The clear air and favorable climate of desert regions have attracted civilizations for countless centuries, but the meager supply of water for domestic use limited the development of these areas. Surface water supplies are almost nonexistent, and only the groundwater resources of desert basins have permitted any appreciable population to enjoy the benefits of air and climate.

RAINFALL COLLECTION FOR DOMESTIC WATER SUPPLIES

By W. G. Matlock and R. J. Shaw

Many of the more desirable home sites in the desert Southwest, particularly those on the slopes or foothills of the mountain ranges, are on impermeable material where groundwater is unavailable or, at best, extremely expensive to obtain.

Rainfall collection, together with sufficient storage to cover drought periods, can provide domestic water in single or multi-family units. Collectors for livestock water have been in use for several years, but only limited application of the system has been made for household use. The feasibility of collecting rainfall for domestic water supply has been studied since 1958 in the Catalina Mountain foothills near Tucson. The study, now completed, also tested the durability and maintenance requirements of two surfacing materials.

Water-Catching Plastic

In July, 1958, a 6,000 square foot rectangular area, with about three percent natural surface slope, was smoothed and graded to drain to a corner. A low ridge was formed around the perimeter of the area. An 8-mil black poly-vinyl plastic sheet was then installed and secured by a layer of soil on the edges. (See Figure 1)

A 10,000 gallon storage tank with connecting wooden flume was installed below the collector. A centrifugal pump lifted the water from storage to an elevated tank for distribution. The water was disinfected by an in-line chlorinator and filtered to remove turbidity.

The efficiency of the collector was determined from measurements of rainfall and water collected. Although rainfall during the first six months of operation was somewhat below average, 30,000 gallons of water were collected. Average collection efficiency was about 75 percent, with efficiencies as high as 90 percent for larger rains. Some clogging of the flume inlet occurred from wind-blown debris.

By the end of the first year, shrinkage cracks appeared in the plastic sheet. Patching with new material permitted operation to continue temporarily, but after a total of 27 months, the entire plastic sheet deteriorated and had to be replaced.

Used Better Materials

The area was resurfaced in November, 1960, with more durable materials. An asphalt sealer coat of about half a gallon of emulsion per square yard was applied first. Building paper was then laid, followed by a second coat of asphalt (See Figure 2). The surface was covered with a single layer of pea gravel to protect against wind damage and sunlight. This collecting surface is in very good condition after more than five years of operation with no maintenance (See Figure 3).

Maximum collection efficiency of 60 to 70 percent was obtained for rains of about one inch. The first 0.05 inch of rain produces no runoff, and efficiency is reduced by evaporation losses and leakage through the slightly permeable asphalt.

Water collection from both surfaces was more than adequate for the 2-person family using the collector. Although the plastic surface is less expensive to install and has higher collection efficiency, the reduced maintenance and longer life expectancy of the asphalt-paper-gravel surface result in a lower water cost. Esti (Continued on Next Page)

FIGURE 1 — Rain collector with plastic surface.
mated water cost per thousand gallons is $2.33 for the plastic and $1 for the asphalt-paper-gravel.

**Has Good Quality**

Quality of the runoff water is excellent. The total soluble salts content, about 60 parts per million, is one-third as high as surface flow in nearby streams, and the hardness is correspondingly low. Following chlorination, the water passed all Public Health Service tests.

Rainfall collection provides a feasible method of supplying domestic water in isolated areas where groundwater is unavailable or must be transported a long distance. Water cost is considerably higher than city rates but less than the cost of hauling water. Of the two collecting surfaces tested, the asphalt-paper-gravel combination is best suited for the Southern Arizona climate. A moderate maintenance program will assure maximum collection efficiency.

**FIGURE 2** — Laying asphalt-paper-gravel collecting surface.

**FIGURE 3** — Collecting surface (shown in Fig. 2, above) after five years of service.

**Hillman Named to LBJ’s Food-Fiber Commission**

Dr. Jimmye S. Hillman of The University of Arizona is a member of President Johnson’s National Advisory Commission on Food and Fiber.

Dr. Hillman heads the Department of Agricultural Economics in the U of A College of Agriculture, where he has served the past 15 years. Recently, he was elected a member of the Tucson District 1 School Board.

Of the commission, President Johnson said, “I am placing on the Commission Americans of broad experience and great talent. These men will construct the most thorough study ever conducted of the effects of our agricultural policies on the performance of our economy and on our foreign relations."

The commission will undertake to review, in terms of the national interest, the welfare of our rural Americans and the well-being of our farmers, the needs of our workers, and the interests of our consumers.

The specific task of Dr. Hillman will be to study the problems and make recommendations concerning (1) agricultural trade and economic policies and (2) the role of agriculture in world economic development.

“We are extremely pleased that a member of our faculty has received this national recognition,” said Dr. Richard A. Harvill.