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GUIDE FOR THE TAKING OF SAMPLES FROM HARD COAL SEAMS IN SITU

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Confederation of Australian Industry
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Department of Minerals and Energy, Victoria
Department of Mineral Resources, N.S.W.
Department of National Development
Electricity Supply Association of Australia
Institution of Engineers, Australia
Joint Coal Board
Queensland Coal Board
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AUSTRALIAN STANDARD

GUIDE FOR THE TAKING OF SAMPLES FROM HARD COAL SEAMS IN SITU

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PREFACE

This standard was prepared by the Association's Committee on Coal and Coke under the direction of the Minerals Standards Committee. It supersedes AS CK5—1964.

The sampling of hard coal in situ usually presents difficulties because of the manner in which the seams occur in relation to their surroundings, and because of variations in mode of fracture and hardness. The aim of this standard is to provide a basis which will promote uniformity and efficiency in the procedures used for taking such samples.

Provision is made for selection and preparation of the sampling site, and recommended methods are given for taking pillar, ply, strip and channel samples, and for transporting the samples. Appendices include methods which may be used for determining seam thickness and give an example of a form which has been found useful for recording sampling and other relevant data.

Attention is drawn to other Australian standards on the sampling of coal and coke which are in the course of preparation as part of a comprehensive revision of AS 1676, Methods for the Sampling of Hard Coal, and AS 1898, Methods for the Sampling of Coke:

AS 0000 Methods for the Sampling of Solid Mineral Fuels
- Part 1—Hard Coal—Sampling from Moving Streams
- Part 2—Coke—Sampling from Moving Streams
- Part 3—Hard Coal—Sampling from Stationary Situations
- Part 4—Coke—Sampling from Stationary Situations
- Part 5—Hard Coal—Sample Preparation
- Part 6—Coke—Sample Preparation
- Part 7—Determination of Precision and Bias

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FOREWORD

A coal seam may consist of a single thickness of relatively uniform lithotype or maceral constitution, with few visible variations, or it may consist of numerous layers, varying in thickness and lateral extent, of lithotypes vitrain, clarain, durain and fusain, interlayered with inorganic sediments and/or carbonaceous shales. Secondary mineral matter introduced parallel to or across these layers may also be present. The layers may vary considerably in hardness, texture and structure according to the nature of the coal types and inorganic sediments. The latter may expand laterally, splitting the seam into two or more separate entities. Thus it is not always possible to obtain in situ samples of a full seam or seam section at one sampling point. Where significant variation in seam thickness, lithotype profile and structure occurs and a representative sample is required, several samples may have to be taken.

Methods of sampling for the assessment of the physical, chemical and petrographic properties include the following:

(a) Sampling from small and large diameter drill cores.

(b) Conveyor belt sampling of underground mine production.

(c) Haul truck sampling for surface mine production.

(d) Sampling from a trial open cut excavation.

(e) In situ, pillar, channel and strip sampling

Methods (a), (b), (c) and (d) are outside the scope of this standard. However, in sampling from a trial open cut, the same principles apply as for in situ sampling (e).

There are three basic methods of in-situ sampling, as follows:

(i) Pillar (or block) sampling, where the sample is taken in the form of blocks which when superimposed represent a specifically defined portion of the seam or the entire seam from roof to floor.

(ii) Channel sampling, where the sample is taken by removing a vertical channel of even cross-section down the full height of the seam from roof to floor.

(iii) Strip sampling, which is a variation of channel sampling where a smaller sample representative of the full seam height is prepared.

In a seam of variable quality it will be necessary to take a number of samples, regardless of the method of sampling, to improve the representivity of sampling.

On the other hand where information is only required for one location or for one particular seam section, the sampling of individual plies may be carried out as an adaptation of any of the basic methods described above.

In operating mines, the manager must be consulted and approval must be obtained before sampling sites are selected and sampling proceeds. In all in-situ sampling situations, experienced and qualified personnel will be required for supervision and to ensure accurate records are made of location, thickness and ply descriptions.

GUIDE

1 SCOPE. This standard sets out a guide to methods for the taking of samples from hard coal seams in situ, either from underground mines or in open cuts. The methods comprise the following:

(a) Pillar sampling.

(b) Channel sampling.

(c) Strip sampling.

(d) Variations of the above methods for taking ply (or subsectional) samples from the seam.

This standard does not apply to sampling from drill cores, production conveyor belts or other run-of-mine productions.

2 PURPOSE. The purpose of this standard is to promote uniformity and efficiency in the taking of pillar, channel and strip samples including ply samples.

3 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 2418	Glossary of Terms Relating to Solid Mineral Fuels
AS K183	Symbols for the Graphical Representation of Coal Seams

4 DEFINITIONS. For the purpose of this standard, the definitions given in AS 2418 and the following apply:

4.1 Pillar sample—a section of a seam taken in the form of a block or series of blocks of coal and associated interbanded impurities which, when arranged in correct vertical sequence, represent a true section of the seam. Where the full section of the seam is not accessible or not required, this term may refer to a sample taken either from a specifically defined portion of the seam or from the floor to roof as mined or exposed.

4.2 Ply sample—a sample taken from an individual ply or from a series of plies of a seam.

4.3 Channel sample—a sample of the coal and associated interbanded impurities taken by removing a channel of even cross-section from the seam. Where the full section of the seam is not accessible or not required, this term may refer to a sample taken either from a specifically defined portion of the seam, or from the floor to roof as mined or exposed.

4.4 Strip sample—a sample similar to a channel sample which is smaller in cross-section but always taken over the full seam height. A single strip sample may often be regarded as being too small to guarantee that all horizons of the seam are adequately represented. However, a number of such samples may be taken (for the same cost as a channel sample) to achieve better representivity in a variable seam.

5 SELECTION OF SAMPLE SITE. If a sample is to be taken so as to provide, as far as possible, a sample representative of the seam, the site should be chosen to avoid cracks and breaks, adventitious lenticles of rock or mineral matter or other abnormalities or irregularities. However on occasion the purpose may be to sample a weathered or heat affected section in which case the sample should be taken at the best available site exhibiting this feature. The location of the sampling point should be recorded (see Clause 7).

6 SAMPLING PROCEDURES.

6.1 General. Before sampling by any of the methods described in this standard, the face to be sampled should, as far as practicable, be uniformly dressed and squared up, and any loose, over-hanging or protruding pieces of coal or rock removed. Where a face is weathered, the immediate surface material should be removed to a depth sufficient to minimize weathering effects. Contamination of the sample by stone dust in particular must be avoided as this will influence the subsequent analysis.

6.2 Pillar Sampling.

6.2.1 *Purpose of pillar sampling.* The main purpose of pillar sampling is to provide large generally intact samples for detailed observations in the laboratory or field office, and for conducting laboratory strength and shear box testing for definition of geomechanical properties.

Pillar sampling of complete, continuous sections of a coal seam is inhibited, if not prohibited, by soft, friable coal or hard fractured coal, especially coal containing hard stone bands. It is facilitated by the availability of compressed air tools including rotary percussion hand drills and a chain saw to obtain relatively smooth pillar surfaces.

Before pillar sampling is attempted, it is essential that—

(a) a suitable location is available;

(b) the sample can be extracted efficiently and safely;

(c) no permanent damage or potential safety hazard is created.

6.2.2 *Marking of sampling site.* Two parallel vertical chalk lines or other suitable markings shall be made on the dressed face of the seam from floor to roof, at least 400 mm apart and as far apart as necessary to obtain the required volume of sample. The coal and other material between these marks shall form the pillar sample which should be of sufficient depth to give an area in the bedding plane which will yield the required mass or volume of sample.

6.2.3 *Taking the sample.* The sample may be obtained by one of the following methods (see Fig. 1):

(a) The sample is taken by cutting into the face at an angle on each side of the chosen and marked sampling position, thus isolating a triangular pillar from the face. This may be freed by cutting into the roof and undercutting the floor, and the sample then removed either *en bloc* or in sections as described in (c) below.

(b) Channels are cut on the outside of the markings, leaving a standing pillar of sufficient cross-section to obtain the required sample size. Working in the channels will enable the back of the pillar to be cut free from the seam. The pillar may then be freed from the roof and, if sufficiently stable and of suitable size and mass, removed *en bloc* after undercutting from the floor.

Should the pillar show signs of instability or tend to collapse, it may be suitably supported so as to enable it to be removed.

Should the pillar be too high or fragile to remove in one piece, it may be removed in plies or subsections as described in (c) below.