Hardgrove Grindability Index
Standard Reference Samples

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Background

In 1930 and 1931, Ralph Hardgrove, a mechanical engineer with Fuller Lehigh Company was working at the Babcock and Wilcox facility in Alliance, Ohio to develop a method for determining the relative hardness of various coals. The process he developed subjected a specially prepared coal sample to a definite pulverizing process. He related the new surface area generated by the pulverization to the force applied to the sample (i.e., the more surface area generated, the softer the coal). He presented his data to the American Society of Mechanical Engineers (ASME) in April of 1931, and it was published in the ASME Journal the following year.


At the time, the ASTM Method specified an equation that all laboratories would use to determine the grindability of coal. Eventually, the need for each laboratory to develop individual equations was realized. With the help of the ASTM Subcommittee on Statistics, a method was developed where each lab would obtain a set of four calibration standards to develop their own equations. The U.S. Bureau of Mines in Oakland, PA would produce the new calibration standards. Following a rigorous calibration protocol, Standard Reference Samples (SRSs) were available in 1966 and ASTM adopted the new method 1967.

In 1985, a delegation of South Africans presented data to ASTM that showed the calibration standards supplied by the U.S. Department of Energy (DOE) had become suspect in their quality. After ASTM completed an audit in 1987, they suspended production and determined that a full recalibration effort must be undertaken to restore confidence in the DOE SRSs.

By February 1990, ASTM recertified a new DOE operation and DOE began making the ASTM Primary SRSs, with all other SRSs being secondary standards and not recognized by ASTM.

In 2003, responsibility for production of Primary HGI SRSs was transferred from DOE to Penn State.

Overview

The Hardgrove Grindability Index Standard Reference Sample (HGI SRS) is a sample of coal used to calibrate instruments that are designed to determine the ease with which coal can be pulverized. The HGI value provides information for determining grinding power consumption and pulverizer capacities. The data can be used by industry to determine power consumption during the grinding process. In general, the higher the HGI value, the softer the coal.

Penn State is the world’s sole provider of primary HGI SRSs. The ASTM Task Group on Grindability maintains oversight of all aspects of HGI SRS production at Penn State. Since 1990, grindability data from various sources have been collected and reviewed by ASTM. The integrity of the SRSs produced since 1990 continues to be of the highest quality.

The HGI SRS customer receives four coal SRSs of varying degrees of hardness. Each SRS contains approximately 3kg of material. With these SRSs, laboratories can calibrate the equipment used in determining the HGIs of their coals of interest.