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# REPORT ON THE ACTIVITIES OF THE INTERNATIONAL COMMITTEE FOR COAL AND ORGANIC PETROLOGY DURING THE PERIOD 1991- 1995

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The Statutes of the International Committee for Coal and Organic Petrology (ICCP) require that its President report on the progress achieved during each four-year term of office. This, then, is the report that I presented to the General Assembly of the ICCP at its closing plenary session in Krakow on September 25,1995. As has been the custom since the termination of the ICCP's formal association with the International Carboniferous Congress, this report has been submitted for publication by the journal Fuel.

The ICCP is a union of scientists representing 37 countries. Currently there are 103 Full, 151 Associate, and 6 Honorary Members. ICCP members are engaged in many different branches, fundamental and applied, of coal and organic petrology. This science involves the study, mostly under the microscope, of the organic constituents of coal and other rocks. Our members' efforts have resulted in major contributions to the understanding of the origins of coal, the behaviour of coal in industrial processes, the exploration for petroleum, and the thermal/burial histories of sedimentary basins.

For the coal and petroleum industries which most ICCP members serve in one way or another, the early 1990's has been a period of introspection and major reorganization. The ICCP too has been caught up in this process and I think we can see considerable evidence of change in the way we meet and conduct our affairs and in what are now our priorities. For example, the use of petrographic predictions of coke properties, which provided such a boost to the science in the 1960's, is no longer a major emphasis following the decline in coke manufacture. Instead there is growing concern with applications related to power generation, pollution and geological processes.

In 1992 the ICCP revised its statutes for, as far as I know, the first time since it was founded in 1951. We even changed our name to include Organic Petrology though we retained the old acronym. The scope of ICCP meetings recently has been broadened to include a technical session for the presentation of papers and posters in addition to the Working Group activities described below. During my Presidency, meetings have been held in University Park, U.S.A. (1992), Chania, Greece (1993), Oviedo, Spain (1994) and Krakow, Poland (1995).

The second edition of the International Handbook of Coal Petrography has been a mainstay of our organisation since 1963. This year the first part of an ambitious rewriting of the Handbook has been published. Another project that has reached fruition in 1995 has been the accreditation of laboratories in the procedures of petrographic analysis. The Committee places considerable emphasis on this undertaking, recognizing that successful use of petrographic parameters in international commerce will hinge upon our ability to perform these analyses within reasonable limits of precision. Another example of the Committee's movement with changing times has been the establishment of an inter-Commission Working Group on Environmental Applications of Organic Petrology.

The ICCP is organised into three Commissions, each of which oversees the activities of several Working Groups. The number and types of Working Groups in each Commission has varied over the years according to the topics which are of current interest.

**Commission 1 - General Coal and Organic Petrology** (Chairman: E. Wolff-Fischer, 1988 - 1992; M. Lemos de Sousa, 1992 - Present. Secretary: A.C. Cook, 1987 - 1994; W. Pickel, 1994 - Present)

As stated above, the ICCP has identified the *Standardisation, Training and Accreditation*

Program (Organiser: A. Depers ) as one of its most important current undertakings. An accreditation program was implemented in 1988. Its recent goal has been to establish a statistically sound means by which to issue ICCP Accreditation to laboratories meeting acceptable standards in the petrographic analysis of a set of diverse coal samples. This year represents the attainment of that initial goal with the provisional accreditation of 44 laboratories for maceral and/or random reflectance analysis. The intention is that exercises will be conducted biannually. Some extensive analyses of variance have been undertaken in support of the establishment of reasonable limits of tolerance. Plans for the future include the holding of training sessions and the circulation of sets of photomicrographs to assist in the differentiation of macerals.

The *Standardisation* Working Group (Convener: W. Pickel) organises ring analyses with the goal of understanding the factors involved in the reproducibility limits achieved in petrographic analysis and works to improve them. Through this group ICCP members have already had an opportunity to participate in analyses using the new classification of vitrinite macerals discussed below.

A third supplement to the second edition of the *International Handbook of Coal Petrology* was published in 1993; included are information sheets on bituminite, the measurement of fluorescence intensity and the petrographic components of hydrogenation residues. Another ambitious undertaking has borne fruit in 1995 in the publication of the first part of a new glossary, the third edition of the handbook, in an entirely new format. A new classification of vitrinite macerals is presented in this publication. One objective was to establish a classification which would be applicable to all ranks of coal; another was to overcome certain inconsistencies in both terminology and usage of the older Stopes-Heerlen system. The new system, presently referred to as ICCP Vitrinite Classification '94, recognises three vitrinite maceral subgroups, namely telovitrinite, detrovitrinite and gelovitrinite. Work on the other two maceral groups, liptinite and inertinite, is still in progress. The ICCP's Editor has supervised the activities of an Editorial Group for the new Handbook.

In the *Fluorescence* Working Group (Convener: S. Bend), a draft has been prepared of information sheets on the measurement of spectral fluorescence. The final revisions are under way. An exercise on the use of calibrated light sources has commenced.

The activities of the *Gondwana* Working Group (Convener: R. Falcon) have ceased.

The President of the ICCP acts as an advisor to the United Nations and the International Standards Organization on matters concerning coal petrology. He has participated in the formulation of the ECE-UN International Classification of In-Seam Coals and the ISO Working Group on Coal Classification.

**Commission 2 - Applications of Organic Petrology in Geology** (Chairman: J. Senftle, 1986 - 1994; W. Kalkreuth 1994 - Present. Secretary: W. Kalkreuth, 1991 - 1994; W. Fermont 1995 - Present)

The *Alginite* Working Group (Convener: A. Cook) recently established definitions for alginite submacerals. These include the larger bodies of alginite with readily distinguishable botanic structures (telalginite), and the smaller occurrences of lamellar morphology (lamalginite). These terms were approved by the General Assembly of the ICCP in 1995.

The *Thermal Indices* Working Group (Convener: B.Pradier) was established to investigate the range of applicability and the accuracy of a number of thermal parameters used in basin analysis and petroleum exploration. A first set of ring analyses conducted on coals and shales showed that vitrinite reflectance had the least interlaboratory variability, whereas geochemical parameters including Rock Eval displayed greater variation.

A Working Group on *Isolation of Organic Matter* (Convener: J. Castano) addresses the effects of sample preparation on petrographic and chemical properties of organic matter. A series of whole rock, dispersed organic concentrate and strew mount preparations have been circulated for a variety of shales and a transitional coal/oil shale. The results indicate that fluorescence response is affected by the acid treatment used in the isolation of kerogen. Under the microscope, dispersed organic concentrates appear to be depleted in structured organic components, and the quantification of organics in strew mounts is difficult. There appears to be much work ahead before an internationally acceptable method of classifying these materials can be achieved.

The Working Group on *Basin Modelling* (Convener: H. Veld) has as its goal the establishment of methods for screening reflectance data and the interpretation of outliers in reflectance profiles. Proper evaluation of these data probably should include consideration of factors introduced by drilling procedure, enclosing lithology, sample type, sample preparation, weathering, other maturity parameters, geologic age, and sedimentation rate. The group has been working towards the establishment of maturity profiles in a coal-bearing sequence using data from an exploration well. A new exercise will deal with the Cretaceous-Tertiary section of a western Canadian basin.

Microscopy is a simple yet effective means of identifying the sources of many organic pollutants. This has prompted the formation of a new Working Group on *Environmental Applications of Coal and Organic Petrology* (Conveners: J. Bailey and A. Depers) operated jointly by Commissions 2 and 3. A white paper has been presented covering topics ranging from the assessment of industrial dust sources to the identification of solid organics in waste water. The final version of this paper will be published by the ICCP.

New initiatives have been proposed on detailing the relationship of coal facies to environment of deposition and good progress has been made toward the creation of an atlas of dispersed organic matter.

**Commission 3 - Applications of Coal Petrology in Industry** (Chairman: C.F.K. Diessel, 1990 - 1995; J. Bailey, 1995 - . Secretary: M. Bengtsson, 1990 - 1992; R. Menendez, 1992 - Present).

The *Combustion* Working Group (Convener: J. Bailey) has as its goal the development of a char classification which can be used to correlate the optical properties of chars with combustion and pyrolysis behaviour. A wall chart has been provided to participating laboratories as an aid in obtaining consistent results among laboratories. Several ring analyses have been conducted. Initial poor reproducibilities have been improved by the combination of categories. Because the finer fragments are easily overlooked, there is a particular disagreement in the proportions counted of this category. Some success has been achieved in relating groups of char types to groups of feed coal microlithotypes.

The goal of the Working Group on *Coke Petrography* (Convener: R. Javier) has been the establishment of a classification of coke texture which can be used reproducibly and related to the technological properties of cokes. Ring analyses have been conducted on circulated coke samples and on pairs and triplets of photographs representing the same fields of view in different orientations of polarised light. Points of agreement and conflict have been identified, enabling the scope of work to become more focussed. A major problem has been the distinction of domain sizes. A working convention has been adopted concerning the extent to which material and structure surrounding a point being identified can be taken into consideration.

The increased availability of rapid image analysis systems for petrographic coal evaluation led to the formation of a Working Group on *Automation* (Convener: P. David). A major goal of this group is the comparison of results obtained by different image analysis systems and conventional visual petrographic analysis. The divergence of results obtained with the various systems is high. Several problems for future consideration were identified including autofocus, the overlap in binder and liptinite reflectances and the influence of anthracite in blends. Analysis of variance is planned as one means of isolating the sources of problems.

A Working Group on *Reactive Inertinite* (Convener: K. Kruszewska) has concluded its activities related to the behaviour of coals in carbonisation. Its goal was the establishment of parameters for identifying inertinite which is capable of fusion during coking. A final report on this subject will be prepared. A new Working group on *Inertinite in Combustion* (Convener: A. Gomez) has been formed.

The difficulties in classifying and analyzing coal mixes will be addressed in a new Working Group on *Coal Blends* (Convener: A. Davis).

**Acknowledgements**

This report is based in part upon the Minutes written by the General Secretary, Prof. Z.C. Correa da Silva, and reports submitted by the Chairmen and Secretaries of the Commissions, to all of whom I am extremely grateful. I wish to express my appreciation also to the Committee's Treasurer, Prof. D.G. Murchison, Vice-President Dr. N. Bostick, and Editor, Prof. M. Wolf. The efforts of meeting organisers and sponsors, the Conveners of the Working Groups and all active members must also be acknowledged; without their dedication we would not be in a position to report the progress recorded here.

## Last Announcement of the Next Meeting

The 48th meeting of the ICCP takes place at Heerlen (The Netherlands) from September 8 to September 14, 1996. It will be organized by the Geological Survey of the Netherlands. If you have not yet sent back the Preliminary Registration Form do it, please, immediately! Those who did not get the first circular should contact Dr. Willem Fermont, Geological Survey of The Netherlands, P.O.Box 126, NL-6400 AC Heerlen; Fax: (+31) 45-571 69 09, E-mail: orgchem@rgd.nl. The Final Circular will be mailed at the beginning of May.

## Brief Report on the Short Term Course on "Applied Coal and Organic Petrology" and a Special Workshop on "Applied Coal and Organic Petrography"

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The short term course was organized at the Indian School of Mines, Dhanbad, India from January 29 to 31, 1996 as Pre-Indian Geological Congress activity under executive development programme. This course was coordinated by Dr. M.P. Singh, B.H.U., Varanasi and Dr. M. Prakash, I.S.M., Dhanbad. There were twelve participants in this course- three from Coal India Ltd., two from Regional Research Laboratory, Bhubaneswar, one from Oil and Natural Gas Corporation Ltd., three from Gujrat Mineral Development Corporation, and three from different Universities. The following lectures were delivered along with a short practical training:

- Sedimentary organic matter: Kinds and their thermal evolution by M.P. Singh
- Macropetrographic characterization of brown coals and hard coals: Recent advances by M.P. Singh

- Microscopic constituents (Macerals) of coals: Recent developments by M.P. Singh
- Petrographic characterization of kerogen (D.O.M.): Application of organic petrographic methods in oil and gas exploration by M.P. Singh
- Scanning Electron Micrography of coal by M.P. Singh
- Fundamentals of coal petrography with special reference to Indian Gondwana coals by S.G. Chaudhuri
- Application of coal petrography in coal utilization processes by S.G. Chaudhuri
- Environmental consideration to utilization of coal in power sector with special reference to the problem of fly ash by Gurdeep Singh
- Exploration planning for proper utilization of Indian coal resources in the wake of globalization in mining sector by R.P. Verma
- Fragmentation of Gondwanaland with special reference to the evolution of coal deposits by N.D. Mitra
- Industrial application of coal petrography: Present and future trends by V.D. Manjrekar.

The special workshop was organized as one of the activities of the Tenth Convention of the Indian Geological Congress on February 2, 1996 under the convenership of Dr. M.P. Singh. Eleven research papers were presented covering a wide range of topics such as petrographic evaluation of coking coals, petrography of Gondwana and Tertiary coals, fluorescence behaviour of macerals, application of coal petrography in coal utilization, petrography of heat affected coals, and petrography of hydrogenation residues. The workshop ended with the remark that Indian coal laboratories should find ways to improve the inter-laboratory data correlation. The participants thanked Prof. K.L. Rai, Convener, Thenth Convention of the Indian Geological Congress and Head, Department of Applied Geology, I.S.M., Dhanbad for his initiative and efforts to give final shape to the above activities.

## Dr. László Soós +

November 2, 1995 Dr. Lászlo Soós - a long standing member of and first Hungarian representative within the ICCP - passed away at the age of 75. Dr. Soós was student of the internationally well-known Prof. Szádeczky-Kardoss and worked together with him at the Hungarian Academy of Science where he studied Hungarian lignites. Among other publications in 1963 he published a paper about the petrography and chemistry of the so-called "melanoresinite". He could show that the relatively high reflecting bodies within plant tissues of lignites are derived from phlobaphenes (tannin) and therefore they are part of the humic matter in coal.. Later this maceral was called phlobaphinite. Dr. Soós was active within the ICCP during the time when the lignite macerals were defined. His career as coal petrographer finished early by an eye-disease.

Monika Wolf

## Miscellaneous

### Correction

Dr. Vasconcelos, Maputo, Mocambique took my attention to the fact that within the minutes of the last meeting at Kraków (ICCP news no.12) his name was not mentioned within the apologies. This should be made up leeway herewith. Sorry!

Monika Wolf

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