SAGINAW VALLEY BRINES POSE PROBLEMS

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Story of the slow decline in amount of available fresh water supplies in many parts of the Saginaw Valley goes back more than a hundred years when scattered salt springs were first discovered.

So many springs were found, the state reserved all such lands as “salt spring lands” for exploration to develop a possible supply of salt for Michigan.

In the 1860’s drilling began in search of stronger brine-bearing beds at greater depths. After discovering such brines many wells were drilled, chiefly along the Saginaw River, to supply brine to the lumber mills and other industrial plants for making salt.

With the settlement of Saginaw and Bay counties, many wells were drilled for domestic water supplies. It was found that the fresh waters were largely confined to the first 80 to 100 feet and below those depths brackish or very salty water was found. In places the depth to salt water was less than 50 feet, in others as much as 200 feet.

With the passing of the lumber industry along the Saginaw River some 280 salt wells gradually were abandoned. The State Salt Commissioners plugged as many as could be found. Many, however, had been abandoned years before saw mill operations ceased and even their locations were lost.

Over the years the brine corroded and ate through many of the casings allowing the salt water to rise into the fresh water beds and also the fresh water to go down into the underlying salt water beds making the brines much weaker. As a result valuable fresh waters were destroyed and likewise strong brines were made so weak as to be useless for chemical purposes.

In the 1890’s hundreds of test holes were put down in the Saginaw Valley to locate mineable areas of coal. In the areas where the coal was of mineable thickness the test holes were plugged but in areas where little or no coal was found many of them were not plugged. These holes usually were deep enough to penetrate the brackish and salt water beds. The unplugged holes allowed the salty waters to rise and spread into the formations carrying fresh water.

Many wells for fresh water on farms penetrated brackish or salt water beds. Those too salty for use were abandoned. Undoubtedly, over the years, the casings were eaten through and salty waters invaded some of the fresh water beds. Those too salty for use were abandoned. Undoubtedly, over the years, the casings were eaten through and the salty waters invaded some of the fresh water beds above, which locally were too thin to furnish an adequate supply but were channels through, which salt water could migrate into the thicker and more productive areas of fresh water. In numerous instances wells yielding brackish but usable waters gradually became so salty they were abandoned.

The combined effect of all these sources of brine pollution of fresh waters apparently has been to gradually lessen the amount of available fresh water supplies in many parts of the Saginaw Valley.

It must not be inferred that all of the damage or destruction of fresh waters has come from man-made operations. Natural causes have brought about “faulting” (that is, breaking of the rock strata). A number of these faults have been discovered in coal mines. Such faulting has permitted salt water to migrate upward into the fresh water beds and undoubtedly has resulted in various natural salt springs and probably the presence of salt waters close to the surface.

Proper disposal of oil field brines became a problem in 1932 when the Vernon Field in Isabella county began “making” large quantities of brine. Only method of control that was known then was to have the producer build earthen ponds. These were not satisfactory because of the sandy nature of the soil which permitted a lot of seepage, either downward into surface waters or through the dyke walls.

In 1936 in the Crystal Field, Montcalm county, brine was first successfully returned to underground formations below any fresh water beds.

In 1939 the present Oil Conservation Law was passed (Act 61, P. A. 1939). One of the provisions of Section 6 of the Act specifically empowers the Supervisor of Wells (the Director of the Department of Conservation) "... to require the disposal of salt water or brines and oily wastes produced incidental to oil and gas operations, in such manner and by such methods and means that no unnecessary damage or danger to or destruction of surface or underground resources, to neighboring properties or rights, or to life, shall result. . ."

Act 61 also gives the Supervisor the authority to make and enforce rules and regulations, subject to the approval of the Conservation Commission, to carry out the purposes of the Act. The rule governing the disposal of brine or salt water reads as follows: “Brine or salt water produced in the drilling for or the production of oil shall not be run to earthen reservoirs or ponds, except for such reasonable time and under conditions as may be approved by the Supervisor; or his authorized representative, after which it must be returned to some underground formation or otherwise disposed of as approved by the Supervisor where it cannot do damage to fresh water, oil, gas, or other minerals.”

This is a broad rule and purposely drawn that way because experience had taught us that brine disposal problems varied from field to field and even from one part of a field to another part. Hence, one rule could not be drawn up that would specifically cover all conditions throughout the state.
Work of preventing pollution begins before a well is drilled. On the application for permission to drill, the operator shows how he proposes to seal off underground formations which may carry brine, how close he is to a stream, lake, swamp, etc. (if less than 330 feet), and what he proposes to do to prevent pollution. These things are closely checked and if in view of our experience they are not adequate the permit is not issued until satisfactory means and methods are worked out.

After drilling commences Department field men continuously visit drilling wells to find out if brine has been encountered and to see if previously agreed to precautions are being followed. If they are not, drilling is stopped, until corrective measures are taken and approved.

Producing leases are regularly checked to determine if they are making brine. In isolated areas where wells make small (up to about five barrels a day) amounts of brine, the operator is allowed, if no other disposal means are available, to put the brine into surface ponds. In all other instances Department men and the producer work out programs of underground disposal.

Many such programs are worked out before any brine is produced. However, occasionally a producer does not promptly take care of his production or is careless and has a sizeable loss. Such a case is referred immediately to the Oil Field Hazard Reduction Section of the Field Administration Division as being in violation of the laws and rules and prosecution follows.

Another step in preventing pollution is the plugging of abandoned wells. Department field men not only issue instructions to the producer on how the well is to be plugged but they also visit the well while it is being plugged to see that the instructions are carried out. The plugging is not approved until we are certain the job is satisfactory.

It is our opinion that the law and the rules are strong enough and comprehensive enough to prevent the pollution of surface or ground waters by oil field wastes.

Early in August 1945 our field men made a survey of the amount of brine being produced in the oil fields that are in the Saginaw Valley and the fields that are in the Saginaw Bay Drainage Area. This survey showed there was being produced a total of 48,112 barrels of brine a day and that all but 795 barrels (1.6 per cent) of the total was being returned underground or piped to chemical companies.

Of the 795 barrels that is not being returned underground and is being stored in surface ponds, a sizeable portion goes to ponds at least a mile from any stream. If any of this brine reaches a stream it would be considerably diluted before it got there.

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