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## LOW ACTIVITY NUCLEAR DENSITY GAUGE

### ABSTRACT OF THE DISCLOSURE

A nuclear density gauge and test method is provided for measuring density material in a relatively thin zone beneath a surface of the material. The gauge comprises a gauge housing and a substantially planar base on said gauge housing adapted to be positioned on a surface of the material sample. A gamma radiation source having a characteristic primary energy and an activity of no more than 100 microcurie is mounted within the housing and cooperates with the base for emitting gamma radiation through the base and into an underlying material sample. An energy selective gamma radiation detector is mounted within the gauge housing and in laterally spaced apart relation from the gamma radiation source. The gamma radiation detector is operable for quantifying the energy level of the detected gamma radiation. Shielding is provided within the gauge housing between the source and the detector for preventing gamma radiation from passing directly from said source to the detector. An analyzer is connected to the detector for detecting gamma radiation counts in a predetermined energy spectrum having a lower limit of 0.1 MeV or greater and an upper limit which is less than the characteristic primary energy of said source. The density of the sample is calculated based upon the gamma radiation counts obtained by the analyzer within the predetermined energy spectrum.

Fig 1.



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