INJECTING SOLUTIONS INTO SOILS

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A method is sometimes required for injecting solutions of radioactive isotopes or other materials into the soil at exact depths and with minimal site disturbance. This can be accomplished precisely, simply, and without contamination by a device similar to the piezometers used by soil scientists.

An pointed access tube ($1/2$ or $3/4$ inch iron pipe) is driven into the ground to the desired depth. The point is inserted into the pipe to keep soil from clogging the end (fig. 1). While hardened steel points are required in rocky soils, a large stove bolt has proved entirely satisfactory in light sands.

The pipe can be driven by a hammer fabricated from iron pipes, caps, and reducing couplings without the necessity for machine work (fig. 2). By placing lead weights in the head of the hammer, any desired weight can be obtained. Depending upon the length of the pipe to be driven, the sleeve can be unscrewed and replaced with ones of different length as required.

After the pipe has been driven to the required depth, a steel rod is inserted in the access tube and hammered to drive the point down into the soil and out of the tube, leaving it unobstructed. If the point has reached maximum depth of penetration, the tube may be withdrawn until it is clear of the point shank.

To introduce isotopic solutions, a plastic tube is inserted to the end of the pipe. Solutions poured down the plastic tube do not contaminate the inner walls of the pipe (fig. 3). All radioactive substances are thus confined to the soil depth at which they were applied and soil shielding is at a maximum.

Figure 1.-The shank of a hardened steel point is inserted in the pipe, which is then driven into the soil. Once at the desired depth, a steel rod is inserted in the pipe to drive the shank of the point out of the pipe, leaving the end unobstructed.

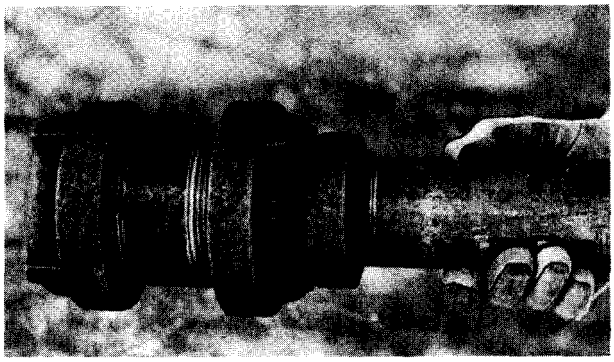

Figure 2.—A hammer for driving pipe into the soil can be fabricated from iron pipe and couplings without the necessity for machine work. The sleeve guides the head of the hammer directly to the top of the pipe.

After it has drained completely, the contaminated plastic tube should be withdrawn, placed in a plastic bag, and discarded. This care is not necessary for nonradioactive solutions, provided sufficient materials are in solution so that absorption on the sides of the pipe does not present a problem.

The access tube should either be capped or driven completely into the soil and filled with uncontaminated soil. It can serve also as a ' plot marker. It should never be withdrawn until completion of the experiment since this nearly always results in a smear of radioactive materials upward through the soil profile as it is removed. Also, the resultant hole provides an unusual path for water movement.

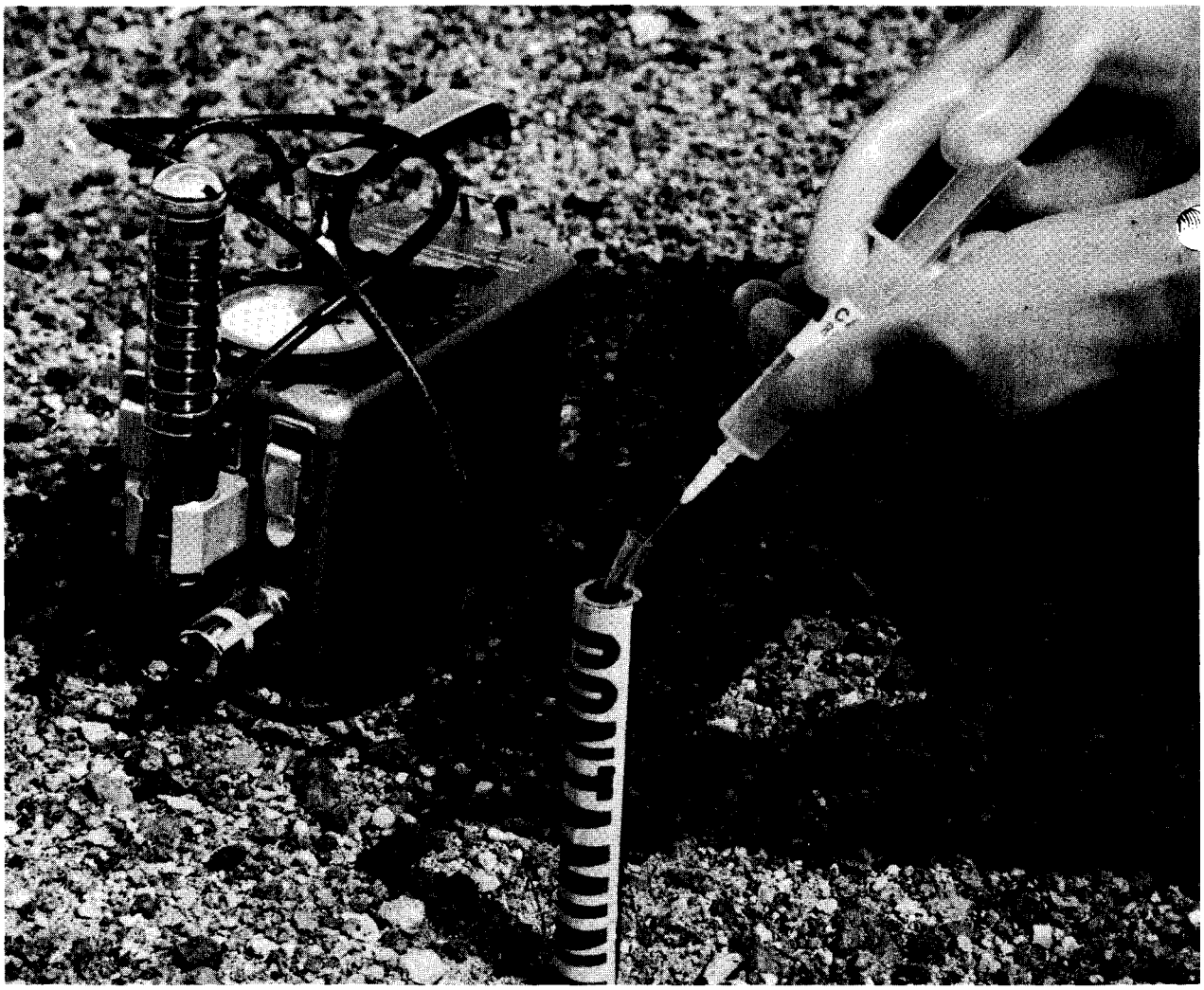

Figure 3.—Isotopes should be introduced to the desired soil depth through plastic tubing, which can be removed and discarded. The end of the pipe should always be sealed.

This technique has given good results for 5 years and has proved usuable in both desert and forest soils. It cannot place materials below the top of the soil water table unless solutions are injected under pressure.

Additional uses of this technique in field studies might include the aeriation of soil below the water table and the introduction of gasses to stimulate root growth.

Bibliography

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