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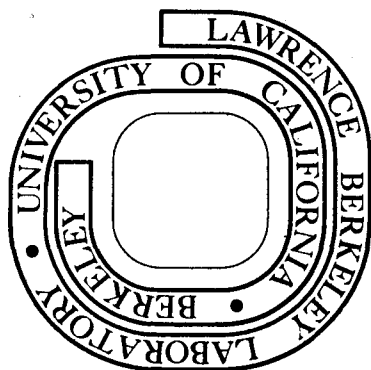
Alvin J. Hebert and Gardener G. Young

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PORTABLE FIELD WATER SAMPLE FILTRATION UNIT†

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The need for a lightweight back-packable filtration unit that could easily be cleaned without cross-contamination at the part-per-billion level while allowing rapid filtration of boiling hot and sometimes muddy water has given rise to the unit shown in Figure 1.

Filtrations are performed by pouring the solution into the funnel or by placing a piece of tygon tubing down a well and drawing the water up and through the filter. Boiling water has been drawn up old geothermal well pipes as high as 5 meters in this manner. Filtration usually takes less than one or two minutes per 500 ml bottle when the water is not too muddy. During the filtration process, it is important that bubbles not be allowed in the input line, otherwise the unit will cease functioning properly until it is reopened and a new filter inserted.

Field and laboratory tests indicate essentially no changes in carbonic acid or bicarbonate or carbonate ion concentrations when filtrations are performed at approximately 1/3 atmosphere of vacuum even though the pH value may range from 3.2 to 9.4.

The aluminum tubing sleeve shown in Figure 1 on one of the 500 ml. Nalgene bottles guards against bottle collapse when filtering

very hot water. The snap-in nipples for line connections to the lid of the bottle were machined from nylon. Total unit weight without lines or bottles is 3.5 kg.

Figure 2 shows the machined groove pattern of the main body teflon plate. These grooves are "round-bottomed" to facilitate cleaning. The tygon lines are connected to this plate via a small nylon nipple and viton O-ring to insure vacuum integrity. Also a large viton O-ring is placed in the outer groove. The 16.5 cm. diameter unit is designed to accept a standard Millipore acetate filter (variety HAWP-142, 0.45 micron, 142 mm plain white filter sheet) which is laid over the groove plate and viton O-ring prior to each clamp down and filtration. No separate filter support is necessary. A 2mm deep recess is machined into the mating top teflon disk shown in Figure 1.

The eight central holes shown in Figure 2 lead to the nylon nipple connector which fits into a mating recess on the other side. The main body teflon plates are backed by 1.27 cm thick aluminum plates.

The hand vacuum pump is manufactured by the Nalgene Labware Division of NALGE Sybron Corporation. The legs on the unit are easily removed for backpacking. The ends of the tie down bolts are expanded so that the brass butterfly nuts will not fall off.

References

†Reference to this device has been made in the publications listed. This work was done with support from the U. S. Energy Research and Development Administration.

H. R. Bowman, H. J. Hebert, H. Wollenberg, and F. Asaro, A Detailed Chemical and Radioactive Study of Geothermal Waters and Associated Rock Formations with Environmental Implications. Paper delivered at the University of Missouri-Columbia, Conference on Nuclear Methods in Environmental Research, July 29, 1974.

H. R. Bowman, A. J. Hebert, H. Wollenberg, and F. Asaro, Trace Minor and Major Elements in Geothermal Waters and Associated Rock Formations (North Central Nevada), presented at the Second United Nations Symposium on the Development and Use of Geothermal Resources, San Francisco, May, 1975.

Alvin J. Hebert and Harry R. Bowman, Nondispersive Soft X-ray Fluorescence Analyses of Rocks and Waters, in the proceedings of the Second United Nations Symposium on the Development and Use of Geothermal Resources, San Francisco, May, 1975.

Harold A. Wollenberg, Sampling Hot Springs For Radioactive and Trace

Elements, presented at the U. S. Environmental Protection Agency Workshop on Sampling Geothermal Effluents, Las Vegas, NV, October 20-21, 1975.

Figure Captions

Fig. 1. Portable Field Water Filtration Unit. BBC 7410-7355.

Fig. 2. Groove and Hole Pattern for Teflon Bottom Plate in Filter Unit. The cross section view of the nipple hub is enlarged by x2 relative to the 16.5 cm. diameter disk. XBL 758-3817.

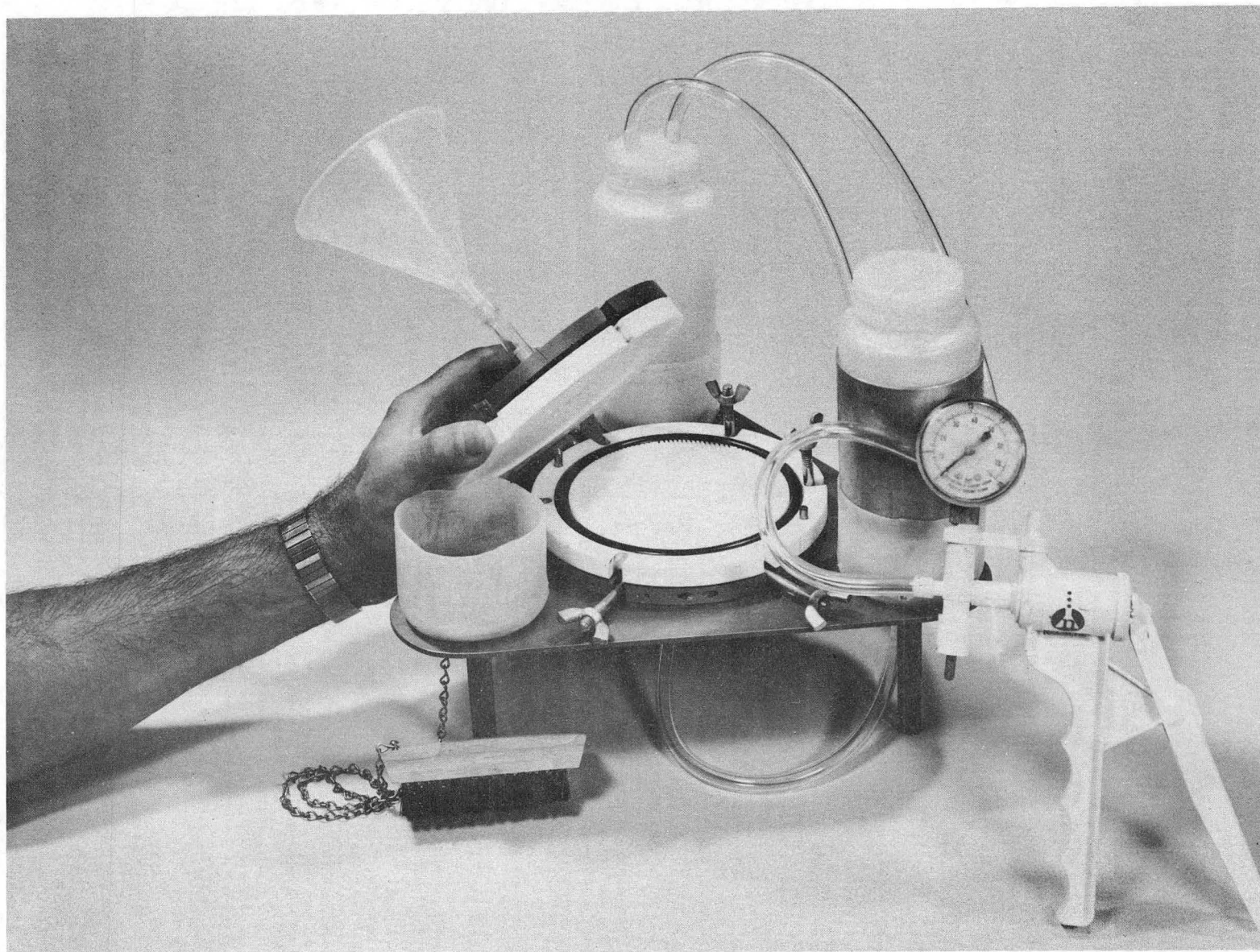
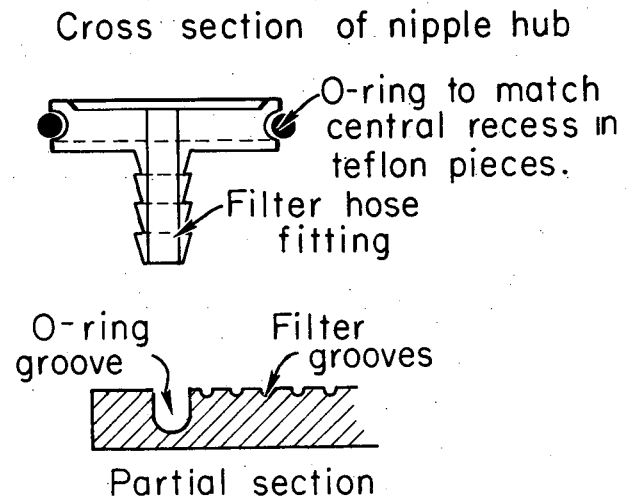
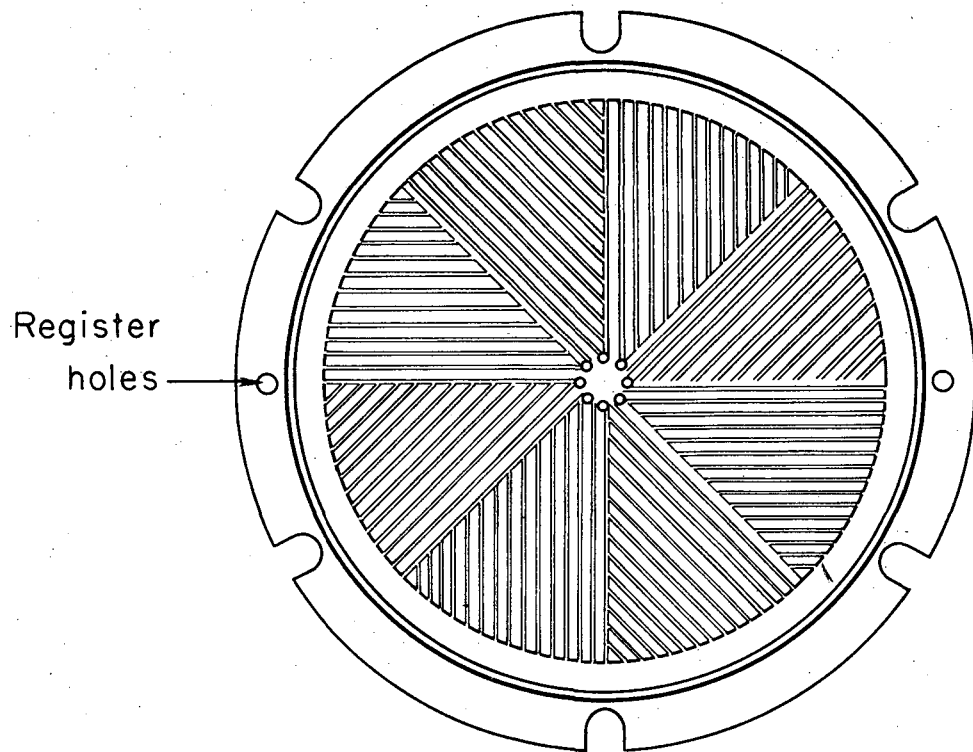


Fig. 1

Portable Field Water Filtration Unit

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Fig. 2 Groove and Hole Pattern for Teflon Bottom Plate in Filter Unit.

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