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A METHOD FOR DETERMINING APPROXIMATE MAGNETIC FIELD SHAPES IN SMALL OR INACCESSIBLE REGIONS

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UNIVERSITY OF CALIFORNIA

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Joseph B. Rechen and John C. Jordan

March 6, 1957

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Radiation Laboratory
University of California
Berkeley, California

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During a recent experiment, a convenient method was needed for determining the approximate field shape of a small cylindrical-shell permanent magnet. The method described below, with minor modifications, could be adapted to any type of magnetic field.

A thin sheet of copper (0.030 in.) was cut to fit inside and around the outside of the cylindrical magnet in a plane containing the axis. A thin coat of high-viscosity silicone oil (Dow-Corning DC-200 fluid, 65,000 centistokes) was then applied to the copper sheet. After about ten minutes had been allowed for the oil to take on a smooth surface, fine iron filings were lightly sprinkled over the surface, care being taken to get a uniform distribution. (See Fig. 1) The copper sheet was then placed in position in and around the magnet. After a few minutes the filings had aligned themselves with the magnetic field lines of force to the degree desired. (Fig. 2) At this moment the copper sheet was removed and subsequently photographed. Once removed from the field, the pattern remains indefinitely if kept horizontal and not disturbed. (Fig. 3)

By this general method, magnetic fields may be mapped in relatively small or inaccessible regions and examined at leisure outside the magnet.

*This work was done under the auspices of the United States Atomic Energy Commission.

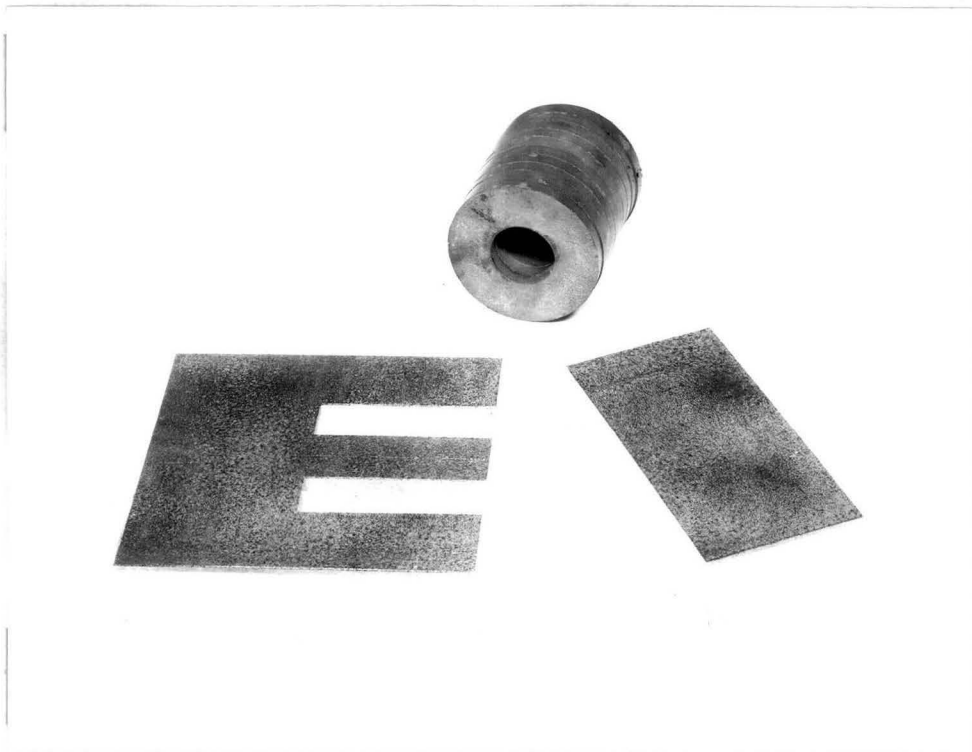
FIGURE CAPTIONS

Fig. 1. Above: Magnet of which field is to be mapped.

Below: Copper test sheet cut to fit in and around magnet; oil and a light coating of iron filings have been applied.

Fig. 2. Test sheet in position in magnetic field; filings are becoming aligned in field.

Fig. 3. "Map" of magnetic field as shown after test sheet is withdrawn from magnet.



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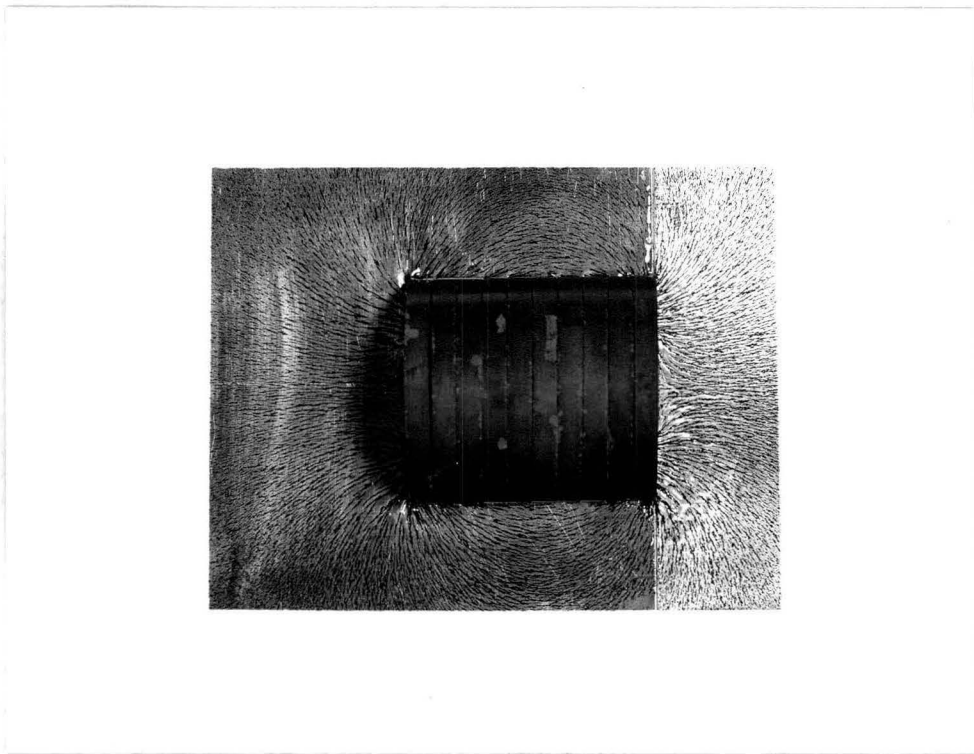


Fig. 2.

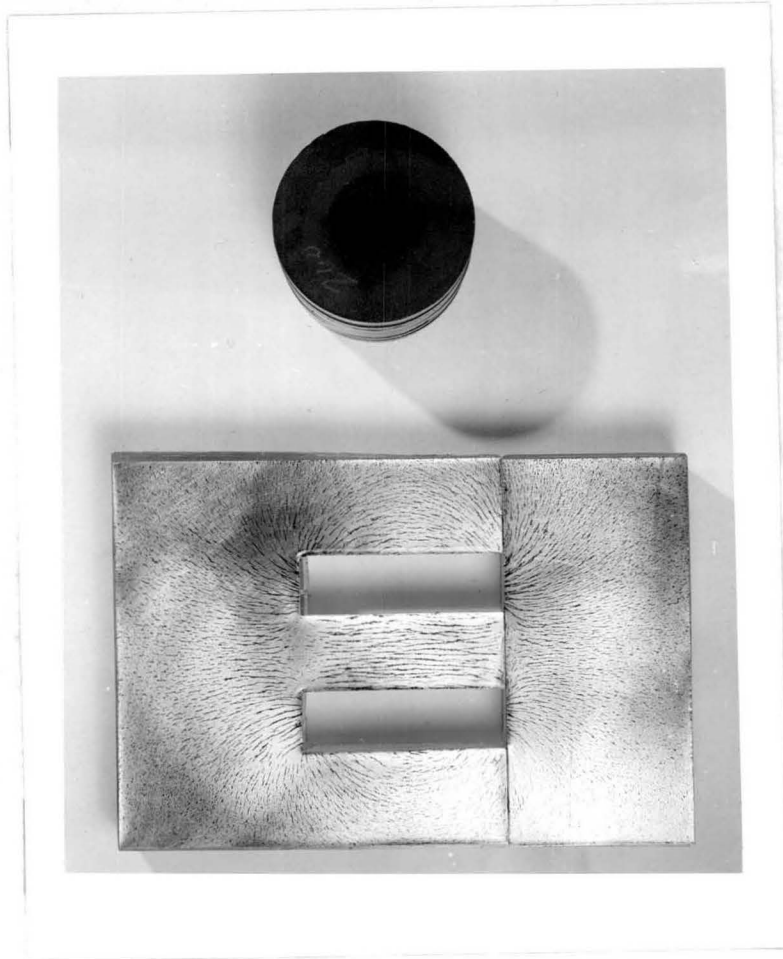


Fig. 3.