Photomicrographs were made of fracture surfaces. The average grain size was found to be approximately 15 microns with a distribution of from 5 to 25 microns. The grain distribution was homogeneous throughout the sample. The grain distribution appeared visually isotropic; that is there was no evidence of mechanical texture created by the hot pressing process. The pores were observed to occur both intragranularly and at grain boundaries.

The porosity of the material was obtained by measuring and weighing rectangular samples, by liquid displacement, and by analysis of photomicrographs. The porosity obtained was $3.3 \pm 0.5\%$ where the theoretical density from Table 2 was used.

A spectrographic analysis for metallic impurities was performed. The results are shown in Table 3. Tests for organic inclusions or oxygen impurities were not made.

TABLE 3.--Spectrographic analysis for metallic impurities

Element	Percent
Fe	Principle constituent
Y	Principle constituent
Ca	.05
Si	.01
Al	.01
Ni	.01
Cr	.01
Mg	.005
Ag	.003
Mn	.002
Cu	.0005

The samples were received as rectangular slabs of dimensions 0.1 x 1.0 x 5.0 cm. The specimens were lapped flat and parallel with #1700 aluminum oxide lapping compound.

The saturation magnetization of the material was determined by magnetizing several samples from zero magnetization to some value determined by the final magnetic intensity. This was performed by initially demagnetizing the specimen and then pulsing a current through the solenoid enveloping the specimen. The data provided a linear plot which was fit to the Weiss relation,[63]

$$M = M_s\left(1 - \frac{a}{H}\right). \tag{4.14}$$

M_s and a were obtained from the intercept and the slope. The saturation magnetization obtained was about 124 gauss. The theoretical value (see Table 2), reduced by the amount expected due to the porosity of the material, is 128 gauss. The latter value was used due to the author's lack of confidence in the somewhat painfully obtained first value.

The magnetoelastic constants b_1 and b_2 were not measured. The constants used (see Table 2) were most probably values obtained from the literature.

4.5. Experimental Corrections

This section will address various experimental perturbations and considerations which will affect, to some degree, the ideal measurement presupposed. The first few problems are related to the experimental design; others concern material behavior.

Since the rectangular specimen is of finite length, there will be an additional contribution to the magnetic field created by the magnetic poles at the end faces. An exact calculation of this field would be very difficult.