Service-Utah Experiment Station Laboratory at Logan, Utah, by the Williams manometric method, were tested by this method. The soils ranged in lime content from 0 to 75%. The two methods checked with each other to within 3% lime on all of the samples. The standard deviation of the individual tests was 1.3%.—LOWELL WOODWARD, Soil Scientist, Soil Conservation Service, USDA, Provo, Utah.

USE OF A REMOTE HYDRAULIC PUMP AND RAM WITH A LUTZ TYPE BULK DENSITY SAMPLER

Although an ordinary hydraulic jack is frequently used to obtain density data by the use of the Lutz sampler jacked into the side of a soil pit, it is not entirely satisfactory for several reasons. One reason is the need for the operator to support the sampler and jack while operating the jack. Another reason is the necessity of keeping the plunger and valves on the bottom instead of on the top of the jack to prevent air from entering the pump when the hydraulic fluid system is incompletely filled. This becomes a serious obstacle when sampling near the bottom of a pit. Finally, the base of most jacks is rigidly perpendicular to the axis which may cause the sampler to veer to one side or the other because most pits do not have smooth, perpendicular walls. The device described in this note was designed to overcome all of these deficiencies and also add to the ease of removing the sample from the pit wall once the sampler has been jacked into place.

The complete sampler is shown in figure 1 and consists of the hydraulic pump, ram, sampling cylinder, and wrench to remove the sampler. The pump is connected to the ram by a high pressure hose (figure 2) and only the ram is in the pit. Such an arrangement frees the man in the pit from the need to operate the jack while holding the jack and sampler in proper alignment when the sampler is started into the soil. Once the sampler is forced to the proper depth, the hydraulic pressure is released, the ram removed, and the wrench placed over the cap of the sampler. Figure 3 shows the wrench in place on the sampler after removal of the ram. The wrench is turned in a clockwise direction and the sampler pulled from the pit wall. The sample is then removed from the sampler and prepared for transport to the laboratory.


The hydraulic pump described in this note was similar to those used in auto body repair shops with some exceptions. All rams used in body repair that were investigated had a stroke of 6 to 8 inches which was too short for the sampler used by the authors. Other satisfactory rams are probably available; however, after an intensive survey of local suppliers, the authors modified a commercial hydraulic bumper jack with a stroke of 15 inches as a ram. All pumping, releasing the pressure, and filling is done at the pump, not at the ram.

The bumper bracket was removed from the end of the ram, and the ram was fitted with a 1%-inch diameter flat head. The head of the ram was machined to a shoulder near the bottom to accommodate a collar for use in very wide pits. Removal of the check valve on the return stroke of the bumper hydraulic fluid from the remote pump to the ram. The other ball check valve must be closed because the fluid under pressure would be forced into the reservoir of the bumper jack and the packing glands are not designed to retain the fluid when the reservoir is under pressure. The bypass valve of the bumper jack is kept tight, otherwise oil enters the reservoir when the pressure is always released.

Figure 2—Bulk density sampling apparatus in use in a soil pit. This pit is 3 feet wide. Note the ball and socket joint at the base of the ram and the lugs on the cap of the sampler.