has a responsibility to ensure conditions of employment that not only permit workers to refuse work they perceive to be unsafe but require them to bring safety concerns forward for resolution to the satisfaction of both management and workers' representatives. The PWU has accomplished this through the development of workplace structures to ensure worker input is sought and acted on.

The paper will describe the next steps required to improve workplace safety at Ontario Power Generation, which could be adapted to other facilities and workgroups.

is we have done.

Our members have maintained and operated full-sized CANDU reactors for close to 30 years. In that time, there has never been a radiation-related injury in any CANDU plant. We submit, based on that experience, that our nuclear reactors have been well proven to be safe to maintain and operate. It also demonstrates the excellent safety culture that has been embraced from the outset by all nuclear industry personnel from regulators, designers, constructors, and operators.

We fully concur with the conclusion of the World Commission on Environment and Development (the Bruntland Commission) that " very strict codes of safety practice are implemented in nuclear plants so that under officially approved operating conditions the danger from radiation to reactor personnel and especially to the general public is negligible". Through the PWU, our members ensure that management adheres to these strict codes of practice.

Our members believe that nuclear reactors, as they are designed, constructed, operated, and regulated in Canada, provide a safe, ecologically sound and economically viable energy source, and that, proven over decades of operation, CANDU reactors commend themselves well for helping to meet the future energy needs of Canadians. They also believe that the nuclear industry has not only provided high quality jobs for Canadian workers, but has also generally enhanced Canadian scientific, engineering, technological and skilled trades expertise and its industrial competitiveness and international reputation.

WORKER TRAINING

Asked if he has any fear of working in close proximity to radioactive material, one of our members at the Pickering Nuclear Generating Station responded as follows:

"I don't fear it; I respect it. From the outset of our training we are taught the risks and dangers of radiation exposure. The potential health effects of radiation exposure are explained in detail. It is also explained that the dose limits are set so that the health risks resulting from radiation exposure at the maximum permissible level is no higher than the average risk faced by workers in other industries. And not only are we told how these levels relate to the natural background radiation that everyone is exposed to, but that it is very important to keep our exposures as low as possible, the ALARA principle.

"When it is at all feasible that a job could result in significant risk of exposure we have to prepare a detailed "Radioactive Work Plan", outlining the precautions to be taken, and the shielding, protective clothing and radiation monitoring equipment which will be used. This Plan has to be submitted to the Shift Supervisor for management approval."

Workers at Canadian nuclear generating stations are classified by colour code to designate different levels of responsibility for operating in a potentially radioactive work

area. The entry-level qualification "Orange" is the first level at which anyone is allowed to perform supervised work in a potentially radioactive area. The next highest level, "Yellow" qualification, allows an individual to carry out unsupervised work in a radiation area. The highest level, "Green" qualification, allows a person to work on their own, unsupervised, and to take responsibility for lesser qualified workers and station visitors.

To obtain an "Orange" qualification an individual must take a one and a half-day course on radiation protection. Work must be supervised at all times by someone with a "Green" qualification.

To obtain a "Yellow" qualification an individual must take 14 days classroom instruction, spend seven days learning station procedures, take a test to demonstrate retention of the information and have at least three months on the job experience at the "Orange" level. If there is any possibility of exceeding the AECB exposure limits, a "Yellow" worker must be supervised by a "Green" qualified person.

To obtain a "Green" qualification a worker must have at least one year's experience, demonstrated knowledge of radiation protection when serving at the "Yellow" level, take a further one week course on radiation protection procedures, and pass both a written test and a practical demonstration of the use of equipment and procedures. Retention of "Green" qualification requires requalification every two years.

We note and fully agree with the following statement by Mr. Carl Andognini of Ontario Power Generation during his recent appearance before a Committee of the Senate in Ottawa, which is examining nuclear safety:

"Whether you get quality or safety it always depends on the hands of the worker. The training required to work at a nuclear facility is very extensive. You have to have fundamental training on radiation protection and operation and in maintenance procedures. The programs are very proceduralized. The procedures are prepared and independently reviewed before they are put into operation. All the work processes are controlled.

"For instance it takes about four years for an individual to obtain a license to operate on one of the reactors. It is a very extensive and demanding program to obtain a license. All the programs are proceduralized and reviewed. Quality controls are there. There are independent checks by regulators and by independent forces within the utility as well as external forces. There are several revues going on constantly not only of the performance but of the procedure and of the personnel."

As noted by AECB staff of Canada's nuclear regulator, the AECB, in their appearance before the same Senate Committee, the regulator carries out "audits of training programs" and sets "written and simulator based examinations of key operating staff".

Worker training programs are therefore very extensive and proceduralized and worker performance is continuously monitored and frequently tested not only by management but also by the AECB. It takes about eight years of training and experience to become a first operator in charge of running a reactor.

Nuclear plant workers are fully informed of the job-related risks they accept and they are fully trained and tested on how to minimize any risk to themselves, their fellow workers, and the surrounding community. An industry critic suggested recently, "whenever anyone claims that a risk is small, negligible, trivial, or acceptable, find out whether the speaker is actually bearing the risk". Our members do indeed bear the risk first hand. And, based on knowledge and hands-on experience, they find the risks to be acceptably small both for themselves and the communities in which they and their families live.

RISK OF ACCIDENTS

It is emphasized strongly within the Canadian nuclear industry that worker and public safety should not and do not depend on an assumption that no worker will ever make a mistake or fail to take immediate action. There are reactor shutdown systems and containment systems, independent of operator action, to protect the workers and the public in the event of equipment failure or operator error.

Nuclear plant workers are not, either at home or at work, preoccupied with thoughts of a highly improbable, catastrophic accident. Critics might cynically claim this to be risk denial. However, their knowledge of the safety systems and their role in helping to test and maintain the high reliability and availability of these systems allows the workers to satisfy themselves directly that if an equipment breakdown or operator error were to happen, they and members of the public are appropriately and adequately protected.

It is sometimes suggested that the workforce at a nuclear power plant is so focussed on electricity generation that safety of operation is somehow neglected. This is an incorrect perception. Whereas there is obviously team pride in setting an operating record, members of the team are fully aware that a condition for continuing operation is the ongoing testing and demonstration of availability of the safety systems. Proven availability of the safety systems is a precondition to the setting of operating records.

FACTORS AFFECTING PERFORMANCE AND SAFETY

There is general agreement within the international nuclear community of the factors affecting worker safety and, by extension, public safety. These factors fall into the categories of training, procedures, operating manuals and reference documents, management and supervision, communications, human/equipment interface, and work practices. All of the activities related to these factors must be done well to assure safety. A comprehensive list of factors within these categories can be found on the web site of the U.S. Nuclear Regulatory Agency at www.nrc.gov/NRR/HFIS/deflist1.htm.

OPG, with the concurrence of the World Association of Nuclear Operators, has selected the following eleven indicators of performance:

- High Pressure Safety Injection Unavailability
- Auxiliary Feedwater System Unavailability
- Emergency AC Power Unavailability
- Collective Radiation Exposure
- Capability Factor
- Reactor Trip Rate
- Fuel Reliability
- Industrial Safety Accident Rate
- Unplanned Capability Loss Factor
- Thermal Performance
- Chemistry Performance

An overall Performance Indicator is calculated from this group of indicators. This allows a valid comparison of the performance of OPG's reactors with operating reactors worldwide. The company issues publicly available monthly and annual report cards, which indicate that a gradual but steady improvement is being achieved.

CANDU reactors are of a robust design and are very well constructed. Rigorous codes and standards, regulatory requirements, and quality assurance programs govern the design process. Also throughout the manufacturing and construction processes work must meet rigorous quality assurance standards. All the workers involved such as welders, pipe fitters, electricians, etc., must be specifically certified. But even the best designed and constructed reactor needs to be maintained and operated safely. Our members assure safety by careful attention to their duties such as calibrating, inspecting, maintaining, and operating the equipment. This contribution of power plant workers is carefully monitored and recorded. It is manifest in the performance indicators used by the company.

CONCLUDING REMARKS

The Canadian nuclear industry and its performance are under constant scrutiny by management, regulatory agencies, expert advisory committees, full-time critics, the media, and members of the public. The safety of its operations has been the subject of numerous public inquiries by Royal Commissions, environmental assessment panels, provincial and federal parliamentary select and standing committees, and Senate Committees. It has withstood vigorous and detailed examination.

The contents of this paper have been reviewed and approved by many of our members and particularly by their senior representatives. We are pleased to be able to provide assurance on their behalf that our nuclear reactors are of a robust and safe design and that

they are being maintained and operated safely, safe for workers and therefore safe for the public.