

**SUBSURFACE WATER MAPPING FOR BOTH PREEMPTIVE
AND REMEDIAL ENVIRONMENTAL PROTECTION**

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This paper considers the recent results of applying water-mapping procedures to certain environmental risks associated with oil recovery. The paper's premise is that minimally-invasive methods of mapping subsurface water can anticipate environmentally damaging surface expressions during steam and water injection, and that once groundwater contamination has occurred the same procedures can effectively guide remediation efforts.

When water and steam are forced through the chambers of an oil field, they sometimes emerge in unexpected places—carrying heavy crude. By charting the potential flow paths of these floods, and identifying possible surface expressions, water maps help minimize the ecological impact of flooding practices. Furthermore, when groundwater has been compromised, water maps play a critical role in remediation efforts.

The procedure detailed in this paper begins by charging water systems with a low voltage electrical current. As the current flows through the water between the electrodes, it emits a magnetic field whose shape and depth are characteristic of the surrounding aqueous network (Biot-Savart Law). This field is then read at the surface by a specially tuned receiver. The data thus generated can be used to create maps indicating the attributes of various aqueous systems, including flooded oil fields and contaminated groundwater.

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