Salt Water in Wells

intrusion into water wells limited to certain areas

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Salt-water contamination of wells, causing them to supply brackish water which will injure the crops they irrigate, is a probability in very limited areas only.

Moving water, either on the surface or below ground, is going downhill relatively. It is traveling to some point of escape which is at a lower elevation. Present-day streams or rivers leave the mountains at considerable elevation on the sides of the valleys and then cross many miles of valley fill that was laid down in prehistoric times by earlier streams, or the parents of present streams.

Prehistoric streams flowed into a valley much deeper than the present one and the sand and gravel they bore were carried far out into the valley to be deposited as fill. This fill accumulated for centuries until the present valley floor was formed.

The streams today cross the sloped gravel beds of the old streams where infiltration takes place. This is the chief source and locale of the present underground water supply and it is located near where the streams leave the mountains. This means that the source of our underground flow is well up in the valley.

Salt water intrusion into well waters implies a contact with the ocean somewhere.

One exception to this lies in the very deep wells such as oil wells which tap saline waters that have been left in the formations since they were part of the sea bottom or which leached their way down to these depths carrying the salts with them.

Leaching from the surface can and does produce salt concentration in the shallower irrigation type wells in a few limited areas. This effect is more often the result of surface irrigation and as such is independent of seasonal precipitation fluctuations.

There are such contacts where the earlier laid-down river fills spilled out into bays or along the coast and were laid down below the ocean floor. Atop these gravels and sands, which are relatively porous, clays and muck layers were deposited until the ends of the bays were filled above the ocean level or tongues of land were formed into the sea. The water seeping into the old stream beds near the foot of the mountains can and does find its exit or escape into the sea at such points. Sea water is heavier than fresh water so the sea water tends to hold back the fresh water flow from the buried gravels. But the source of supply for these gravels is from one to many hundreds of feet above the surface of the ocean so the fresh water is able to force its way out against the resistance of the ocean.

When pumps begin to take the water from these subsurface gravels and sands which are the supplying ducts or strata, a new place is provided for the water to escape. It is now somewhat easier for the water to move from the mountainside seepage areas and it moves a little more quickly, going downhill a little faster, or losing head a little more rapidly. More pumps drawing water from the gravel strata provide further easy escape ports for this motile supply and the process of losing head, or pressure, or elevation, increases.

Affected Areas Limited

At some times sufficient pumps drawing upon the water-supplying gravels cause a situation where the flow from the seepage points is not able to maintain the force, or pressure, necessary to discharge into the ocean while supplying the wells. Then the ocean begins to seep back into the gravel strata.

This is the point at which those limited areas contacting ocean waters may begin to have salt water in the wells. All other areas of the state, including the main interior valleys, need have no fear of salt contamination from this source. Points a few miles inland from the sea will not be bothered.

This year, with the limited supply of rain, the streams will not have sufficient water in them to recharge the seepage areas mentioned above. As a result, as pumping is continued, providing easy outlets for the underground supply, it will continue to move toward our wells and will lose more and more elevation or head in doing so. It is apparent this is happening as the water levels go down farther than usual. Normal rainfall next year may bring back normal well levels.

In some limited inland areas, very deep wells encounter strata containing salts in undesirable amounts. Some such salt is the product of old land-trapped bodies of ocean water and others have resulted from deep leaching of salts naturally in the great mass of soil above by water percolating from the surface. Such waters are salty from the first and normally do not respond to variations in surface water supply.

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WEDGELEAF

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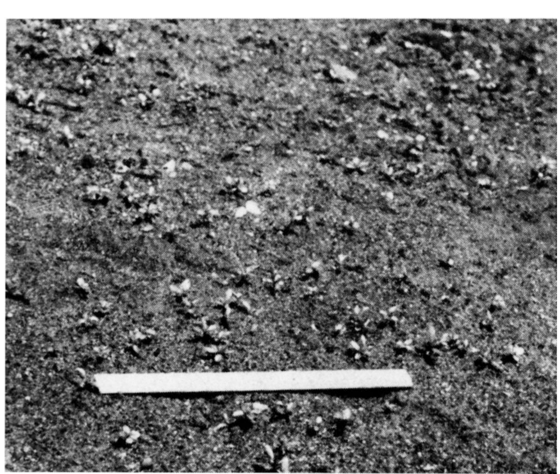
eight years or less in age. Mature wedgeleaf ceanothus plants growing in the open on the natural area had a spread of 14 feet and averaged 10 feet in height. Evenly distributed, 240 mature plants of this size will about cover an acre.

On lightly grazed or protected areas, plants of wedgeleaf ceanothus eight years or less in age can be easily cut with one stroke with an axe. But plants older than this are multiple-stemmed from the ground level, and are more difficult to remove. After the plants are mature, probably as much time would be required to cut one plant as 200 plants eight years or less in age distributed over an acre. This indicates the importance of cutting or removing the plants while they are young.

On the natural area at the San Joaquin Experimental Range where there was an abundant source of seed, about 40 new plants came in each eight or ten years following the fire of 1929. But on moderately grazed areas, and in places where old seed plants were not so numerous, they appeared much less rapidly. This number of plants per acre could be cut at very little expense.



Young wedgeleaf ceanothus plants growing thickly in an ideal seedbed formed by the ash of a dense brush fire.

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