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tion recently published an extrapolation showing that Baja California and a sliver of California west of the San Andreas will eventually split off from the rest of North America and drift northward. In 10 million years, Los Angeles will be abreast of San Francisco, they predict, and in 60 million years it will begin to slide into the Aleutian trench. Thus on a geologic time scale, the die seems to be firmly cast. But on the time scale of civilized societies, earthquakes, not surface movements on a global scale are the immediate problem.

Scientific efforts to enable Californians to live with this perpetual hazard are taking two directions: prediction of the occurrence of earthquakes and reduction of their impact. Though the scientific knowledge to predict earthquakes is not far in the future (see p. 131), the actual capability of predicting them in practice is much further off. Dr. Charles Richter believes that earthquakes may not be predicted in the same way as the weather for another century.

In the meantime, several studies have suggested ways to reduce the human suffering and property damage caused by earthquakes. Last November, the Office of Science and Technology's Task Force on Earthquake Hazard Reduction released a report recommending such precautions as requiring earthquake-resistant design in all new Federal buildings and in other publicly owned facilities such as schools and hospitals; consideration of seismic risks in urban planning; development of plans for earthquake disaster relief; revision of income- and property-tax structures to provide incentives to reduce earthquake hazards, and improved measurement of earthquake risk.

Since the 1950's, when Los Angeles abolished its 13-story limit on the height of buildings, structures have risen to a height of 42 stories. One now under construction will reach 52 stories. These new skyscrapers, designed to weather earth tremors, were relatively unscathed by the Feb. 9 earthquake. But the new $23 million Olive View Sanitarium in Sylmar, a building which was supposed to be earthquake-proof, collapsed completely, killing three people. Forty-five deaths resulted from the collapse of a Veterans Administration hospital in Sylmar. Thousands of people were forced to evacuate a 20-square-mile area below a dam that was damaged by the quake.

Sen. Alan Cranston (D–Calif.) says he will seek a Congressional investigation of the collapse of the VA hospital. United Nations Secretary-General U Thant suggests the possibility of setting up a worldwide early warning system against earthquakes and other natural disasters.

The Alaskan earthquake of 1964 sparked similar requests for studies, one of which proposed a 10-year program for earthquake study that would ultimately cost $26 million a year. The study's recommendations have not been carried out, and Federal spending for earthquake research is now in the neighborhood of $10 million a year.

But the Alaska quake was in a thinly populated area. Perhaps this glimpse of the devastation an earthquake of only moderate magnitude can cause in a heavily populated area like Los Angeles will cause the public to demand a higher priority for earthquake research in the Federal budget and to seek faster solutions to the human and engineering problems of building safe structures in earthquake-prone areas. Or maybe there will only be another study. □

EKA-MERCURY

Evidence for element 112

Within an atomic nucleus both cohesive and disruptive forces operate. The balance between them is affected both by the size of the nucleus and the ratio of neutrons to protons. The heaviest nuclei, which are the largest and the richest in neutrons, are least likely to be stable.

Nuclei of the heaviest elements are apt, therefore, to end their lives in spontaneous fission or the lesser breakages of alpha or beta decay. The elements with the highest atomic numbers (and also the highest atomic weights) have such short lifetimes that they do not exist naturally on earth, but have to be manufactured.

Up until now the maufacturers have gotten as far as element number 105. (Number 92, uranium, is the highest found naturally on earth.) The higher the number, the more evanescent and elusive the element is, and the more difficult to make.

Lately, however, theorists have pointed out (SN: 12/14/68, p. 593), that although absolute stability cannot be expected above 92, certain configurations of neutrons and protons should produce relative stability in this region—lifetimes of millions of years rather than millionths of a second.

One of the most promising of these theoretically quasistable nuclei is element 114, and a number of experimental efforts have been mounted to find it. One of these projects now appears to have found element 112. The evidence is reported in the Feb. 12 NATURE by Drs. A. Marinov of the Hebrew University in Jerusalem, C. J. Batty and A. I. Kilvington of the Rutherford High Energy Laboratory at Didcot, Berkshire, in England, G. W. A. Newton and V. J. Robinson of the University of Manchester and J. D. Hemingway of the Universities Research Reactor in Risley, Lancashire.

The way to make a superheavy nucleus is to bang together two heavy nuclei and hope they stick. To achieve the fusion the nuclei must be going fast enough to overcome the electrostatic repulsion between the two positively charged nuclei.

The best of the current machines that accelerate whole nuclei, ion accelerators, cannot accelerate heavy ions up to the energy levels that could produce the superheavies. But there is an indirect alternative: If a heavy-element target is irridiated with high-energy protons, sometimes whole nuclei will recoil, and these recoil nuclei can have sufficiently high energies to make the fusions possible.

In the actual case, targets that were

99.95 percent pure tungsten were irradiated for about a year in the Proton Synchrotron at the CERN laboratory in Geneva with protons of 24 billion electron-volts (GeV) energy. Then they were taken to the Rutherford Laboratory for analysis.

Microchemical separation techniques were applied to the samples to separate traces of the elements osmium, platinum, gold, mercury, tantalum and lead. This was done because the elements from 110 to 114 are positioned directly below the last five of these on the periodic table and are expected to have similar chemical properties. The superheavies are designated by the prefix eka, from eka-osmium to eka-lead, and each eka-element is expected to be identifiable in the chemical analysis along with its namesake.

The mercury samples derived by this analysis, say the researchers, give evidence of the existence of eka-mercury, element 112. The first datum is a long-lived emission of alpha particles at 6.73 million electron volts (MeV). This, they say, is hard to explain on the basis of known radioactive elements. Though contamination by thorium might produce alpha particles of this particular energy, they point out, it should also produce alpha activity at other energies, and these energies are not seen.

The second datum, considered more telling, is the observation of spontaneous fissions in the mercury sample. Since mercury does not fission spontaneously, something else must be doing it. "But we do not believe that the spontaneous fission events observed in the mercury source can be ascribed to contamination," the investigators conclude. This leaves element 112. On the basis of observed fissions they suggest that its half-life for fission is about 500 years.

In an editorial comment in the same issue, NATURE takes the claim cautiously but without disparagement. "In the long run," the journal comments, "the belief that element 112 has indeed been manufactured in the CERN accelerator will be best of all sustained by a thorough characterization of the isotopes concerned."

"I think it's fascinating, and I hope it's true," says Dr. Albert Ghiorso of the Lawrence Radiation Laboratory at Berkeley, who has participated in the discovery of most of the elements heavier than uranium. He feels it will have to be studied further. Some of the data appear a bit marginal.

However, "if it's true," he says, "then with the superhilac [a heavy-ion accelerator now being built at LRL] we can produce much more of it. We can make large quantities of superheavy elements and map out the whole region." □

SWORDS TO PLOWSHARES

Thorny shifts in priorities

As defense and aerospace budgets decline, the critics of military and space spending have come face to face with the thorny problem of what to do with the casualties: The individuals and companies who have been thrown into unemployment or bankruptcy as a result of the cutbacks.

It is clear that as long as there are no mechanisms for conversion of the displaced persons and industries, the nation's flexibility for establishing new priorities is severely limited. One of the strongest arguments of proponents of the supersonic transport, for instance, was that terminating the SST prototype program would add to already high unemployment in the Seattle area.

Last week Rep. John W. Davis (D–Ga.), chairman of the House Subcommittee on Science, Research and Development, held a press conference in an effort to gain support for a bill he and Rep. Robert N. Giaimo (D–Conn.) introduced to establish a three-year, $450 million program for research into problems of conversion from defense to peace activities, for reeducation of scientists, engineers and technicians and for assistance to small business firms in converting their activities. Davis called for a "national outcry of protest" over the plight of the highly trained workers and their loss to the national economy.

There is no doubt that the situation is serious for many professional persons. Nationwide, unemployment among professional and technical workers rose from 1.2 percent in 1968 to 2.5 percent in January 1971; among engineers it quadrupled from 0.7 percent to 2.9 percent in the same period. Exacerbating the problem is the decline in academic employment, which, combined with overproduction of Ph.D.'s, has resulted in sometimes startlingly high levels of unemployment among physicists, chemists and biologists.

The Davis-Giaimo Bill, which now has 68 co-sponsors, would give the National Science Foundation and the Commerce Department major responsibilities in conversion efforts. NSF would administer retraining programs for scientists, engineers and technicians and provide grants to state and local governments for conversion planning and for nonprofit Community Conversion Corporations. Commerce would sponsor retraining for management personnel and, through its Small Business Administration, offer conversion grants and loans to small business firms. The emphasis throughout the program would not be "simply to serve civilian, consumer ends," but, rather, toward "resolution of our besetting social ills . . . unemployment, poverty, crime, race relations, pollution, nutrition, housing, health care, transportation, education and social alienation."

Two questions arise in connection with such conversion goals: The first is just how adaptable aerospace and defense industries and their personnel are to such radically different missions. The second is how many jobs and contracts actually exist in the social and environmental areas. Late last year Rep. Henry S. Reuss' (D–Wis.) subcommittee on conservation and natural resources held hearings on possibilities for conversion of aerospace personnel and firms to environmental cleanup. One often-expressed view was that the firms and their personnel could make the adaptation.

"After all," Dr. Ronald F. Probstein of Massachusetts Institute of Technology told the committee, "aerospace firms themselves are the best example of conversion, for the technical and scientific employes who make them up were not trained to develop lunar landers or design supersonic transports. . . . Not many among them studied manned space flight problems in the colleges and universities they attended." These men and their firms, he claimed, could quickly reconvert to environmental concerns.

But Dr. Probstein's view was by no means unanimous. Dr. Edward E. David, director of the White House Office of Science and Technology, for instance, saw economic obstacles to conversion. These, he said, would result from the fact that aerospace firms operate with few constraints on spending, constraints which must exist in any civilian market, and the companies deal with a single customer instead of with the multitude of customers that would exist in environmental endeavors. Other witnesses expressed doubt about the ability of specialists to make the change-over.

The committee was, in addition, disappointed because of the inability of environmental control agencies and the firms to make even ball park predictions about the number of jobs and contracts that might actually materialize.

As a Reuss committee staff member said, this failure is due partly to the fact that no one yet knows how deeply the Administration and the Congress are committed to environmental cleanup. Despite defense cuts, the gulf between the defense budget and the environmental budget (and budgets for alleviation of social ills) is still immense. Part of the purpose of Reuss, and now of Davis and Giaimo, is to shift the priorities. But the new bill alone will not accomplish this unless the gulf is narrowed. □