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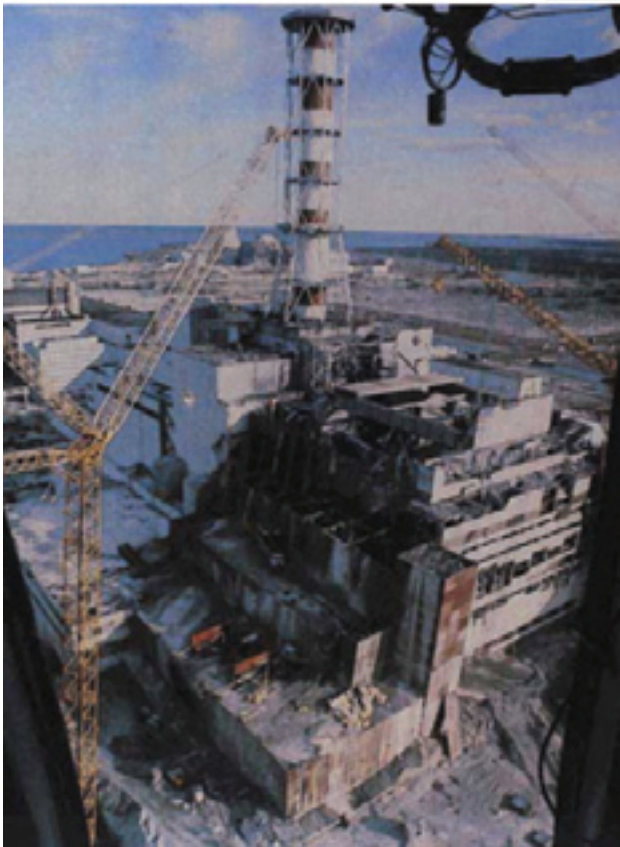
National Radiation Laboratory

The Source

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Chernobyl 20 years on

April 26, 1986, is a date that will be forever etched into the minds of nuclear and radiation specialists across the globe. In the early hours of the morning an explosion in the Number 4 reactor at the Chernobyl



nuclear power station resulted in an unprecedented release of radioactive materials to the atmosphere, with subsequent transport and deposition across most of the Northern Hemisphere. New Zealand, in common with all other countries in the Southern Hemisphere, might not have received any radioactive fallout from the explosion but the political and economic fallout continues to exert effects and will do so long into the future.

The Chernobyl disaster marked a turning point in our consciousness of many issues concerning the nuclear industry and energy generation in general, the environment and its monitoring, foodstuffs, and international cooperation and communication. The outcomes in these areas were generally positive. Elaborate new systems have been set up to enable rapid international communication following any incident with either transboundary implications or where the country involved needs help, and many nations including New Zealand have signed agreements to immediately provide relevant information and assistance to the international community. International assistance in handling emergencies and monitoring their effects has been planned, with environmental monitoring capabilities being radically improved.

Chernobyl also increased awareness of contaminants in foodstuffs and the certification of radioactivity levels in exported food products, even from New Zealand, is now a mandatory requirement imposed by importing countries. Safety consciousness in energy generation, particularly within the nuclear sector, has improved with a common goal of ensuring that Chernobyl can "never happen again". There is thus no doubt that, 20 years on, we are in an improved position of awareness and preparedness, with encouraging growth of international cooperation coupled with determination to make the world a safer place.

For further information contact Murray Matthews (murray_matthews@nrl.moh.govt.nz).

Transport of radioactive material

NRL recently attended a meeting of the IAEA Transport Standards Safety Committee (TRANSSC) held in Vienna. TRANSSC is comprised of a group of experts in the transport of radioactive material, and its role is to advise the IAEA on the overall programme for the development, review and revision of standards relating to the transport of radioactive material. Its objective is to achieve consensus, quality, coherency and consistency in the development of international standards for transport safety.

One of the main issues causing concerns internationally and currently being addressed by TRANSSC relates to the denial of shipments. This term encompasses the failure to deliver needed products (containing radioactive materials) or failure to deliver these products on time. This is of particular significance when the shipments involve radionuclides intended for use in medical activities.

A number of possible causes resulting in denial of shipments have been identified. These include inconsistencies in application of the IAEA Transport Regulations between different Member States, complexity of the regulations, lack of economic viability for carriers of radioactive material, perception of radioactive materials (ie, class 7 seen as special risk), security concerns, restrictive segregation requirements, training requirements and communication issues.

NRL recognises that some of these issues are applicable in New Zealand. In recent years we have held a number of one-day seminars for the transport sector and it is intended to offer some updated seminars in 2007. Details will be advertised nearer the time. In addition we have recently published a pamphlet entitled "Road Transport of Radioactive Material: Requirements and Guidance Notes for Drivers and Handlers". The pamphlet is available electronically on the NRL website.



For further information or hard copies of this pamphlet contact Cris Ardouin (cris_ardouin@nrl.moh.govt.nz).

Portable hand-held intra-oral dental x-ray machines

Portable hand-held intra-oral dental x-ray machines are now starting to appear on the market.

Such hand-held units will be advantageous in special applications such as in forensics and in domiciliary work where access by more conventional pedestal or wall-mounted units may be very difficult or even impossible.

The main disadvantage of such units in comparison to more conventional units is that although they all incorporate additional shielding to varying degrees, the dose to the operator will almost inevitably be larger (with the potential to be considerably larger), due to the closer proximity of the patient and the x-ray unit itself. There is also the issue of security of such a unit to consider, in particular its potential to be misused.



NRL is at present finalising a regulatory assessment on this type of equipment. In the interim NRL discourages the holding of such units by hand in routine day-to-day use in a dental surgery. Where at all practicable, the equipment should be used with a positioning stand and an exposure switch utilising an exposure cable that allows the operator to stand at least two metres away from the x-ray unit and patient. Where this is not practicable, and the unit needs to be held by hand during exposures, the operator must wear a protective lead apron and a personal radiation monitor at collar level. Additionally, utilisation of finger monitors should be considered.

For further information contact Glenn Stirling (glenn_stirling@nrl.moh.govt.nz).

New Test-Ban Treaty monitoring station installed in Mauritania

Earlier this year NRL staff successfully installed a new radionuclide monitoring station in Nouakchott, Mauritania, moving the Comprehensive Nuclear-Test-Ban Treaty (CTBT) monitoring network one step closer to completion.

While the operating principle of this station is exactly the same as the other four CTBT radionuclide stations installed by NRL (a pump sucks air through a filter, trapping any particles, following which the filter is tested for radioactivity), the remoteness of the site meant that the equipment was pre-installed and tested in two shipping containers fitted out as a laboratory, and then shipped to the site. The Mauritanian Army Engineering Corps, which is hosting the station at their base just outside the Mauritanian capital, prepared foundations to receive the equipment and assisted with the completion of the site. During the installation, NRL trained local staff to carry out the daily operations, while NRL monitor the data and are available to assist as required. The CTBT inspection visit passed successfully in July, and full certification is expected soon.



The Mauritania radionuclide monitoring station installation



NRL employee, Grant Thyne (right) taking a break with the locals

Regular sand and dust storms provide difficulties not encountered at our other sites, blocking the filter and making outside work unpleasant. A further contrast is provided by the regular detection of low levels of Cs-137, possibly a relic of the French atmospheric tests in Algeria in the 1960s or fallout from the Chernobyl accident in 1986.

For further information contact [Martin Gledhill \(martin_gledhill@nrl.moh.govt.nz\)](mailto:martin_gledhill@nrl.moh.govt.nz).

Microwave oven testing

A recent Court decision in Australia found that a company was in breach of the Australian Fair Trading Act when its promotional material implied that employers had a duty of care, under workplace health and safety laws, to carry out regular tests of leakage from microwave ovens. The Court agreed with expert evidence for the prosecution that regular testing was unnecessary, and ovens need only be tested after repair or if damage is suspected.

NRL experience fully supports the Australian view, and NRL only recommends testing ovens for leakage if the door has been damaged or does not close properly. Any leakage detected in NRL tests of new and old ovens has been well within the limits specified in the *Microwave Ovens Regulations 1982* and the relevant manufacturing Standard, and there has been no evidence that leakage increases with age if the oven is undamaged and kept clean. In the past a few companies have circulated material which can only be described as scare-mongering in efforts to persuade employers to get ovens tested regularly. NRL recommends that such material be either discarded or sent to the Commerce Commission.

Resources: NRL information sheet 15 Microwave ovens

For further information contact [Martin Gledhill \(martin_gledhill@nrl.moh.govt.nz\)](mailto:martin_gledhill@nrl.moh.govt.nz).

Advice on the licensing requirements for the use of electron microscopes

Electron microscopes produce x-ray radiation incidentally to their intended function, and the question often arises as to whether there are obligations placed on owners or operators of these machines by the *Radiation Protection Act 1965*.

The Act defines an irradiating apparatus as "any apparatus that can be used for the production of x-rays or gamma rays or for the acceleration of atomic particles in such a way that it produces a dose equivalent rate of or exceeding 2.5 microsieverts per hour at a point which could be reached by a living human." Because this equipment is not specifically type-tested and approved for use in New Zealand, the onus is on the owner to verify that the equipment falls below the limit for irradiating apparatus set in the *Radiation Protection Act*.

Although not mandatory, as a convenient means of verifying the above requirement, NRL recommends that a written local rule (ie, policy and procedure) be incorporated into the organisation health and safety plan, which addresses the following:

- a facility electron microscope unit register
- survey documentation showing that the dose equivalent rate of 2.5 $\mu\text{Sv/hr}$ is not exceeded
- maintenance of shielding integrity*
- following of owner's manual recommendations
- user training.

* If the machine is modified following an original characterisation, it shall be re-evaluated to validate that the safety features have not been compromised.

As a final aside, electron microscopy laboratories occasionally ask NRL about the correct means of disposing of uranyl acetate/uranium oxyacetate (CAS number 541-09-3). This compound should be disposed of as a hazardous chemical substance, and reference should be made to the manufacturer's material safety data sheet.

For further information contact Mark Dirksen (mark_dirksen@nrl.moh.govt.nz).

ReSources

Global burden of disease from solar ultraviolet radiation

The World Health Organization (WHO) has recently published an analysis of the global burden of disease from solar ultraviolet (UV) radiation. Evidence of harm associated with overexposure to UV has been demonstrated in many studies. Skin cancer and malignant melanoma are among the most severe health effects, but a series of other health effects has been identified. The report quantifies the global disease burden associated with UV, and estimates that up to 60,000 deaths a year worldwide are caused by overexposure. The report can be downloaded from <http://www.who.int/uv/publications/solaradgbd/en/index.html>. More information on UV and the InterSun programme is available at <http://www.who.int/uv/en/>

Newly available on the NRL website (www.nrl.moh.govt.nz):

- **Environmental annual report.** The latest in this series is that for 2005. Follow the menu choices: Publications – Miscellaneous items – Environmental annual report.
- **NRL Matters No. 18.** NRL has implemented new policy regarding consents for the import, export and sale of radioactive materials. Follow the menu choices: Publications – NRL Matters.
- **IS27, NRL ratification of research proposals involving exposure of volunteers to ionising radiation.** This information can be found by following the menus: FAQs & Advice – Information sheets, or Publications – Information sheets.