CYANIDE

Price of Safety

THE quantities of sodium cyanide waste dumped in the Midlands recently could have been disposed of for as little as £30 or £40. ICI, the largest manufacturer of inorganic cyanide in Britain, offer a disposal service to those companies buying cyanide from them. For a charge of about £2 a 2 cwt drum, they will collect and dispose of the cyanide waste that results, for example, from the case-hardening of steel. The quantities recently dumped in the Midlands have varied from 6 cwt to about 40 cwt in each instance.

Not that ICI's disposal methods would appeal to everybody. They seal and weight the containers whose contents are about 10 per cent cyanide and, with the approval of the Ministry of Agriculture, Fisheries and Food, drop them into 2,000 fathoms of water in mid-Atlantic. ICI dispose of 1,000 tons of cyanide waste in this way annually—business worth some £20,000 a year.

Other methods of cyanide disposal are more expensive. Cyanide waste comes either as a solid or a liquid. The solid comes from the casehardening of steel, where sodium cyanide is used in a heat treatment bath. During use the cyanide content of the bath decreases, and when the levels reach about 10 per cent the bath is drained and then refilled.

The liquid comes mostly from electroplating. The cyanide content is only about 5 per cent and is not consumed in the process, but the mix is discarded after a time because of contamination by metals. The larger electroplating companies almost all do their own cyanide disposal on site.

Both forms of the waste are comparatively easy to dispose of by chemical means, because cyanide is relatively unstable. The liquid waste is mixed with chlorine in one form or another and the result is a non-toxic fluid. The solid waste is treated in the same way after being turned into a solution.

The cost of chemical decomposition, however, is much higher than disposal at sea. A ton of solid waste costs about £100 to treat, and transport to one of the three companies with treatment plants in Britain would add substantially to that bill. The liquid waste disposal costs about £30 for 1,000 gallons, again exclusive of transport costs.

Cyanide can also be buried very effectively. Because it is unstable it decomposes in a matter of months if spread around a controlled site which is in a very active microbiological state and, provided the anaerobes which thrive on cyanide and other carbonates are not disturbed, the tip can be used repeatedly.

It is clear, however, that in spite of the current concern, cyanide is one of the lesser disposal problems that industry and society face. Waste metals, for example, provide a bigger disposal problem and the only simple solution to their disposal is to bury them. But with the introduction of stricter controls, both at sea (see *Nature*, **235**, 414; 1972) and now on land in the form of the government's new bill, a higher price will have to be paid if toxic substances are to be disposed of safely.

It is, however, an ill wind which blows nobody any good. A spokesman for the Purle Group of waste disposal contractors said last week that following the cyanide scare their treatment plant is now working flat out and their incinerator, which three months ago was operating six days a month, is likewise at full stretch. "Heaven knows where it was all going before," he said.

CERN

Right on Schedule

THE construction of the 300 GeV accelerator in Geneva is on schedule, and physicists can still look forward to a 200 GeV beam of protons in 1976. Decisions to be taken at the end of 1973 will determine whether or not 300 GeV will be available for experiments in a new experimental hall by 1979.

The first annual report of the 300 GeV programme published recently (CERN/1050) shows, with all credit to Dr J. B. Adams, the director general of the project, that the costs of the project are still within the budget of SF 1,150 million, at 1970 prices, which was agreed a year ago, and it is gratifying that contracts awarded for the first two principal civil engineering projects did not exceed the estimated costs.

A year ago the project had four full time employees, but now there are 100 staff members with a further thirty appointments earmarked. There should be 415 staff members by the end of 1972, and by 1976 the number will have risen to 730. Between then and the end of the project in 1979 it is planned to employ only forty more people. The maximum complement of 770 will be made up of 500 people in the machine group and 270 in the services group.

The decision whether or not superconducting magnets are to be incorporated has to be taken at the end of 1973. This decision will determine whether 300 GeV protons will eventually be available or whether higher energies — possibly 1,000 GeV — will ultimately be attained.

The first stage of the machine, which will be completed by 1976, will have two magnets in each of 217 sectors of the accelerator. At most there will be room available for two more magnets in each sector. At the end of 1973 a decision will have to be taken on the type of magnet to put into the gaps. This will be dictated by the budget, and also by the state of the technology of superconducting magnets at that time.

The necessarily stringent budget of the project, according to the report, implies that "any modifications or options arising in the course of the programme can only be adopted if they do not increase the costs of the programme". The budget allocates SF 516.3 million to the planned second stage—to increase the energy to 300 GeV by incorporating a third conventional magnet in each sector as well as to build a new experimental area. If it is thought scientifically worthwhile to obtain protons of energy higher than 300 GeV, and if, as seems probable, the cost of superconducting magnets turns out to be much more than the cost of conventional magnets, then in eighteen months' time a plea will have to be made to the contributing countries for more money.

Superconducting magnets incorporated in the second stage will raise the maximum energy to 700 GeV, of which 500 GeV will be obtained from the superconducting stage and the remainder from the first stage. If a decision is taken later to remove the first stage conventional magnets and replace them with superconducting magnets, then a maximum energy of 1,000 GeV will be obtainable.

There is now a definite commitment to build a 200 GeV accelerator, and it is only if "the physics interest makes the extra 100 GeV important" that a decision will be made to go ahead and add the extra magnets. At the end of 1973 results of experiments carried out with the 200 GeV machine at Batavia, Illinois, which went into operation last week, will be available, and these should help in coming to a decision about whether or not to increase the energy of the CERN machine.

The decision to be taken at the end of 1973 will also depend critically on the progress made with the superconducting accelerator under construction at Stanford University. Difficulties experienced at Stanford in the past twelve months have raised doubts about the future of superconducting accelerators, and perhaps the end of 1973 will come too soon for all the difficulties to have been ironed out. This could save the decision makers at CERN from having to go back to their respective governments cap in hand.

The difficulties experienced with obtaining the required voltage gradient on the accelerator sections at Stanford are resounding all through the nuclear physics world. Once these problems are ironed out, the application of superconducting technology to heavy particle accelerators—in contrast to electron accelerators—will become more than a pipe dream.