local police dispatched a squad car that ended up at the wrong facility, 14 miles away.

The GAO report does not explain why it picked these three plants for examination, nor does it indicate how representative they may be of the many other private firms authorized to hold large quantities of fissionable materials. One GAO official familiar with the investigation told *Science* that these plants were not chosen as a representative sample. Nonetheless, Theodore Taylor, a nuclear physicist who has emerged in the past few years as one of the AEC's best-informed critics on nuclear safeguards, says that he thinks the security measures described in the GAO report reflected the general level of protection afforded in mid-1972. "It would be wrong to imply that the stuff is just lying around without any physical security, and some facilities are quite sophisticated," says Taylor, a former deputy director of the Pentagon's Defense Atomic Support Agency. "But it is reasonable," he adds, "to say that what the GAO found was fairly typical."

How much longer holes in the fences and broken locks on the doors will remain typical of American safeguards is hard to tell. The AEC says the three plants in question have been improved (although the GAO hasn't been back to check) and, after years of procrastination, the commission is moving quickly now to tighten security both of transportation and storage of nuclear materials. Both the GAO and critics like Taylor attribute lax security in the past to ambiguous and sketchy AEC regulations that gave private firms little idea of what was expected of them. The AEC sensed the inadequacy of these regulations more than 3 years ago when it began an internal study of the protection afforded "special nuclear materials." In September 1971, the internal study group said the regulations needed clarifying and elaboration; that access to SNM needed tightening; and that the inspection system needed strengthening.

Last February, the AEC did finally propose stringent new security measures, and the outcry from the nuclear industry, which has resisted tighter security on the grounds that it would cost too much, was quick and vehement. Among other things, the new rules called for armed guards capable of repelling all but a "significant armed attack," for active intrusion alarms on storage sites, searches of persons and vehicles entering and leaving storage and processing areas, redundant communications with police, and more frequent and meticulous inventories of fissionable materials. All this, said Exxon Nuclear, was "obviously unworkable." A committee of the Atomic Industrial Forum (AIF) a trade group, said the guard requirement threatened to turn nuclear facilities into an "armed camp." The regulations, said Babcock & Wilcox (whose subsidiary the Nuclear Materials and Engineering Corp., of Apollo, Pa., gained notoriety in 1966 for losing 100 kilograms of weapons-grade uranium), were "beyond the bounds of reason."

The AEC has since clarified some parts of its new rules, and mildly softened others, and the level of industry anxiety has abated accordingly. "Nuclear safeguards is still a small, young business," notes a spokesman for the AIF. "The industry is holding its breath right now, waiting to get some experience with the new regulations."

One reason the business is still small is that the civilian power reactor business has not yet begun to deal in large amounts of plutonium or uranium enriched to the point where it could be used in a weapon (about 90 percent uranium-235.) But as fuel reprocessing plants begin to proliferate, and as they begin to recycle the plutonium that appears as a waste product in spent fuel rods, the quantities of weapons-usable material shuffling around the country and stockpiled in vaults is expected to rise rapidly toward a level of 1 million kilograms a year by 1980. "That's why I'm trying to get the message across now," says Taylor. "If we wait until 1978 to impose strict safeguards, we'll have real chaos".

—ROBERT GILLETT

International Conferences: A Package Deal That Came Unwrapped

The international conference held in an attractive European city is so accepted a consolation of academic life that only a killjoy would raise doubts about its value to the taxpayer, who foots most of the bill. But a conference held recently in the fashionable holiday resort of Montreux, on Lake Geneva, was such a disaster that many of the participants wished they had found less arduous ways of combining business with pleasure.

The invitation to the International Congress on Drug Education, held from 15 through 18 October, suggested that no excessive demands would be made on participants' powers of attention. Admittedly, there were 4 hours of lectures scheduled, but the rest of the time was to be passed in the form of the talk sessions known as workshops. Conference activities were to last only 6 hours a day, and participants' energies were to be revitalized in the evening by a program of Swiss soirées, dinner dances, and "folkloric demonstrations." And to recover from the exertions of the conference, participants had offered to them in the package deal the option of post-Congress cruises down the Rhine and tours to Amsterdam or Paris.

Right from the start the academic conférenciers found that their trip was going to be less idyllic than the pictures on the travel brochure. The bus drivers who ferried them from Geneva airport to Montreux did not know which hotels to leave them at. Rooms had been allocated on an apparently random basis, so that some people who had booked for tourist class were lodged in deluxe suites and a conferee who had paid for a $31-a-day room found herself in a room without bath or toilet. When the delegates assembled for their first meeting, they were refused entrance by the hotel management and had to wait 2 hours in the lobby while another room was found.

Matters failed to improve on the next day. The international character of the conference was not enhanced when the French-speaking delegates departed en masse after being informed by the organizers that there were not enough of them to justify the promised interpretation facilities.

Mutiny was also brewing among the English speakers who were left. Why, people demanded to know, should they have to pay for coffee in the coffee breaks after being charged an unusually stiff registration fee of $111? Delegates began to feel that the rather unstructured form of the conference provided more freedom than they found they wanted. The conference gained even more free form when some of the workshop moderators failed to turn up, allegedly because they were not offered a fee. Rumors began to fly that the contractor, one Claudius Chorus, and his travel agent, Robert Musquetier, had charged the conferees more for their hotel rooms and air tickets than they had to pay to the providers of these services.

(Asked if he had made a profit on the prices charged for air fares or hotels—which most people alleging a rip-off cited as the grounds for their complaint—Chorus replied that "As far as I know, we did not do this." The Swissair office in Washington, D.C., says that the $295 air fare quoted by Chorus is $22 above their standard price for package trips but would include ground transportation from Geneva to Montreux, for which $22 did not seem way out of line.)

The attention of the delegates turned more and more from the subject of international drug education to their own discomforts and the suspicion that the chief purpose of the conference was to turn a profit for the contractor. Open revolt broke out, and a caucus was held to reorganize what was left of the program. A radical group of delegates also confronted the organizer, Arthur Tongue of the Lausanne-based International Council on Alcohol and Addictions. Tongue and Chorus gave voice to the explanation that the cost-cutting measures, such as cancellation of the French interpreters, were regrettable but necessary, because only half the expected number of delegates had shown up. And Chorus informed the conferees that even after these economies he would still suffer a loss of some 40,000 Swiss francs (about $12,500).

Many delegates returned from the meeting feeling they had not learned a great deal. "It was a poor conference that turned into a real fiasco. People started demanding that the program be changed, that they get their money back, and really nothing got done," says Peter Levin, assistant city prosecutor of Philadelphia. According to G. J. Hanneman, of the University of Southern California, "There was an utter breakdown in logistics." And Edward M. Brecher, a free-lance writer on drug matters, describes the conference as a disaster.

Everyone has different explanations for what went wrong, chiefly because each blames someone else. The anger of the delegates seems to focus on Chorus rather than Tongue. Hanneman, for one, believes that Tongue did a "fine job" of organizing the program, which was no better or worse than the average international conference, and unfairly bore the brunt of people's disgruntlement with the shortcomings in logistics.

Chorus, not unnaturally, has a different version. Reached in The Hague, where his conference-arranging organization is located, he admitted there were problems but, far from blaming the conferees, he praised them for their steadiness under duress. "The participants behaved very well, and I was very pleased with such open type discussion. I must say," Chorus added, "Americans are much better educated to deal with this than Europeans." The root of the trouble was that only 230 or so participants had turned up (Chorus did not know the exact number), far fewer than the 400 expected by the two sponsors, Tongue's International Council on Alcohol and Addictions and the National Coordinating Council on Drug Education (NCCDE), a private organization based in Washington, D.C. Chorus observed that there had been

a lack of direction on the part of the NCCDE after its executive director left for a job in the White House. The number of dissidents, he thought, was no more than 25 percent of the conferees.

The former executive director, Peter Hammond, is now the press officer of the Special Action Office for Drug Abuse Prevention. Hammond, who had the original idea for the conference, was introduced to Chorus by Robert Schumacher, a public relations agent who used to do work for the NCCDE. The three of them expected the conference to draw 700 persons and agreed to split the profit three ways among Chorus, Schumacher, and the NCCDE. Schumacher later dropped out and Hammond took no further part in arrangements after he had left the council. Asked what he thought had gone wrong, Hammond said he guessed it was "incompetence at that end, lack of adequate supervision at this end, and the bad luck of devaluation of the dollar, which hit a lot of conferences at that time." (International conferences generally require a reasonable number of American delegates in order to make ends meet.)

Several conferees described the conference as a "rip-off," citing the suspicion that they had been overcharged for their hotel rooms or air fare. This does not in fact seem to have been the case—the higher air fare included a legitimate charge for ground transportation—and the complaints of being ripped off seem to reflect more a general sense of not getting one's money's worth than any specific cases of overcharging. The NCCDE is sufficiently concerned, however, to have written Chorus asking for an audit. Chorus says there will be no problem in supplying one.

Told of the conferees' complaints, Hammond commented: "I don't think a single person attended the meeting with a more noble idea than to get a week's European vacation. So the notion of being ripped off is an interesting accusation to make." Budget cuts—such as the decision to dispense with the interpreters—were simply an inevitable attempt to make ends meet when fewer people turned up than expected. Says Hammond: "I don't know Claudius that well, but I don't think there was any deliberate scheme on his part. He just started losing his shirt and getting desperate." Chorus says that most

Briefing

Sakharov Wants to Leave

On 21 November, Andrei D. Sakharov, the celebrated Soviet physicist and civil liberties advocate, took his first steps toward applying for a visa to leave the Soviet Union and come temporarily to the United States. Sakharov has now told several American newsmen in Moscow that he wants to come to New York to receive an award from the International League for the Rights of Man (ILRM). He also says that he wants to spend several months at Princeton University.

Sakharov's statements to newsmen represent a turnaround from his previous insistence on staying in the Soviet Union despite a government campaign of harassment directed against him and his family; in recent weeks the campaign has intensified.

At present, there is no indication of how Soviet officialdom will respond to Sakharov's latest moves. Princeton's physics department has invited Sakharov to be a visiting professor for one academic year and has included his family in the invitation. The ILRM, for its part, plans to award Sakharov its fourth human rights award in New York on 5 December. Although Sakharov told ILRM representative John Carey by telephone that he hoped to be in New York to accept it, this seemed unlikely. In addition, the Massachusetts Institute of Technology has arranged academic enrollment and employment for members of the Sakharov family.

A previous campaign of anti-Sakharov activity in the Soviet Union died down in October, after an international wave of protest that included a stern telegram from the U.S. National Academy of Sciences. Recently, however, Sakharov's wife, who openly acknowledges her activities in the underground dissidents' movement, has been repeatedly interrogated by the Soviet secret police. Sakharov has written that the interrogations are cruel, because she is partially blind, and are a "form of pressure upon myself." On 28 November, when he revealed his steps toward applying for an exit visa, Sakharov said he would not permit her to respond to any more police summonses.

If Sakharov does come to Princeton, as now seems more likely, he may find a mixed reception. Some American scholars and scientists who have criticized Soviet policies regularly discover that the Russians do not always grant them permission to visit the Soviet Union. Those who do go are sometimes subjected to baggage searches, unexplained travel delays, and even warnings about which activities would be viewed as undesirable by the authorities.

Some Princeton scholars say that they may find their dealings with the Soviets more difficult once Sakharov arrives on the faculty. Knowledgeable experts on Soviet-American relations confirm that this is a real possibility.

But not everybody at Princeton shares this fear, and several state bluntly that this should not inhibit them from speaking out. Robert C. Tucker, of the politics department, and a well-known biographer of Stalin, for example, said, "If we take the view that we'd better keep silent and not speak out, we might as well give up being a free country and forget about détente."

Marvin L. Goldberger, chairman of the physics department, who issued the invitation to Sakharov in the first place, wonders whether he will be *persona non grata* to the Soviets as a result. But, he concludes: "If they chose to misinterpret our invitation as having been critical of the government and don't want me there as a result, then that's too damn bad."

So far, however, the Administration is not admitting that the Sakharov matter is hurting scientific cooperation between the two countries. In Moscow on 30 November, science adviser H. Guyford Stever signed an accord widening U.S.-U.S.S.R. exchanges and said that Sakharov "is not an issue in this exchange agreement." The exchanges, he said, have "excellent support from American scientists and engineers."—D.S.

of his time is spent organizing conferences—two he has handled are the First International Congress on Aerospace Medicine, held in Amsterdam in 1970, and the United Nations Second World Food Congress held last year in The Hague—but he is not planning another at present.

The International Conference on Drug Education proved a bad trip for Claudius Chorus, Arthur Tongue, the NCCDE, and the participants. But each knew at least in part what risks he was taking. The innocent victim was the U.S. taxpayer, who in one form or another paid for or subsidized many of the conferees. The sum contributed to the Swiss balance of payments was not enormous—on the order of $36,000, assuming that the U.S. Treasury was the ultimate source of half the estimated $600 in conference expenses incurred by each of the 120 American participants. But even a glance at the "travel program" issued for the conference would perhaps have suggested the existence of more direct ways of contributing to the advance of knowledge.

—NICHOLAS WADE

RESEARCH NEWS

The Big Accelerators: A Progress Report

1) New Optimism at NAL: Problems Continue, but Research Is Under Way

In contrast to the dissatisfaction and bitterness of a year ago, there is an upbeat mood among physicists working with the world's largest accelerator at the National Accelerator Laboratory (NAL), near Batavia, Illinois, now that experiments are well under way and beginning to produce results. The accelerator itself has operated at energies up to 400 billion electron volts (Gev), a fivefold increase over earlier machines of the same type. While no startling new results have emerged from the first round of experiments, a number of important measurements have been made and more are expected in the coming year. Officials of NAL believe that the worst of a frustrating series of delays, equipment failures, and management problems are behind them. Nonetheless the facility is still far from complete. The accelerator does not yet operate at its full intended power, none of the three major experimental areas is complete, and a logjam of approved but not yet done experiments is causing problems for university physicists and other users of NAL.

Operation of the accelerator was delayed nearly a year until spring 1972 by magnet failures attributable to cracks in their insulation and, according to some physicists, to an inadequate amount of insulation. Magnets are still breaking down at the rate of about one a week, although use of a new insulating material, mica and resin instead of the earlier epoxy, seems to be gradually eliminating the problem; nearly half of the 1000 magnets in the accelerator's main ring have been replaced, some more than once. There have been difficulties with accelerating cavities, power supplies, and the equipment for extracting the beam of protons from the accelerator. In the first 10 months of 1973, unscheduled repairs closed down the accelerator for a total of 2514 hours, a period slightly longer than the operating time available for research. The accelerator, in short, has simply not worked very well in its initial year of operation.

The philosophy followed by NAL director Robert Wilson in building the accelerator included cutting corners whenever possible and generally following a tight design. This approach is given credit for getting the accelerator built quickly and within a stringent budget, and some difficulties in bringing such a complicated machine into service were expected. But some physicists now question whether a more conservative approach—such as that being followed in the construction of the new accelerator at the European Organization for Nuclear Research (CERN) (see accompanying article)—would really have required any more time or money. The problems at NAL appear to have been aggravated by what in retrospect were unrealistic promises about the performance of the accelerator. Plans to bring three major experimental areas into operation simultaneously have been hampered by the concentration of manpower on fixing the accelerator. Experimental physicists who hurried to prepare experiments for NAL have found themselves facing delays of 2 to 3 years, often at some cost to the individuals and institutions involved. Those who did set up the first round of experiments reported complaints ranging from irregular and often inadequate beam to a lack of technical support facilities and a shortage of housing. It has been, as one physicist put it, "not fun to do an experiment at NAL."

To their credit, the NAL management have been responsive to these complaints, according to experimenters contacted by *Science*, and conditions are improving. The reliability of the accelerator is reaching the point where it can be turned off and on without necessitating major adjustments. The average intensity has reached 5×10^{12} protons per pulse (5×10^{13} is ultimately hoped for), the beam is now being extracted from the accelerator with an efficiency of about 95 percent (99 percent efficiency will be needed to avoid radiation problems at the higher intensity), and a uniform pulse nearly 0.75 second in length is being delivered to experimental areas (a 1.0-second pulse is eventually promised). Directors have been appointed for each experimental area to facilitate the research efforts.

The experimental facility furthest along is the neutrino area, now nearly 90 percent complete. It includes a high energy neutrino beam and a muon beam. A variety of counters, spark chambers, and other electronic equipment has been used to detect particles from these beams and study their reactions. Also located in the neutrino area