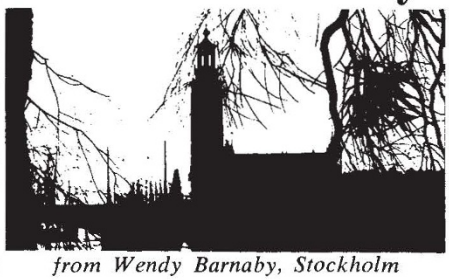
economic data are, traditionally, always presented in terms of percentages, and it is frequently difficult to refer them back to a base date, so as to calculate their meaning in real terms. Such figures for production as are readily available, however, give for the first half of 1975 240 million tons of oil, 141,000 million cubic metres of gas, 348 million tons of coal, 69.8 million tons of steel and 44 million tons of mineral fertilisers. Against this background of rapid expansion, the new laws seem to show a growing awareness that the mineral resources of the Soviet Union although vast, are still finite.

A *Pravda* editorial, dealing with the laws, stated: "Science is faced with great problems. Scientists are charged with creating new methods, techniques and technology which will allow mineral resources to be extracted without loss, with introducing them more fully into the national economy, and with ensuring the safety of mining operations". The Academy of Sciences of the USSR, the Academies of the Union Republics, the State Committee on Science and Technology and the various scientific research organisations as well as the Ministries concerned, will all be involved in implementing the new laws.

Meanwhile, surveying for new deposits continues. □

Scandinavian diary



from Wendy Barnaby, Stockholm

THE Baltic countries' scientific cooperation continues. Under the auspices of the Helsinki Convention for the prevention of pollution in the Baltic Sea, a meeting was recently held in the Swedish archipelago at which Swedish and Russian biologists studied each other's methods of intercalibration of measurements in marine biological experiments. The meeting was the second in a series (the first, last year, concentrated on chemical methods of measurement) which will continue next year with the additional participation of the other signatories of the Convention: Finland, Poland, the German Democratic Republic, the Federal Republic of Germany and Denmark.

● A new input into the Swedish nuclear energy debate promises to heat the simmering controversy yet again. This time the fuel is the publicity being given to a report prepared at Cornell University, New York; by Professor Robert O. Pohl, who challenges the traditional wisdom that nuclear energy causes fewer health problems than result from the same amount of electricity produced from coal. The report evidently asserts that the effects of radioactive waste from uranium mines should be included in calculations of nuclear health risks. On this basis, nuclear energy is said to be between 100 and 10,000 times as dangerous as has previously been thought.

Professor Pohl is reported to be critical of calculations done by the US Environmental Protection Agency (EPA) in a 1973 report *Environmental Analysis of the Uranium Fuel Cycle*. According to the EPA's estimates, the slag heap from a mine extracting uranium to produce about 1,400 million MWh of electricity would cause 60 cases of radiation damage—mainly lung cancer—after 100 years; 95% of these cases, it was estimated, would lead to death. So an annual rate of production of 10 million MWh would result in almost 0.4 deaths after 100 years. Professor Pohl points out that the slag at the mine contains thorium-230, which —by way of radium-226—decays to (radioactive) radon-222. During the decay of the thorium (and only 0.091% will have disappeared after 100 years) the slag will emit radon at a rate which Pohl estimates could result in a total of 396 deaths—presumably over more than 100,000 years. These calculations put nuclear energy in the same order of risk to health as coal-fired energy.

The report also questions the platitude that, although nuclear waste is dangerous, its volume is small enough to be controlled. On the contrary, if the slag is reckoned as part of the waste the disposal problem becomes enormous. For Sweden especially the difficulties would be immense: a ton of Swedish shale contains only 300 grams of uranium. The uranium required to produce 10 million MWh leaves 1 million tons of shale behind. Sweden's present annual electricity production is about 85 million MWh. The percentage of this provided by nuclear energy is negligible at the moment, but it is expected to rise to 12% by 1985.

Professor Pohl reportedly admits that thorium-230 and radon-222 would be formed wherever uranium occurs naturally, irrespective of whether it were mined or not. But he maintains that radon can escape more easily from the broken ground of a mine than from an undisturbed terrain. The effect of his views on the Swedish debate has yet to be seen; but it will probably provide another example of the fact that what may burst with a bang over the heads of the antinuclear lobby is, to the ears of the pronuclear government, merely a whimper.

● Experiments carried out by the Swedish Water and Air Pollution Laboratory show that the use of commercial preparations labelled 'non-toxic' and sold to disperse oil leaks in water has a far worse effect on marine life than the oil itself. The results indicate that if a dispersant is used to clean up oil spills, the effect on most marine life will be more severe and last for a longer time than if no dispersant is used.

The experiments, reported in the latest edition of the Royal Swedish Academy of Sciences magazine *Ambio*, were carried out on two dispersants commonly used throughout Europe: BP 1100X (British Petroleum) and Finasol OSR2 (Fina SA). According to the Swedish researchers, normal toxicity experiments are done with adult organisms under abnormal external conditions and for a short length of time. On the grounds that such testing should be concentrated on the most vulnerable part of the organisms' life cycle, the Swedes used larvae instead. The type of larvae they worked with (Baltic herring, *Clupea harengus membras L.*) occurs naturally in the upper 10 metres of the water column, and is therefore especially susceptible to oil spills.

The tests were done in jars containing brackish sea water to which was added Venezuelan crude oil with a density of 0.868 and a total sulphur percentage of 1.9. Some of the jars also had a dispersant mixed in. A control experiment with larvae in sea water only was carried out in parallel.

In the first set of experiments, in which larvae were exposed to different concentrations of water–oil and water–oil–dispersant mixtures, the larvae reacted 50 to 100 times more strongly to a mixture of dispersant and oil than to oil alone. The larvae deteriorated by swimming abnormally, then suffering injuries and finally dying.

In the second test, larvae were exposed to mixtures of different ages (0, 24 and 72 hours). The behaviour of the larvae showed that when oil and water were newly mixed, the resulting toxicity was higher than in older mixtures of oil and water. When a dispersant was added, however, the mixture's toxicity was even higher, and it remained almost unchanged after 24 and 72 hours.