Occupational radiation

# British nuclear workers cleared

An independent study of mortality among workers at the British nuclear reprocessing plant at Sellafield (previously known as Windscale) has confirmed earlier claims by the operating authorities that the workforce at the plant is even less susceptible to diseases believed caused by radiation than the general population of Britain. But the study, carried out by Dr Peter Smith and Ms Alison Douglas of the London School of Hygiene and Tropical Medicine, suggests that myeloma and, unexpectedly, bladder cancer are significantly more common among those exposed to large doses of radiation.

The study is founded on an attempt to trace all the 14,327 people who worked at the site between 1947 (when operations began there) and the end of 1975. Only four per cent of the workforce could not be traced. Of the remainder, 2,277 have died, a quarter from cancer of all kinds. The report, published in the current issue of the *British Medical Journal* (**293**, 845; 1986), says that in the period up the end of 1983, mortality among the Sellafield workers was 2 per cent less than that in the general population of England and Wales and 9 per cent less than that in Cumbria, where Sellafield is situated.

For many years, British Nuclear Fuels, the company now operating the Sellafield plant, and its predecessors have pointed to the comparatively low mortality among Sellafield workers as evidence that radiation exposures there have not been overtly damaging. But the evidence has not carried the weight it might have done because it had been assembled by interested parties and because, as Smith and Douglas also acknowledge, selection of only healthy people for work at reprocessing plants must bias statistics of mortality.

One of the surprising features of the report is the evidence it provides that, despite the specialist character of the work at reprocessing plants, only just over a half of the workforce employed before 1976 had worked at the plant for five years or more.

Radiation records were apparently available for nearly three-quarters of the Sellafield workforce (the remainder being people exposed only infrequently to radiation). Figures for radiation doses due to internal radiation have not been used in the study. The average radiation dose for those for whom film-badge records are available is given as 124 mSv (12.4 mrem) accumulated until the end of 1983. The total collective radiation dose for the whole workforce is estimated at 1,260 Sv between 1947 and 1983. The report shows a steady reduction by about a half of the average annual radiation dose to workers at Sellafield since the early 1970s.

One of the findings of the study is that Sellafield workers were less likely to die in the first five years of their employment, whether of cancer or of some other disease, than members of the general population, presumably one of the effects of the selection of healthy people for employment. According to the study, the lower incidence of conditions such as bronchitis among those exposed to the larger doses of radiation may result from similar selection effects, possibly because people with chest conditions are discouraged from becoming radiation workers or because their higher socio-economic status diminishes their use of cigarettes.

For cancer mortality, the report says that the risk of death from cancer among Sellafield workers was 5 per cent less than in the general population of England and Wales and 3 per cent less than among the population of Cumbria.

The only statistically significant causes of death from cancer in respect of which the Sellafield workers differ from the general population of England and Wales are bladder cancer (14 cases), multiple myeloma (7 cases), leukaemia (10 cases) and all lymphatic and haematopoietic carcinomas (27 cases). Correlating radiation exposure with the occurrence of these conditions (after a time-lag of 15 years), the study arrives at numerical values for the supposed linear relationship between radiation exposure and mortality, but the significance of the coefficients is not so great that the association can be taken as more than cause for further investigation. Similar results for multiple myeloma, have been reported in a study of the workforce at Hanford, United States. □

Space shuttle

# Programme for 1988 announced

*Washington*

Military missions and communications satellites will be the predominant payloads when US shuttle flights resume in 1988 according to a manifest released last week by the National Aeronautics and Space Administration (NASA). But three of the first nine flights will be reserved for science missions, including the long awaited Hubble Space Telescope.

The first shuttle launch, now scheduled for 18 February 1988, will place a tracking and data-relay satellite (TDRS) into orbit. Once in place, these satellites will make up NASA's primary system for space communications. There is only one such satellite currently operational. Challenger was carrying a TDRS satellite when it exploded last January, and a third satellite will be launched in September 1988.

The Hubble Space Telescope will fly aboard the shuttle Atlantis on 17 November 1988, according to the new manifest. Robert Milkey, assistant director for programme management at the Space Telescope Science Institute (STSI) says that although only one operational TDRS satellite is essential for the space telescope's functioning, two will be extremely useful. Milkey admits he would like to have an earlier launch date, but finds it "very gratifying" to be the fifth mission after flights resumed.

The Ultraviolet Astronomy Telescope (ASTRO-1) is scheduled for launch in January 1989, and the Venus radar mapper Magellan in April 1989. For Magellan, this means a longer type-4 trajectory, with an arrival at Venus in mid-1990. There is also a slot in November 1989 for a planetary mission. No decision has yet been made whether this will be given to Galileo, the Jupiter probe and orbiter, or Ulysses, the solar polar mission, but it is now clear that both will not be launched in 1989. NASA will face political pressure from the European Space Agency to launch Ulysses as soon as possible, but it also faces considerable cost in keeping Galileo on the ground. Although NASA administrator James Fletcher says that a decision on launch assignments for Galileo, Ulysses and the Mars Observer spacecraft will be made in 1987, for planning purposes a decision will have to come earlier than that. **Joseph Palca**

| Date | Payload |
|---|---|
| 1988 February | TDRS-C, communications satellite |
| 1988 May | Department of Defense |
| 1988 July | Department of Defense |
| 1988 September | TDRS-D, communications satellite |
| 1988 November | Hubble Space Telescope |
| 1989 January | ASTRO-1, ultraviolet astronomy telescope |
| 1989 March | Department of Defense |
| 1989 April | Magellan, Venus radar mapper |
| 1989 June | Department of Defense |
| 1989 June | 2 global positioning satellites and a materials science laboratory |
| 1989 July | Department of Defense |
| 1989 August | Department of Defense |
| 1989 August | 2 global positioning satellites and a materials science laboratory |
| 1989 November | Planetary mission |
| 1989 December | Space life sciences laboratory |