The committee is now sifting 85 such definite proposals. The proposals were being drawn up at the same time that the technological advances were becoming apparent, but some of them, says Getz, are written in the expectation of having 500-GeV beams available. Others can be done with 200-GeV beams, the level at which the accelerator will do most of its running in the early days.

Many of the proposals now before the laboratory management propose to search for particles that theorists feel are necessary to the success of various theories but which so far have not been found by experimenters. These include the so-called quarks, particles of which all the other particles are supposed to be built (SN: 9/13, p. 198).

Another theoretically desirable particle is the so-called intermediate vector boson or W particle (SN: 11/16/68, p. 500). This particle is important to certain theories of how the weak subnuclear force behaves. Another particle to be sought is the so-called magnetic monopole, an object that would have either a north magnetic or a south magnetic pole standing alone, unlike any other known magnetic body.

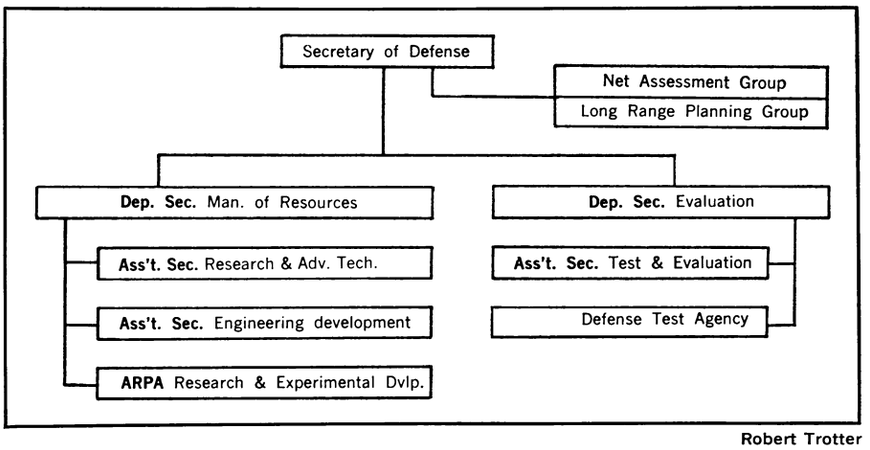
A large new area that the Batavia accelerator will be able to investigate, says Dr. Goldwasser, is the behavior of neutrinos, massless particles involved in nuclear beta decay. Because of the intensity of NAL's proton beam it will be able to produce very copious beams of neutrinos. "Not one neutrino, or two, or a dozen," says Dr. Goldwasser, "but thousands." With this kind of intensity Dr. Goldwasser feels that the interactions of neutrinos with other matter, which are still somewhat mysterious, can be definitively studied.

The most numerous items in the batch of proposals, says Dr. Goldwasser, are suggestions to test theoretical predictions that the cross section, or probability of interaction with some other matter, of a particle and the cross section of its antiparticle should approach the same values at higher energies. At low energies, matter can do some things that antimatter cannot do, so the cross sections of a particle and its antiparticle are different. Theory says that at higher energies the inhibitions should disappear and matter and antimatter should be able to do the same things; the cross sections should therefore come to the same value.

Another prediction made by theorists is that there should be an upper limit to the masses of elementary particles. So far no accelerator has indicated that this limit actually exists, although theorists put it at a particle mass of about 5 GeV. "We are in a position to observe particles above 5 GeV," says Dr. Goldwasser. □

DEFENSE STUDY

Revamping research and development



Robert Trotter

Panel report: New posts, more clout for Defense research and development.

To Pentagon watchers, as the fortunes of the military establishment rise and fall, so vary the emphasis and support given to its research and development programs. And in the past an increase in military expenditures has been related to external pressure—a firm response to a potential or real threat. This was expected.

Today, however, critics in increasing numbers feel that both militarists and their technologists have usurped too much of the nation's wealth. Their emotions have been exacerbated by press reports of "poor performance," "cost overruns," "duplication of effort" and "military waste."

The result has been pressure from within the Administration itself to cut back military spending. Congress, in contrast to its former rubber-stamp approach, is questioning nearly all new military R&D programs and taking a harder look at many ongoing sacred cows.

Last year, the new President faced an austere military budget but foresaw no reductions in United States commitments. In July 1969, he convened a blue-ribbon panel to perform a critical analysis of the Defense Department's organizational structure and management processes. The intent: to improve Defense performance and still effect cost reductions.

The year-long investigation by the Defense panel completed, its chairman, Gilbert W. Fitzhugh, delivered a 237-page report to the President in mid-July, and by the end of the month it was made public.

The report was a shocker. It proposes broad Defense Department reorganization through 113 major recommendations, and calls for sweeping changes in the management of R&D programs.

If Defense Secretary Melvin R. Laird responds positively to this streamlining, the impact on military R&D will be resounding—and, many feel, the nation will be the beneficiary. At present Defense officials are hesitant to comment on the proposed changes, but some do admit privately that the whole system is overdue for such an overhaul.

The key recommendation concerning research and development is the abolition of the position of Director of Defense Research and Engineering, now occupied by Dr. John S. Foster. The position would be replaced by three Assistant Secretaries to direct Research and Advance Technology, Engineering Development, and Test and Evaluation. A new independent Defense Test Agency to monitor all weapons testing would also be established.

A new Net Assessments Group to weigh United States defense capabilities against intelligence reports of potential threats and determine weapon needs prior to procurement approval would be established. Also created would be a Long Range Planning Group.

Fitzhugh, board chairman of Metropolitan Life Insurance Co., says he is not wholly critical of the way the military does things. There are, he asserts, "many things I think they do well." But he also says; "Frankly, we think it's an impossible organization to administer in its present form—just an amorphous lump."

The consensus of some industry and Pentagon officials appears to be that if panel recommendations relating to research, development, test and evaluation are acted upon, these functions will assume a more important role and provide more effective control in the future process of weapons procurement.

A principal argument of the panel is that too many decisions have to be made by the Secretary of Defense and

that not enough clear functional responsibility is delegated.

Therefore, in eliminating the post of Director of Defense Research & Engineering, a single position is replaced by three of higher rank—two Assistant Secretaries reporting directly to a new Deputy Secretary for Management of Resources and one reporting to a new Deputy Secretary for Evaluation.

As a result, the Deputy Secretary-Resources would control all R&D, including the existing Advanced Research Projects Agency (ARPA), whose responsibilities would be expanded to direct all basic military research and exploratory development.

Similarly, all test and evaluation would be under a Deputy Secretary, with the Assistant Secretary-Test and Evaluation directing testing for all R&D programs; his operations would be monitored and testing methods and procedures would be designed by the proposed Defense Test Agency. Further, DTA would oversee operational test and evaluation of all major weapon systems.

These changes in R&D management would contribute enormously to another major recommendation of the panel already instituted, coincidentally, by Laird. Hereafter, all new major weapon systems will undergo thorough and rigid testing prior to procurement; no longer will components of a major system undergo development concurrent with production. It was this concurrence policy that led to the huge cost overruns in such programs as the C-5A cargo plane.

The panel's recommendations could go far to eliminate some of the embarrassing aspects of Defense procurement, and indications are that the report is being taken seriously.

In making the recommendations public, Laird declared, ". . . we have put a high priority on the panel's report." But it is doubtful that critics of military spending in general will be appeased by any reorganization, no matter how effective. □

NERVE GAS AGAIN

Disposal at sea

The Department of Defense has been subjected to intense criticism in recent years over its practices and proposals for disposing of weapons containing chemical warfare agents. The criticism is partly justified: The military appears to have shown a remarkable lack of judgment in its failure to take into account environmental effects and other hazards.

But now DOD is between a rock and a hard place. Small ground-to-ground rockets containing the deadly GB nerve gas, stored at Lexington Blue Grass Depot in Kentucky and Anniston Army Depot in Alabama, must be disposed of quickly before something even more serious happens. The only disposal method appears to be to load them on an old freighter, tow it out to sea and sink freighter, rockets and all in the ocean depths.

The reason for the urgency: Internal leaking in the rockets. Although Army statements have been vague, apparently the nerve gas is seeping into the rockets' propellant chambers; it is feared that this may cause detonation. The Army says this risk so outweighs the hazards of dumping at sea that it will go ahead with this method of disposal despite opposition. If the Army has its way, the rockets, encased in desk-sized concrete blocks after the leaking was first suspected, will be loaded aboard trains sometime after Aug. 10. They will be hauled to Sunny Point, N.C., to be put in the freighter's hold. Two days later, the freighter will be sunk 245 miles off Cape Kennedy in 16,000 feet of water. The job must be done before the September hurricane season begins.

The opposition to the Army's plan comes mainly from Rep. Paul Rogers (D-Fla.) and Florida Gov. Claude Kirk. Rogers is asking for a Congressional resolution against the dumping off Florida's coast; Kirk is reported to be seeking a court injunction.

A serious disaster during the operation is so unlikely as to be "vanishingly small," says a National Academy of Sciences report last year on a similar disposal problem (SN: 7/12/69, p. 26). Extensive precautions will be taken during the shipment to the coast. The trains hauling the concrete-encased rockets will travel at no more than 35 miles an hour and they will avoid population centers. The danger while towing the freighter out to sea and sinking it is likewise small. But what happens on the bottom of the sea is anyone's guess (SN: 6/28/69, p. 609), and the NAS report treats this subject only perfunctorily: "Upon the corrosion of the steel containers, seawater will penetrate concrete and the thin aluminum bodies of the rockets, thus allowing the GB to diffuse slowly to the outside. . . . The GB that escapes will be hydrolyzed gradually by seawater. The resulting toxicity of the sea should be highly localized."

But a Defense Department spokesman this week admitted that the Army did not know exactly how much seawater would hydrolyze a given amount of GB; and he also admitted that sea life could be killed by the gas before the detoxifying hydrolysis takes place. It is mainly because of the numerous unanswered questions with regard to the effects on marine ecology that Kirk is asking for an injunction against the operation. □

PLASMA PROBLEMS

Protecting the donors

Only a decade or so ago medical researchers in the United States were inducing a serious disease, hepatitis, in prison volunteers. Public shock at a practice reminiscent of the medical experiments of Nazi Germany caused researchers to rethink their extensive effort to solve the mystery of the sometimes fatal disease. Such human experiments on hepatitis and other diseases are no longer done.

Last week the National Academy of Sciences raised a new question of medical ethics, as well as a serious question of public health. The Academy's Committee on Plasma questioned the methods of many of the small plasma banks which, without benefit of a supervising physician, collect blood plasma for sale to the drug houses that use it to produce the albumin and antibodies doctors use to save lives.

Alcoholics, drug addicts and assorted derelicts have become major donors of such plasma. A person can make as much as $400 a month selling his plasma, especially if he doesn't mind being immunized against tetanus and certain other deadly diseases before it is withdrawn. On-the-spot immunization is used to produce the wanted antibodies or other immune substances in the donor's blood stream.

While there are sharp limits on the amount of whole blood anyone can give, donors can survive plasma extraction as often as every two days.

This is possible because a recently developed closed-system plastic tube apparatus makes it possible to take the blood out of the body, extract the plasma and return the vital blood cells to the donor, all without risk of infection.

There are nevertheless unpleasant results, both for the derelict donors and for the thousands of hospitalized patients who receive antibodies or other products derived from the donated blood plasma.

The public health question is well known: Along with life-saving plasma products, patients may occasionally receive serum hepatitis, treatment of which requires a minimum of three months of hospitalization.

Another question has been less thoroughly discussed. Plasma donors are usually quite unaware that certain little-understood diseases may show up years later because blood banks have hyperimmunized them — given them large, repeated doses of antigens—to stimulate antibody formation before their plasma is withdrawn.

An estimated two percent of derelict or hippy donors have been found to be hepatitis carriers, while only about