Radioactive waste

Windscale leak

The scathing report last week from the British Nuclear Inspectorate on the latest radioactive leak from the Windscale reprocessing plant raises familiar issues. Yet again, it seems, a substantial leakage of radioactivity, 100,000 curies this time, has arisen from relatively minor design faults and sheer human frailty.

One of the benefits of the arrangement under which the Nuclear Installations Inspectorate works directly to the Health and Safety Executive is, however, that its full report (Health and Safety Executive, £1.25) has now been made public. It emerges that the inspectors had seriously considered prosecuting British Nuclear Fuels Limited, or members of the senior staff at Windscale, for breaches of the operating licence. Instead, the inspectors have asked the company (which is state-owned) to take remedial action and plainly hope that publication of their report will be a more effective safeguard for the future. BNFL has duly eaten humble pie, with a statement reading like the public confessions common in China during the Cultural Revolution.

The chronology of this latest incident at Windscale begins in 1955 when a plant was built for bleeding off small quantities of highly active liquid waste from the reprocessing line as part of the research programme then under way at Harwell to glassify highly active waste. The UK Atomic Energy Authority (then the operator of Windscale) erected building 701 which contained a 1,400-litre stainless steel tank in which active waste could be aged for an appropriate length of time, and a device for transferring some of this material into 20-litre shielded flasks for transport to Harwell. There were arrangements for returning waste from the building to the main processing line, principally from a small 70-litre sump in the floor of the building.

After the last consignment of waste to Harwell in 1958, Building 701 seems to have fallen out of use and out of mind. For some years, workmen at Windscale followed the standard operating procedure of emptying the sump at regular intervals, but during the 1970s the practice had become irregular. BNFL told the inspectors that they assumed that the liquid collecting in the sump was not radioactive, but probably consisted of rainwater leaking through the roof of the building and of condensation inside. The inspectors complain that BNFL should have considered the chance that active waste was splashing over the movable vanes used in a valve arrangement to divert the stream of active waste in one direction or another.

Attempts to empty that sump during the 1970s were not always successful, now it seems because one of the two outlet lines had been mistakenly cut and blanked off in

1971. Curiosity about the level of liquid in the sump could not reliably be satisfied — the pointer on the face of the instrument recording the liquid level can apparently turn full circle and then keep on turning, so an over-full sump may seem nearly empty.

The leak was discovered during a survey of the Windscale site in 1978, and recognized to consist of fission products only two years old in March 1979 when the nuclear inspectors were informed. The inspectors say that for several years the sump had been overflowing and that radioactive material had found its way through the stainless steel cladding lining the bottom of the building to soak through the concrete foundation to the ground beneath.

The penance required from BNFL includes the reinstrumentation of building 701, its isolation and, eventually, its decontamination, the monitoring of radioactivity in the ground beneath the plant (where most of the activity is some three metres beneath the surface) and preparation for the physical isolation of the activity or even the removal of the contaminated soil.

Both parties to the investigation agree that nobody has been exposed to a significant radiation dose because of the leak.

European biotechnology

EEC proposals

The European Commission's proposals for the regulation of genetic manipulation, once widely feared for their restrictiveness, have turned out to be comparatively tame. The commission's "recommendation", submitted to the Council of Ministers this week, requires merely that experiments in genetic manipulation should be registered nationally. The proposals are thus much less constraining than the directive proposed in 1978 and later withdrawn.

A "recommendation" carries no legal force but, if agreed by ministers, has a certain moral force among the nine member states. Last week's recommendation argues that while hazards are now thought to be "non-existent or small" it would nevertheless be prudent to register experiments centrally in case so far undetected "long-term effects" exist. To deal with commercial objections about confidentiality, notification would be restricted to "the portion of the experimental protocol which is required for the evaluation of safety".

Compulsory notification already exists in the United Kingdom, and may do so in Germany if a proposed law on genetic engineering re-emerges after the October election. Elsewhere it is voluntary.

The commission would also set up a committee of experts, mandated by member states, to examine at least once a year the need for harmonization of regulations and to consider emerging knowledge of hazards. **Robert Walgate**

IWC whaling quotas

Politics wins out

The recent 32nd annual meeting of the International Whaling Commission (IWC) closed after a week of political struggle between those nations seeking a ban on commercial whaling (led by France, the Netherlands and the United States) and those, mainly the whaling nations (Canada, Chile, Iceland, Japan, South Korea, Peru, South Africa, Spain and the Soviet Union), arguing that such a ban could not be justified.

Any hope of a total moratorium was crushed at the beginning of the meeting, and for most of the week it looked as if agreement on quotas might never be reached. On the final day of the meeting, however, quotas were eventually agreed — 13,753 whales of all species can be taken in 1981–82 compared with 15,883 in 1980–81. The alternative of no agreement at all might have led to the demise of the whaling commission and a free-for-all, which would have been an even greater blow to the conservationists.

The purpose of the IWC's annual meetings is to reach agreement on the management of whale stocks for the next year based on the advice of its scientific committee. One of the problems is that the monitoring and prediction of whale population dynamics is fraught with difficulties, allowing interested parties to interpret the statistics as they wish.

The task of the IWC's scientific committee, which met a few weeks before the commission's main meeting, is to formulate a basis on which catch quotas can be set. It does this by estimating the current population of individual whale stocks and the ideal population which could be supported in the absence of interference by man. A population slightly below the ideal level will replace itself more rapidly than one at the ideal level because of increased resources per whale. The aim is to maintain populations at the level which shows the greatest replacement rate and hence gives the maximum sustainable yield (MSY). Under the IWC's new management procedure, a target yield, which provides guidance for setting catch quotas, is set at 90 per cent of MSY. The management procedure also stipulates that all catching should stop on any stock which falls to 10 per cent below the level at which it produces the MSY.

Estimated stock sizes and MSY and recommended catch limits

North Pacific, Western Division	Males		Females	
	(11+)	(10+)	(10+)	(10+)
1910 stock $\times 10^3$	157.9	175.0		
1981 stock $\times 10^3$	66.5	124.6		
1981/1910	42.1%	71.2%		
MSY level $\times 10^3$	88.3	131.1		
1981% MSY level	75.3	95.0		
Catch limits	0	405		

The ideal population can be estimated only by knowing the current population and its rate of change. Almost all the data on the status of current stocks have come from whaling ships which have been providing information on the basis of catch per unit effort. This works on the principle

outcome of the recent meeting as much as might have been expected. In spite of Beddington and Cooke's new evidence on sperm whales, which led the scientific committee to recommend that they should not be killed in the North Pacific, a quota of 890 was awarded to Japan. Some

Irradiated Samples of Austenitic Steels". Before his dismissal from the institute, this research had been cleared for open publication. Kislik managed to send the paper by hand to the United States, where in 1977 it appeared in the *Journal of Nuclear Materials*.

Shortly afterwards, an article appeared in the local evening paper *Vechernyi Kiev*, accusing Kislik of being a foreign agent and of smuggling out nuclear secrets. At the end of 1979, the accusation was revived, and he was informed by the Kiev Public Prosecutor, Ignatiev, that a file had been opened against him under Article 136 of the Ukrainian Penal Code "Violation of Authors' and Inventors' Rights" — in other words, plagiarism.

Since October 1979, Jewish emigration from Kiev has virtually ceased and routine police harassment of long-term refuseniks has intensified. In April 1980, Kislik was prevented from travelling to Moscow for the refuseniks' International Symposium on Collective Phenomena. One of the western visitors to the symposium, Professor Paul Kessler of the Collège de France, later

IWC whaling quotas					
North Atlantic	1980/81	1981/82	S. Hemisphere	1980/81	1981/82
Sperm	273	130	Bryde's	264	264
Minke	2,543	2,554	Sperm	580	300
Sei	100	100	Minke	8,102	6,718
Fin	624	701	Others		
North Pacific			Bowhead	18	17
Bryde's	479	529	Humpback	10	10
Sperm	1,350	890			
Minke	1,361	1,361			
Gray	179	179	Totals	15,883	13,753

that the difficulty of finding and catching a whale is inversely proportional to the total number of whales available. Changes from year to year in making a catch will reflect change in the population size and hence allow estimates of ideal population to be made.

Catch per unit effort, however, is not a reliable measurement on which to base calculations of population because it varies considerably with different whaling techniques. When allowances for handling time were recently taken into account, it was found that the depletion of population was being seriously underestimated.

One new way of modelling populations which overcomes some of the difficulties with catch per unit effort was proposed by John Beddington and J G Cooke of the University of York at the recent scientific committee meeting. It has already been applied to sperm whale stocks in the North Pacific with some success. The Beddington and Cooke model uses the fact that whaling distorts the distribution of length in populations as the basis for calculations of current and ideal populations (whaling ships tend to catch big animals leaving smaller ones behind). By examining the current length distribution of the catch and the change over recent years and by knowing the size of the catch, the current population and hence the ideal population can be calculated. This technique works well for species of whale, such as the sperm whale, which vary considerably in length.

One difficulty with the management procedure is that it only works well for species which have already been depleted where the catch is a fair proportion of the current population. The minke whale, for example, the most heavily exploited species, cannot be managed easily because its numbers are actually on the increase. Sperm whales also present problems, because unlike all other species, they are polygamous. Only large males over 25 years of age can hold harems so the damage to the sperm whale population of taking only the largest whales could be greater than at first suspected.

The deliberations of the scientific committee probably did not affect the

concession to the scientific evidence was made, however, by banning the killing of female sperm whales and all males over 45 feet long. Two other seriously endangered species also failed to get total protection: the humpback whale of the North Atlantic — Eskimos in Greenland will be able to kill 10 next year — and the bowhead whale in the Bering sea where a small quota has been set for the benefit of Eskimos in Alaska.

Judy Redfearn

More Soviet psychiatry

Physicist held

Vladimir Kislik, nuclear physicist, long-term refusenik and member of the European Physical Society, has been committed to a Kiev mental ward, apparently to prevent him from meeting western visitors to the city. Although this means of repression has of recent years been used against a number of political dissidents, including geneticist Zhores Medvedev and mathematician Leonid Plyushch, this is the first time that it has been used against a Soviet scientist who simply wishes to emigrate to Israel.

Kislik applied for an exit visa in 1972, but was refused on the grounds of access to state secrets while at his previous job at the Chelyabinsk Nuclear Reactor Plant. Following his application, he was dismissed from his research post at the Institute of Physics of the Ukrainian Academy of Sciences and since then has had to work as a bus-ticket seller, nightwatchman and the like. He attempted, however, to keep up his scientific reading and to organize a scientific seminar for other refuseniks in his own home. In June 1976, however, he was beaten up by security police and threatened that he must close his seminar — or else face a criminal charge of black market activities. Meanwhile his name "disappeared" from the Soviet bibliographies and from references to the papers which he had published in his professional capacity.

He did, however, have one unpublished paper on the "Absorption of Helium by

visited Kislik in Kiev. After the visit, Professor Kessler reports, he was attacked by four strangers in plain clothes who gave him an "intentionally not too heavy" beating, which, he believes, was meant simply to intimidate him. A few weeks later, Kislik managed to make contact with some American geneticists who were attending a meeting in Kiev — an event which, some of his friends believe, was not unconnected with the latest harassment.

On 25 June, Kislik was picked up in the street and taken to the police station for an identity parade in connection with an alleged theft. On 4 July, he was arrested for alleged hooliganism and given 15 days detention. When this term was up, and he was not released, he threatened to go on hunger strike. The next day, 19 July, he was transferred to a psychiatric ward in the Pavlov hospital. Ironically, and to a certain extent in support of Soviet claims that Jews (as opposed to "Zionists") suffer no discrimination in the Soviet Union, the doctor in charge of the case is a certain Naum Lifshits.

Vera Rich