In addition to their theoretical significance, these mathematical functions were directly applicable for determining the proper concentration of morin in the fluorescent system. The combined effects of the opposing functions indicated the one region of free morin content that gives linearity and also maximum sensitivity for this system. Working curves prepared with this optimum amount of morin are linear over a wide range of thorium concentration.

A transmission fluorimeter was designed and built for use in this investigation. Its light source, sample cell, and phototube are arranged on a linear axis with a lamp and phototube on opposite sides of the sample. This arrangement is superior to that of conventional fluorimeters for theoretical studies, because it simplifies the development of the mathematical relationships of light absorption and fluorescence.

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Ground Water in the High Plains of West-Central United States

THE vast High Plains of the west-central United States constitute a region of transition—rather abrupt transition—between the humid East and the arid Southwest. Here, water problems are the more trying because, from year to year, the region "vacillates" between a semiarid or arid environment and a moist subhumid environment. Here, then, "average" water conditions can be misleading indeed.

The High Plains are unique in many respects. Once the grass-covered home of buffalo and nomadic Indians, they were conquered and settled first by cattlemen, who found the virgin grasses ideal for stock raising; then by dry-farmers, encouraged by the Homestead Acts, who discovered the high fertility of the soil; and finally by farmers who found that in parts of the area the uncertainties of meager precipitation could be offset by irrigation—first from streams and later from wells. To a growing agricultural development, discoveries of large oil and gas fields have added substantial industrial development.

The agricultural development has not been without failure and hardship, for nature has tried many times to undo man's accomplishments and often has succeeded over all but the most persevering. Severe drouths and dust storms have ruined dry-farming periodically, but, thanks to irrigation (largely from wells), a stable and prosperous agricultural economy has been established at many places.

Available information indicates that the groundwater reservoir beneath the High Plains probably contains more than 2 billion acre-ft. An estimated 2,700,000 acres now is irrigated by pumping from about 26,000 irrigation wells. The Llano Estacado in Texas and New Mexico, the most heavily pumped part of the High Plains, typifies a large part of the area where ground water is the sole source of supply. Some areas remain undeveloped but some are overdeveloped.

Basic information, collected and studied over a period of more than 20 years by the U.S. Geological Survey, in cooperation with the several States, has materially aided the understanding and orderly development of ground-water resources, but much more investigation and study are needed to realize full development.

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Preliminary Report on the Geology of the Aleutian Islands

SINCE 1946 the U.S. Geological Survey, in cooperation with the Department of Defense, has been making a reconnaissance study of the geology of the Aleutian Islands. The Aleutian Islands form a volcanic island arc extending 700 mi westward from the Alaska Peninsula. A deep submarine trough, the Aleutian Trench, lies along the southern convex side of the arc. The northern concave side is marked by a line of stratovolcanoes and is bounded, in part, by a steep scarp that extends to the floor of the Bering Sea.

The oldest rocks crop out on Attu, Agattu, Rat Island, and Amchitka in the western Aleutians and along the southern edge of many of the central and eastern Aleutian Islands. The association of rocks is typical of volcanic geosynclines in orogenic zones and consists of a thick sequence of pillow lava, submarine pyroclastics, siliceous mudstones, argillite, sandstone, and conglomerate. The pillow lavas are basaltic and spilitic. Many of the submarine tuffs are keratophyres. These oldest rocks have yielded no identifiable fossils, and they differ somewhat in lithology from island to island; neither their age nor their interisland correlation is known. On Attu and Amchitka an unconformity separates them from overlying rocks containing early Tertiary fossils.

On Attu and Amchitka, the spilitic suite is overlain by several thousand feet of conglomerate and banded, well-bedded siliceous mudstones, argillite, sandstone, and limestone, all deposited in shallow water. Foraminifera suggest an Eocene-Oligocene age. Rocks of early Tertiary age have not been recognized in the central and eastern Aleutians.

Both the spilitic rocks and the early Tertiary sedimentary rocks of the western Aleutians have been intruded by dikes, sills, and small plutons of gabbro and by a few stocks of albite granite. Batholiths and stocks of diorite and quartz diorite have been found in the central and eastern Aleutians. In general, the intrusive rocks of the Aleutian Islands belong to the calc-alkalic circum-Pacific suite.

Unconformities younger than the plutonic intrusive activity have been mapped on Attu, Kiska, Umnak,