MOONROCK SURPLUS

Too much, too soon

Even before the first moon samples were brought to earth, scientists were wondering whether they weren't going to be quickly flooded with more riches than they could digest (SN: 6/14, p. 585).

Now that the analysis of those first moonrocks is well underway, it is becoming evident that they had guessed right. The researchers are still ecstatic about what they are learning from the 48 pounds of rock delivered by the crew of Apollo 11, but if the present Apollo schedule is adhered to, they will soon be inundated with samples of which they simply will not be able to take full advantage.

While the first of 142 principal investigators were just beginning to receive their samples from the Lunar Receiving Laboratory in Houston last week, the scientists who manage and work in the LRL were already feeling the pressure.

Most of the knowledge obtained from the Apollo 11 samples, in fact, will not be available to plan the mission or even aid the astronauts of Apollo 12 in November, says Dr. Daniel H. Anderson, new curator of the LRL. There just will not be time to complete the examinations.

The present plan of a lunar landing every four months is overpowering, in the view of Dr. Anderson and most of his colleagues, including Dr. Wilmot N. Hess, former chief scientist at the Manned Spacecraft Center.

"Three missions a year gives us terrible troubles," Dr. Anderson says. "They should be moved farther apart so that we can evaluate the results."

Furthermore, he adds, it is extremely difficult to make the engineering changes that are and will be necessary in the LRL as long as the missions come so close on one another's heels.

Dr. Persa R. Bell, the LRL's stridently expressive manager, is another who feels that the landings are planned too close together to suit science. "Too close?" he explodes. "Of course they're too close! They (National Aeronautics and Space Administration mission officials) ought to give us a factor of two!"

But even eight-month intervals would probably not be enough to take full advantage of one mission's findings in planning the next. Dr. Eugene Shoemaker of the California Institute of Technology thinks such scheduling, with science as the sole constraint, could result in missions a full year apart. "Instead," he says "we leapfrog our feedback," which means that data from one mission are largely put to use two flights later.

NASA

As much as they love moonrocks, scientists wish Apollo would take its time.

Getting the most out of the moonrocks is not made any easier by the difficulty of working within the LRL. Ever since they arrived on earth, the rocks have been surrounded by elaborate precautions and procedures, both to preserve their scientific value and to protect the earth from any possible danger they might harbor. Though the researchers found no moon germs or other pathogens, the precautions will be maintained on future missions, both for science's sake and because the Apollo 11 samples, while germfree, might not be representative of the whole moon.

The simple act of transferring a rock from one room to another in the LRL requires painstaking packing in special containers and the personal knowledge and approval of the LRL's curator. It also means filling out, in triplicate, a form which includes the sample number (also recorded in the laboratory's central computer), its weight, the type of container, date, time of day and the signatures of the test directors relinquishing and receiving the samples. In handing the samples over to the principal investigators, the tight security is not giving an inch.

A special packing room was still being completed this week at the LRL and containers for the samples include some with built-in vacuum pumps, special clamps and known radiation levels.

To make sure that the priceless samples will be well treated in the outside world (as well as to ensure their survival for posterity), NASA is retaining ownership of the rocks. Unlike most Government-sponsored research scientists, the PI's do not simply receive grants of funds with which to carry out a proposed project. Instead, they sign contracts with NASA, essentially as hireling scientists, to do their assigned research and then return the lunar material to the Government.

The rules apply to all the material: rocks, chips, dust, vapors, solutions, emulsions and residues. About the only lunar items that are not required to be returned, says Dr. Anderson, are the gamma rays given off by radioactive elements.

As much as 60 percent of the 48 pounds of the lunar material, in fact, will not be given out at all, but will be kept in permanent storage as a virgin sample in the LRL's vault, to which the curator is the omnipotent keeper of the keys.

Even the vacuum chamber in which the rocks were first studied is scrupulously cleaned to make sure that every bit of material is accounted for. After an initial dusting, a technician crawls into the chamber, which is the size of a very cramped coffin, to get at the corners with a pencil-sized vacuum cleaner. Finally, everything is rubbed down with special cloths treated with a benzene methanol solution, and the cloths are retained in sealed plastic bags.

The principal investigators, nevertheless, hold the keys to some of the most vital knowledge about the moon, much of it untouched or only hinted at by the preliminary work in the LRL. The surprising finding that the samples are more than three billion years old, for example, was made in the LRL using potassium-argon dating (SN: 8/30, p. 160); outside researchers will apply the more reliable strontium-rubidium and uranium-lead methods to get dates in which geologists are confident enough to base their lunar theories.

Stable isotopes will be particularly valuable, points out Dr. Shoemaker, because they will help reveal the temperatures at which the different minerals in rocks crystallized. "Then," he says, "we'll really have a handle on the processes that have been at work in the moon"—some of which, the scientists agree, are unlike any processes at work on earth. ◇