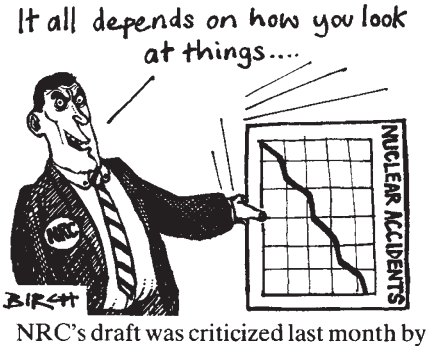
Nuclear safety

Opposition to relaxing standards

Washington

A ROW is brewing about the official calculations of the amounts of radioactivity likely to be released in nuclear accidents. The Union of Concerned Scientists (UCS) has added its criticisms to the reservations expressed last month by an advisory committee to the Nuclear Regulatory Commission (NRC) about the commission's proposed revision of "source terms" for nuclear power plants. These quantities refer to the probable amount and chemical form of radioactive releases to the environment in the event of a severe accident. UCS says the new source terms "deliberately" omit plausible accident sequences, including some that have actually occurred.

The new source terms are derived in a NRC draft report, NUREG-0956, and are inspired by research in the wake of the accident at Three Mile Island, some of which suggested that releases of radioactivity had been overestimated.



NRC's draft was criticized last month by its own Advisory Committee on Reactor Safeguards, which expressed "reservations" about the document and said the new source terms should "not be given much weight". Containment failure, an important factor in an accident, is treated, in a "rather preliminary fashion".

The NRC draft acknowledges the many uncertainties surrounding its estimates, and admits that the results depend critically on the design of particular plants. But externally initiated events, such as earthquakes, are not considered at all, according to UCS.

Although only five plants are modelled in the draft, NRC says it intends to go ahead and use the new source terms to re-evaluate and revise regulations governing power plant safety, from siting requirements to the design of safety systems. According to UCS, the revisions will in almost every case result in safety requirements being relaxed.

NCR's approach relies heavily on probabilistic risk assessment, which requires analysts to specify all possible routes to failure. Rupture of steam generator tubes, which has led to accidents in the past, is one omission cited by UCS, which has compiled a lengthy list of similar examples.

The UCS criticism comes at a bad time for NRC, which is investigating several accidents at nuclear plants that, according to Robert Pollard, UCS's nuclear safety expert and a former NRC official, occurred because NRC had not enforced its own requirements. The Toledo Edison Company may be fined $900,000 because of violations that led to an incident on 9 June last year, at its Davis–Besse plant in Ohio, when both main and auxiliary feedwater were lost. NRC has also upgraded its investigation of an accident in December at the Rancho Seco plant in California in which 450 gallons of contaminated water were spilled in an auxiliary building, leading to a small release of radioactive steam.

NRC says the UCS critique will be considered as a "comment" in its revision of NUREG-0956: a definitive report will be issued later this year. But Pollard doubts whether NRC will take notice "until we get them in court". How soon that will be depends of to what uses NRC puts its new source terms; but if the two do meet in court it will not be for the first time. Last time, UCS challenged NRC's right to restrict public comment on NRC rule-making. It won. **Tim Beardsley**

Neutron research sources

US ambitions for new machine

Washington

COMPETITIVE juices are already rising in US laboratories hoping to capture a new advanced neutron source that they hope will be built during the first half of the next decade. Development funds for the instrument, which is seen as essential if the United States is to catch up with Europe on uses of slow neutrons, will be included in the Department of Energy (DoE)'s research budget for 1987, to be presented by the President to Congress next month.

Several recent studies requested by DoE have emphasized the European lead, which is ascribed largely to the success of the British/French/German collaboration at Institute Laue–Langevin in Grenoble in developing instrumentation for use in cold-neutron experiments. (Little account has yet been taken in the United States of the new British machine, the Neutron Spallation Source, commissioned last year by the UK Science and Engineering Research Council.) There is agreement that the immediate need is for a steady-state source producing up to 10^{16} neutrons $cm^{-2}s^{-1}$ (although the project would just get by with half-flux). Design concepts described at a recent workshop in Gaithersburg, Maryland, imply a facility costing about $300 million with running costs of about $25 million a year, although part of this could be saved by closing down one of the older sources when the new machine came on-line, according to Dr Donald Stephens, associate director of basic energy sciences at DoE.

Researchers are expecting about $6 million of development funds for the new machine in 1987. The most popular approach seems to be a 2–300 MW reactor source; Brookhaven National Laboratory is backing a design using small uranium oxide pellets, while Dr Ralph Moon of Oak Ridge National Laboratory wants a reactor with high-density uranium silicide fuel. A design suggested by Argonne National Laboratory, and disparaged as too preliminary by Moon, has rotating overlapping rings of fuel that would generate high flux densities near their point of contact and cool down during the rest of a revolution.

The chief technical problem foreseen for heavy water-cooled reactors operating at high power densities is in the formation of insulating aluminium oxide on fuel supports. Dr Robert Burke, of DoE's Hanford Engineering Laboratory in Washington state, favours instead a spallation design using a proton accelerator operating at a steady current of 100 mA. Burke says this approach would be more flexible than a reactor (because the protons could be used for other purposes) and that the less onerous safety requirements of an accelerator design mean that siting would be less critical. (He did point out that low electricity costs in the north-west Pacific would make this area attractive.)

The Hanford proposal would cost $300–450 million, according to Burke (although Moon says that $800–1,100 million would be nearer the mark), and he claims that the 100 mA proton-beam current required is feasible without extensive research. As a bonus, the Hanford design would allow the source to be upgraded easily should this be thought desirable.

For all the sparring over the design approaches, persuading Congress to build, or even to study, a new facility is not likely to be easy. But DoE's Energy Research Advisory Board has pointed out that existing major US neutron research facilities will be 30 years old by the time a replacement can be built, and the principal use of the new machine — neutron scattering — is the sort of research that can often bring immediate and tangible benefits. That might give it a better chance on Capitol Hill than the much more expensive facilities required for, say, high-energy physics. **Tim Beardsley**