

National Bureau of Standards
Certificate of Analysis
Standard Reference Material 1169a
Steel
(Lead-Bearing)

This is a free-machining steel intended for application in x-ray and optical emission methods of analysis.

Constituent	Lead
Certified value, % by wt. ¹	0.29 ³
Estimated uncertainty ²	0.01

¹ The certified value listed is the present best estimate of the "true" value.

² The estimated uncertainty listed is based on judgment and represents an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

³ Average of chemical analyses obtained from five plants of the United States Steel Corporation (Cuyahoga, Duluth, Elwood, Lorain, and Youngstown) and average of x-ray fluorescence analyses at NBS.

The technical and support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

Washington, D.C. 20234
May 5, 1978

J. Paul Cali, Chief
Office of Standard Reference Materials

(Over)

PLANNING, PREPARATION, TESTING, ANALYSIS:

The material for this SRM was provided by the United States Steel Corporation, Cleveland, Ohio, in a cooperative program with the National Bureau of Standards. The material, in the form of rods 40 mm (1 9/16 in) in diameter, was lathe cut at NBS to 32 mm (1 1/4 in) in diameter and cut to specimens 3/4" thick.

Homogeneity testing was performed by metallographic examination, and by optical emission and x-ray and spectrochemical analyses at the National Bureau of Standards. Lead was found to be segregated both from center to outside of the cross-section and from one end to the other longitudinally along the rod. The observed variation was about 0.007 percent lead in either direction.

Metallographic examination showed a difference in structure for the transverse section as compared to the longitudinal (rolling direction) section. It is recommended that for both the SRM and the unknown samples, analyses be performed on the transverse section.

Because the lead is present as soft particles in the relatively hard steel matrix, care must be taken to ensure the surface analyzed represents the metal. In optical emission analysis, the usual surface preparation will suffice, although a longer preburn may be necessary. The surface preparation for x-ray analysis is more critical and may require wet finishing with a fine-grit paper (preferably a metallographic finish).

Elements other than lead are present in this material as indicated below. These *are not* certified, but are given as additional information on the composition.

Element	C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo
Concentration, % by wt.	(0.1)	(1.0)	(0.07)	(0.3)	(0.01)	(0.1)	(0.05)	(0.04)	(0.001)	(0.02)