

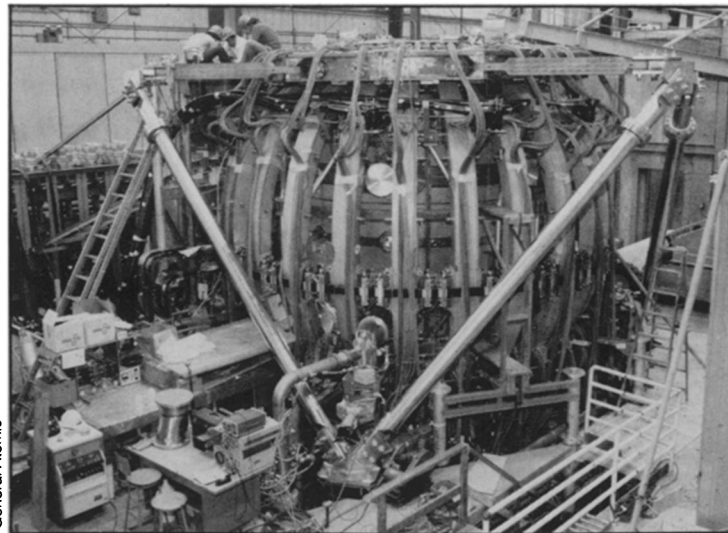
tween 58,000 and 75,000 are "associated with" asbestos. However, because exposure to more than one carcinogen may increase one's chances of getting cancer far more than might be expected from the individual risk factors, projecting cancer incidence from all factors combined becomes quite complicated. For example, many of the cancer cases will be associated with smoking as well as with some industrial carcinogen. For this reason, a rather artificial term — "excess cancers" — is used to compare the potential danger to workers from various industrial substances. (The quantity reflects the number of cancers that would result from a given length of exposure in a group of workers of the same age who didn't change jobs.) For asbestos, the number of expected "excess cancers" a year is 13,900 — far less than the number actually expected to be associated with asbestos exposure, but a useful figure when comparing risks. The excess cancers expected annually from five other common industrial substances — arsenic, benzene, chromium, nickel oxides and petroleum fractions — is 33,000, leading the researchers to conclude that "the five other agents together pose hazards similar to or greater than those posed by asbestos."

And that's just the beginning. Some 221 substances have been identified as causing cancer in animals, but for most not enough occupational exposure data have been gathered to allow projections like those above. To compensate for this handicap, the report presents a list of occupations known to involve high cancer risks, but where no single agent can be identified. Furniture workers, for example, experience three or four times the number of cancers in the nasal cavity and sinuses than would ordinarily be expected. Other high-risk occupations: shoe workers, miners, tire workers, newspaper pressworkers and chemists.

Predictably, industry representatives strongly disagreed with the conclusions of the report. "If the vinyl chloride estimates are any indication of the accuracy of the rest of the report," said Ralph L. Harding Jr., president of the Society of the Plastics Industry, "the document must stand convicted as an embarrassment to medical science and to the government agencies that produced it." The study has estimated an excess cancer rate from vinyl chloride of 1,940 cases annually. Harding called the estimate "ludicrous to the point of absurdity," saying that only 23 confirmed fatalities from the chemical had been seen in the last 16 years.

Other industry sources were more cautious, preferring to wait until company scientists had had a chance to analyze the data carefully. More specific challenges will certainly follow, and the whole issue of how the public should be protected from hard-to-predict risks is likely to heat up when new proposals for regulations result from this report. □

Doublet III pulls up its hosen



The vertical coils look a little bit like stays, and somewhere inside them is the chamber where Doublet III's plasma is expected to hold its hourglass figure as it slithers toward the day of breakeven.

Of American experiments aimed toward controlled thermonuclear fusion, the series called Doublet, which has been operated by General Atomic in San Diego, is unique for its shape. The Doublet series is made up of magnetic confinement experiments in which a magnetic field is used to confine a plasma of atomic nuclei and electrons until the nuclei fuse. There are many other varieties of magnetic confinement experiment. The vacuum chamber in which Doublet's magnetic fields do their confining is a toroid. That, too, is not unusual; there are many toroidal experiments.

The unusual quality is the cross-sectional shape of the plasma, which is bilobar, or figure-eight shaped. Most plasmas are held in circular or elliptic cross sections, but it has been General

Atomic's conviction, or rather the conviction of Tihiro Ohkawa, vice president and head of General Atomic's fusion division, that the Doublet shape would provide savings in magnetic field strength that would mean less power needed to keep a fusion reactor going, and therefore a more economical reactor system than other options (SN: 1/22/77, p. 61).

Now General Atomic has dedicated Doublet III, the biggest in the series, 500 tons, 16 feet tall, 19 feet in diameter. In it they hope by the early 1980s to reach "breakeven," the situation in which energy generated by fusions equals the energy expended to get the fusions going. To them this means temperatures near 100 million degrees for up to a second and a density of 300 trillion nuclear particles per cubic centimeter. □

Self and non-self chemicals of immunity

Cancers might be attacked more successfully and flu vaccines might be more effective if the body's immune system could be thrown into high gear at a physician's command. Two chemical approaches that may rev up disease-fighting ability are: imitating a natural invader and imitating a signal normally sent between the defense troops. Drugs that result from investigations of these mechanisms, also could aid patients with immune system deficiencies and with auto-immune diseases.

The first approach, imitating a natural invader, is based on the established use of dead bacteria and bacterial extracts to stimulate a general immune response. This technique took a step forward in 1974 when Edgar Lederer of Orsay, France, isolated a small bacterial molecule, a sugar attached to two amino acids, that contained much of the immune stimulating activity. The molecule, called a muramyl peptide, is as potent as but less toxic than

a complete bacterial extract.

At the recent meeting of the American Chemical Society in Miami Beach, Peter Dukor of Ciba-Geigy Limited in Basel, Switzerland, discussed research on the muramyl peptide. It has been synthesized chemically, along with analogs that have even greater activity than the natural molecule. Dukor suggests that these peptides act by stimulating macrophages. In the body, the macrophages release chemicals that act at several places on the immune system. Thus, the single peptide can boost proliferation of the T and B lymphocytes and also can act to stimulate precursor cells to mature into additional macrophages. The first application of the bacterial component, Dukor expects, will be as an ingredient to enhance the effect of vaccines.

A second approach to enhancing disease-fighting ability involves imitating body chemicals that stimulate the immune system. Researchers have identified