ation of the Committee on Safety of Medicines "in no way absolves the ethical committee from investigating the ethical aspects of that trial".

Patients who are undergoing tests which are not intended for their benefit should be given a full explanation of the proposed procedure and the patient should feel free to withdraw from the tests at any time, says the committee. Except for trivial procedures of which venapuncture is an example, an explanation of the procedure should be given in the presence of a witness.

When the research is intended for the benefit of the patient the committee feels that there are circumstances in which it would be "inappropriate or even inhumane" to give detailed explanations of the procedures involved. Such cases should be investigated with particular care by the appropriate ethical committee.

SOVIET SCIENCE

Land and Sea

LUNOKHOD-2, which landed on January 16, 1973, in the Le Monnier crater on the eastern edge of Mare Serenitatis, had a region of particular selenological interest to explore—the transition from mare to highland. Operating among features assigned unofficial working names such as 'Head-on Hills', 'Shallow Crater', 'Round Bay', 'Near Cape', 'Far Cape' and 'Straight Rille', the Lunokhod recorded and transmitted data of considerable significance, not only to the interpretation of this specific type of area but to lunar research as a whole.

One of the most important experiments of Lunokhod-2 was the determination of possible changes in chemical composition of the transition area surface. A modified version of the RIFMA X-ray spectrograph used on Lunokhod-1 was used—the new instrument, RIFMA-M, being specifically adapted to determining the ratio of iron to other elements—notably aluminium and titanium. Near the landing site, on the slope of a crater of diameter 40 m, readings of Si, $24\pm4\%$; Ca, $8\pm1\%$; Fe, $6\pm0.6\%$; and Al, $9\pm1\%$ were obtained. (The iron reading obtained by Lunokhod-1 for Mare Imbrium was 10 to 12%.) As Lunokhod-2 moved southwards, towards the 'Head-on Hills' on the edge of the highland, no significant changes were at first observed—data from a 13 m diameter crater at approximately 1.5 km from the landing site were close to the first readings. But as it moved closer to the hills the iron content decreased and 5 km from the landing site it had fallen to $4.9\pm4\%$. On February 19 a minimum reading of $4.0\pm0.4\%$ was obtained. During this part of the survey, the aluminium content increased to $11.5\pm1.0\%$. Writing in *Pravda* (November 20, 1973), Academician A. Vinogradov and Dr S. Solokhov attribute this change to a general variation in regolith composition in mare-to-highland transitions.

Panoramic television surveying of the transitional region revealed a number of interesting features, including a crater of diameter 15 to 20 m in the neighbourhood of the 'Head-on Hills' with associated slip terraces of some 10 to 15 m. In this region the density of small craters (diameter 2 to 3 m) fell to one half to one third of the average maria density.

A particular object of investigation was the 'Straight Rille', which stretches for some 15 to 16 km in a north–south direction along the south-east edge of Le Monnier. On both the eastern and western edges of the rille, a 30 to 40 m zone of intensive shear towards the fault was observed. The thickness of the regolith decreased as the lunokhod approached the rille and the lip consisted of a rock 'border' with boulders of diameter at least 1 to 2 m.

One interesting feature of the Lunokhod-2 programme was an attempt to correlate chemical composition to visual observation of the albedo. Using photometic telephotography from Earth and the RIFMA-M observations, a general relationship between the readings has been established. This is a result which is considered by the Soviet team to "extend considerably the significance of the Lunokhod-2 results".

The magnetometer experiments, a new feature of Lunokhod-2, revealed some characteristic variations in the field attributed to induction currents produced by variations in the interplanetary field. These data, it is claimed, should reveal the conductivity of the Moon to a depth of some hundreds of kilometres.

NUCLEAR WEAPONS

Poor Security

by our Washington Correspondent

LAST month, when fighting in the Middle East was at its peak, the United States Atomic Energy Commission (AEC) ordered security to be stepped up at all institutions which handle enriched uranium and plutonium, to ensure that none of the material could be stolen and end up as part of a nuclear finale to the Arab–Israeli conflict. The extra precautions were, it seems, more than justified, for a recent investigation by the General Accounting Office (GAO) has come up with the disturbing finding that security arrangements in some plants which hold strategic nuclear materials would pose few problems for a hamfisted amateur burglar, let alone a terrorist organisation.

The most expensive, lengthy and difficult part of making a nuclear weapon is the production of fissionable material, but fabrication of the weapon itself is reckoned to be a relatively easy task which would not be beyond the wit of scientists in most countries. Thus, if a supply of enriched uranium or plutonium could be diverted from installations in the United States, probably over a period of time, nuclear weapons could be within reach of those willing to pay the price. A crude bomb, such as the ones dropped on Hiroshima or Nagasaki, would require some 17 kg of enriched uranium or about 6 kg of plutonium, and it would, of course, take only one such bomb—or the threat of it—to upset the military balance in the Middle East.

The AEC itself acknowledged such risks in an internal report in 1971, which came to the conclusion that "as long as significant quantities of nuclear materials are in active use by the government, by government contractors, and by licensed commercial and other interests, there will be a distinct probability that some of those materials will be stolen, unexplainably or accidentally lost, diverted from authorised use, or used or disposed of in unauthorised ways".

With such considerations in mind the GAO, which carries out investigations for Congress, inspected the security arrangements in three plants which hold strategically important quantities of special nuclear material (as enriched uranium and plutonium are called). It found that in two of the plants, security "was so limited that protection was inadequate".

This is what the GAO found at one of the plants which, mercifully, remained nameless. The plant was protected by a part-time security officer and four armed guards, one of whom was on duty at all times, and it was surrounded by an 8-foot high wire fence. Special nuclear material, some of which is described in the report as being "of high strategic importance", was located in three buildings just inside the fence. Entrances to the building were connected to an alarm system.

On the face of things, that seems a fairly good security system, but the GAO found that it had the following defects:

- The fence had thirteen weaknesses, ranging from broken welds to inoperative locks, which would allow it to be breached with ease. Ten of the weaknesses were out of sight of the guard post.
- One of the storage areas was a prefabricated structure, just 16 foot from the fence, made from sheet steel panels 3 foot by 9 foot. According to the GAO investigators, who tested the strength of the panels with an adjustable spanner, "within 1 minute we were able to remove five metal screws from