

P.A. HACQUEBARD

## BIBLIOGRAPHY

1(a) Departmental refereed publications.

1. HACQUEBARD, P.A. 1951. The correlation, by petrographic analyses, of No. 5 seam in the St. Rose and Chimney Corner Coalfields, Nova Scotia. Geological Survey of Canada Bulletin, v. 19, 33 p.

Presents detailed accounts of methods followed in sampling of coal seams, in preparing polished sections of coal, in compilation of coal-seam data; in interpretations with respect to conditions of deposition, to rank and heating value, and to application of correlation of coal seams in two separate basins; notes extraordinary abundance of opaque resin rodlets ('sclerotoids') in this coal.

2. HACQUEBARD, P.A. and BARSS, M.S. 1957. A Carboniferous spore assemblage in coal from the South Nahanni River area, Northwest Territories. Geological Survey of Canada Bulletin, v. 40, 63 p.

Recognition of a Lower Carboniferous spore assemblage similar to one reported from Spitsbergen and Moscow basin and indicative of a distinct floral province in L.C. time; original discovery of a Carboniferous coal in Western Canada, where all known occurrences are Mesozoic. As senior author Hacquebard contributed identification and taxonomy of 22 genera (including 5 new genera), literature research, and writing of report.

3. BARSS, M.S., HACQUEBARD, P.A. and HOWIE, R.D. 1963. Palynology and stratigraphy of some Upper Pennsylvanian and Permian rocks of the Maritime Provinces. Geological Survey of Canada, Paper 63-3, 13 p.

Presents a biostratigraphic study of strata of the Pictou Group in the Maritime region; it contains 4 miospore zones, which range in age from Westphalian C to Stephanian; in addition, a Permian assemblage was found in rocks of eastern Prince Edward Island; a range chart of 63 species is included. Hacquebard coordinated this study and assisted with compilation of the text.

4. HACQUEBARD, P.A. 1970. Coal in southeastern Canada. Geological Survey of Canada, Economic Geology, Report 1, Chapter VII, p. 356-364.

A synopsis of the geology and seam development of the different coal basins in the Maritimes, together with examples of facies interpretations from coal petrology, from palynology and the lithology of the associated sediment; data on coal production and coal resources are included also.

5. HACQUEBARD, P.A. 1977. Rank of coal as in index of organic metamorphism for oil and gas in Alberta; Chapter 3 of "The origin and migration of petroleum in the Western Canadian Sedimentary Basin, Alberta". Geological Survey of Canada Bulletin, v. 262, p. 11-22; Appendices B and C on p. 119-121.

By integrating data on maximum depth of burial (obtained from near-surface and subsurface coals) and coalification time (from burial history) it has been possible to determine the level of organic metamorphism and paleotemperatures of producing oil and gas pools in Alberta. Results show that oil occurs at rank level of H.V. bituminous coal (between 0.5 and 1.0% Ro) and paleotemperatures of 68 to 131°C - gas is present mainly in rank range of H.V. bituminous coal to anthracite (between 0.8 and 2.0% Ro) and temperatures of 106 to 177°C.

6. HACQUEBARD, P.A. 1983. Geological development and economic evaluation of the Sydney coal basin, Nova Scotia. Geological Survey of Canada, Paper 83-1A, p. 71-81. (Also to be published in Compte Rendu of 9th Carboniferous Congress held in Urbana, Illinois in May 1979; See Bibliography item 2-29).

Paper gives a detailed description of present day knowledge of this coalfield, with a discussion of: (1) age and stratigraphy; (2) structure of offshore Sydney Basin; (3) environment of deposition and development of coal seams; (4) splitting of seams; (5) coalification and variations in rank; (6) coal resource estimates; (7) availability of coking coal.

7. HACQUEBARD, P.A. 1984. Composition, rank and depth of burial of two Nova Scotia lignite deposits. Geological Survey of Canada, Paper 84-1A, p. 11-15.

Analytical data (equilibrium moisture, B.T.U. and Ro's) on two core hole intersections of Cretaceous lignites are presented and have been described megascopically. Maximum depth of overburden of 762 m and 779 m have been deduced from these analytical data.

8. HACQUEBARD, P.A. and AVERY, M.P. 1984. Geological and geothermal effects on coal rank variations in the Carboniferous basin of New Brunswick, Canada. Geological Survey of Canada, Paper 84-1A, p. 17-28. (Also to be published in Compte Rendu of 10th Carboniferous Congress held in Madrid, Spain in 1983 - See Bibliography item 2-31).

Trend-surface analyses on 162 Ro measurements show a progressive increase in rank from H.V. "C" bituminous coal in the east to anthracite in the southwest. This correlates with progressively older formations in same direction, but to obtain the high rank of anthracite additional heat is required. It was likely provided by the high thermal conductivity of underlying igneous rocks. The distribution of these rocks is shown with a Bouguer gravity map, and abnormally high present day heat flow measurements in southwestern New Brunswick also supports this interpretation.

Hacquebard directed the investigation and presented the paper; Avery carried out the analytical work and prepared the samples, which were provided by the New Brunswick Department of Mineral Resources.

9. HACQUEBARD, P.A. 1998. Petrographic, physico-chemical, and coal facies studies of ten major seams of the Sydney coalfield in Nova Scotia. Geological Survey of Canada, Bulletin 520, p.1-46.

1(b) Departmental publications, limited review.

1. HACQUEBARD, P.A., BARSS, M.S., BIRMINGHAM, T.F. and CAMERON, A.R. 1962. Summary of activities of Coal Research Section. Geological Survey of Canada, Paper 62-30, p. 19-21.
2. HACQUEBARD, P.A. 1963. Summary of activities of Coal Research Section. Geological Survey of Canada, Paper 63-2, p. 60-65.
3. HACQUEBARD, P.A., CAMERON, A.R. and DONALDSON, J.R. 1964. A depositional study of the Harbour Seam, Sydney coalfield, Nova Scotia. Geological Survey of Canada, Paper 64-2, p. 90-91.
4. HACQUEBARD, P.A. and DONALDSON, J.R. 1964. Stratigraphy and palynology of the Upper Carboniferous coal measures in the Cumberland Basin of Nova Scotia. Geological Survey of Canada, Paper 64-2, p. 9-10.
5. HACQUEBARD, P.A. and DONALDSON, J.R. 1965. Carboniferous coal deposition associated with flood-plain and limnic environments in Nova Scotia. Geological Survey of Canada, Paper 64-2, p. 70-71.
6. HACQUEBARD, P.A. 1966. Palaeoecological and environmental studies of the Minto coalfield. Geological Survey of Canada, Paper 66-2, p. 60.
7. HACQUEBARD, P.A. and BARSS, M.S. 1966. The value of fossil spores in evaluating the remaining reserves of the Pictou coalfield. Geological Survey of Canada, Paper 66-2, p. 60-61.
8. HACQUEBARD, P.A. and DONALDSON, J.R. 1966. Structural problems in relation to coal mining at Springhill, Nova Scotia. Geological Survey of Canada, Paper 66-2, p. 61.
9. BARSS, M.S. and HACQUEBARD, P.A. 1967. Age and stratigraphy of the Pictou Group in the Maritime Provinces as revealed by fossil spores. Geological Survey of Canada, Paper 67-1, Part B, p. 53-54.
10. DONALDSON, J.R. and HACQUEBARD, P.A. 1967. Coal mine geology and evaluation of coal reserves. Geological Survey of Canada, Paper 67-1, Part B, p. 52.
11. HACQUEBARD, P.A. 1967. Minto coalfield. Geological Survey of Canada, Paper 67-1, Part A, p. 169.
12. HACQUEBARD, P.A., BIRMINGHAM, T.F. and DONALDSON, J.R. 1967. Petrography of Canadian coals in relation to environment of deposition. Geological Survey of Canada, Paper 67-1, Part B, p. 51-52.
13. HACQUEBARD, P.A. and BARSS, M.S. 1968. Paleogeography and facies aspects of the Minto coal seam, New Brunswick. Geological Survey of Canada, Paper 68-1, Part B, p. 5-7.
14. CAMERON, A.R., HACQUEBARD, P.A., DONALDSON, J.R. and BIRMINGHAM, T.F. 1969. Radioactivity of Tertiary lignites in Saskatchewan, Alberta and British Columbia. Geological Survey of Canada, Paper 69-1, Part A, p. 4; and Paper 70-1, Part A, p. 18.
15. HACQUEBARD, P.A. and DONALDSON, J.R. 1969. Coal metamorphism and hydrocarbon potential in the Upper Paleozoic of the Atlantic Provinces. Geological Survey of Canada, Paper 69-1, Part B, p. 4-7.
16. HACQUEBARD, P.A. and DONALDSON, J.R. 1972. Rank studies of coals in the Rocky Mountains and Inner Foothills Belt, Canada. Geological Survey of Canada, Paper 72-1, Part B, p. 9-10.
17. CAMERON, A.R., GUNTHER, P.R., HACQUEBARD, P.A. and BIRMINGHAM, T.F. 1974. Relation of predicted to experimentally determined coke stabilities for western Canadian coals. Geological Survey of Canada, Paper 74-1, Part B, p. 19-20.
18. HACQUEBARD, P.A. 1974. A composite coalification curve of the Maritime region and its value for petroleum exploration. Geological Survey of Canada, Paper 74-1, Part B, p. 21-23.
19. HACQUEBARD, P.A. 1975. Correlation between coal rank, paleotemperature and petroleum occurrences in Alberta. Geological Survey of Canada, Paper 75-1, Part B, p. 5-8.

2. Publications in refereed journals, including refereed symposia papers, poster sessions.

1. HACQUEBARD, P.A. 1943. Kolenpetrographische Studien (Dutch with English Summary, Ph.D. Thesis). Mededelingen Geologische Stichting, Serie C-III-2, No. 1, 129 p.

Describes the microscopic constituents of coal, their mode of formation and develops a new method of correlating coal seams by petrographic profiles in the South Limburg coalfield of the Netherlands; coal facies interpretations on four seams are presented also.

2. HACQUEBARD, P.A. 1950. The nomenclature and classification of coal petrography. Nova Scotia Department of Mines and Nova Scotia Research Foundation. First Conference on the Origin and Constitution of Coal, p. 8-38.

Describes and illustrates with 42 photomicrographs the macerals and microlitholytes of coal as observed by reflected light; proposes a correlation between the nomenclature and classification of C.P. as developed from reflected light and transmitted light techniques.

3. HACQUEBARD, P.A. 1952. Opaque matter in coal. *Economic Geology*, v. 47, p. 494-516.

Opaque matter as presented by the organic coal constituents is discussed and illustrated with 36 photomicrographs; primary and secondary opacity can be recognized and an appropriate nomenclature for the (primary) opaque constituents is introduced.

4. HACQUEBARD, P.A. 1952. A petrographic investigation of the Tracy seam of the Sydney coalfield, Nova Scotia. Nova Scotia Department of Mines and Nova Scotia Research Foundation, Second Conference on the Origin and Constitution of Coal, p. 293-309.

With petrographic profiles the regional extent and variations of the Tracy seam has been determined; the seam is characterized by a unique concentration of "squat bulky spores", which were noted in polished sections; spore density diagrams (as counted per 1 sq. inch) proved valuable for seam identification.

5. HACQUEBARD, P.A. 1955. Microscopic coal research in Canada. *Leidse Geologische Mededelingen*, v. 20, p. 74-88.

A review of the author's activities in CP in Canada since 1949; it discusses terminology, quantitative CP analysis, seam correlation, coal preparation and studies of spontaneous combustion of coals from Eastern Canada.

6. HACQUEBARD, P.A. and LAHIRI, K.C. 1955. Petrographic examination of washed, screened and crushed samples of coal from the Sydney and St. Rose Coalfields, Nova Scotia. *Economic Geology*, v. 50, p. 837-862.

The paper shows that through special preparation techniques coals of different petrographic composition can be produced: such coals also have different physical and chemical properties and therefore can be utilized for various purposes. The investigation was the first in Canada carried out in field of CP and coal utilization. Hacquebard directed the study, assisted with the microscopic analyses and wrote the report.

7. HACQUEBARD, P.A. 1957. Plant spores in coal from the Horton Group (Mississippian) of Nova Scotia. *Micropaleontology*, v. 3, no. 4, p. 301-324.

A taxonomic spore study of a coal of lowermost Mississippian age; 19 genera and 50 species (including 4 new genera and 30 new species) are described; a close affinity with Upper Devonian spores of USSR is noteworthy.

8. HACQUEBARD, P.A. 1960. The value of a quantitative separation of the maceral vitrinite into its constituents telinite and collinite for the petrography of coking coals. *Proceedings of the International Committee of Coal Petrology*, no. 3, p. 131-139.

Quantitative analyses of the constituents collinite and telinite have been made on etched grainmounts examined with an oil immersion objective; studies on Carboniferous coals from Nova Scotia and Cretaceous coals from Alberta show that there exists a close relationship between the amount of telinite and the swelling indices of these coals; this correlation is significant for the evaluation of coking coals.

9. HACQUEBARD, P.A., BARSS, M.S. and DONALDSON, J.R. 1960. Distribution and stratigraphic significance of small spore genera in the Upper Carboniferous of the Maritime Provinces of Canada. *Proceedings of 4th Carboniferous*

Congress, Heerlen, Holland, September 1958, v. 1, p. 237-245.

A range chart of miospore genera present in the Upper Carboniferous in the Maritimes is presented; it is based on a study of 150 coal samples and includes some 40 genera; comparisons with Namurian and Westphalian spore assemblages of Western Europe are made; a revision of the boundary between Westphalian C and D is suggested.

Hacquebard coordinated the spore analyses and compiled text of the paper.

10. HACQUEBARD, P.A. and TIBBETTS, T.E. 1960. Practical significance of coal petrography to coking; results of investigations of Harbour seam of Sydney Coalfield, Nova Scotia, and Bellevue No. 1 seam of Crowsnest coal area, Alberta. Proceedings of 12th Dominion-Provincial Coal Research Conference, Ottawa 1960, p. 13-57.

This paper consists of two parts. In Part I Hacquebard compares the petrography of an eastern and a western coking coal with physicochemical tests, such as: per cent ash, sulphur, volatile matter, swelling indices, plasticity and grindability. It was found that in these high volatile "A" bituminous coals the inertinite rich parts produce a stronger coke. In Part II, Tibbetts describes the coking mechanism, and types of laboratory coking tests.

11. HACQUEBARD, P.A. 1962. Palynological studies on some Upper and Lower Carboniferous strata in Nova Scotia. Part I: The Mabou Coal Area. Proceedings of Third Coal Conference, held at Crystal Cliffs, Nova Scotia, June 1956, p. 227-253.

A correlation of three separate coal seams by 27 histograms of miospores leading to a structural interpretation of the coalfield; presentation of a spore range chart through 1200 foot thick section at Mabou (Westphalian C), and stratigraphic assignment of two thin coaly layers cut at 4080' and 5350' in Hillsborough No. 1 well drilled at Governor's Island near Charlottetown, Prince Edward Island.

12. HACQUEBARD, P.A., CAMERON, A.R. and DONALDSON, J.R. 1964. Die Ablagerungsbedingungen des Flozes Harbour im Sydney - Kohlengebiet von Neuschottland, Kanada (A depositional study of the Harbour seam, Sydney Coalfield, Nova Scotia, Canada). Fortschritte Geologie Rheinland und Westfalen, Band 12 (Potonie Festschrift), p. 331-356, 7 figures, Krefeld, 1964. Also in Geological Survey of Canada, Paper 65-15, 31 p.

A study of the sedimentation, coal petrology and palynology of one coal seam over entire coalfield; it showed that different coal facies derived from different plant associations and different modes of preservation are present; based on these facies changes a paleoecological picture is presented.

Hacquebard coordinated this project and wrote the report.

13. HACQUEBARD, P.A. and DONALDSON, J.R. 1964. Stratigraphy and palynology of the Upper Carboniferous coal measures in the Cumberland basin of Nova Scotia, Canada. Proceedings of 5th Carboniferous Congress, Paris-France, September 1963, v. III, p. 1157-1169.

The lithology, stratigraphy and miospore distribution in the coal measure sequences at Joggins and Springhill is presented; the two productive coal zones are considered to be of the same age because both belong to the "high" Lycospora zone, which is regarded as middle Westphalian B; the sequence at Spicer Cover, however, belongs to Westphalian C as it compares with the Lonchopteris zone of the Morian Series.

Hacquebard directed the investigation and wrote the report.

14. BARSS, M.S. and HACQUEBARD, P.A. 1966. Age and stratigraphy of the Pictou Group in the Maritime Provinces as revealed by fossil spores. Geological Association of Canada, v. 4, p. 267-281.

Precise correlations of the uppermost Paleozoic rocks over the entire Maritimes have been established by the recognition of five spore zones in 20 sections. For many areas the proper assignment of these rocks, which reach a maximum thickness of some 8500 feet, was hitherto unknown. The study also is of significance to the stratigraphy of the Upper Carboniferous in general, because of the similarities with Europe and USA.

Hacquebard evaluated the results and assisted with the compilation of the report.

15. HACQUEBARD, P.A., BIRMINGHAM, T.F. and DONALDSON, J.R. 1967. Petrography of Canadian coals in relation to environment of deposition. Symposium on Science and Technology of Coal, Ottawa, March 1967, published by

Mines Branch, p. 84-97.

- 15A. HACQUEBARD, P.A. 1967. Condensed German version of Item 15: Die Petrographie Kanadischer Kohlen im Zusammenhang mit ihren Umweltbedingungen. Fortschritte Kohlenpetrographische Arbeitsgemeinschaft issued by Bergbau Forschung in Essen, 1967, p. 1-14.

In six different coal basins, situated in both Eastern and Western Canada, it is shown that the overall seam development and the microscopic coal types can be correlated with the morphological shape, geological origin and position relative to the sea of these basins. The paper introduces a wider geological application of coal microscopy and has aroused considerable interest amongst foreign coal scientists, in particular in Germany, hence its reproduction in the German language.

Concepts, coordination of analytical work, and writing of report were all done by Hacquebard.

16. HACQUEBARD, P.A. and DONALDSON, J.R. 1969. Carboniferous coal deposition associated with flood-plain and limnic environments in Nova Scotia. Geological Society of America, Special Paper 114, p. 143-191.

The effect of the environment of deposition on seam development, seam termination and coal composition is illustrated with the Sydney and Pictou coalfields. For each field lithofacies maps, regional cross-sections through the seams and palyno-petrographic profiles have been compiled. In addition, diagrams showing facies changes (based on petrography of column samples) of eight seams from Sydney are included.

The concepts are based on original work by Hacquebard, who also compiled the report.

17. HACQUEBARD, P.A. and BARSS, M.S. 1970. Palaeogeography and facies aspects of the Minto coal seam, New Brunswick, Canada. Comptes Rendus 6th Carboniferous Congress, Sheffield 1967, v. III, p. 861-872.

This paper gives information on: (1) the regional changes in seam thickness and best seam development; (2) variations in sulphur content; (3) extent of the coal basin and location of best area for exploration of additional coal resources; facies changes within the coal seam based on petrographic and palynological data.

Hacquebard wrote the paper and carried out all analytical work, except the palynology.

18. HACQUEBARD, P.A. and DONALDSON, J.R. 1970. Coal metamorphism and hydrocarbon potential in the Upper Paleozoic of the Atlantic Provinces, Canada. Canadian Journal of Earth Sciences, v. 7, p. 1139-1163.

This paper has generated much interest, it being the first one in North America to relate coal rank (as determined by vitrinite reflectance) to hydrocarbon evaluations; its main feature is an isorefectance map of the Maritime Provinces, which is based on reflectance determinations of 178 samples of coal or coaly materials; the map outlines areas with a favourable degree of organic metamorphism for oil in Paleozoic sediments.

Hacquebard wrote the paper, coordinated the analytical work, and initiated the project.

19. HACQUEBARD, P.A. 1972. The Carboniferous of Eastern Canada. Comptes Rendus 7th Carboniferous Congress, v. I, p. 69-90.

This is a comprehensive paper on the tectonic framework, lithology, and biostratigraphy of the Carboniferous in the Atlantic region. It discusses the presence of 17 miospore zones, and illustrates the regional and vertical distribution of these zones in four 3-dimensional diagrams, containing a large number of columnar stratigraphic sections. Age, location, production, and resources of minable coals and their different development in separate basins are mentioned. A very complete bibliography of 91 references with precise regional allocations is included.

20. DUTCHER, R.R. *et al.* 1974. Carbonaceous materials as indicators of metamorphism. Symposium volume of six papers, R.R. Dutcher, P.A. Hacquebard, J.M. Schopf, and J.A. Simon (eds.). Geological Society of America, Special Paper 153, 108 p.

The papers are:

1. N.H. Bostick: Phytoclasts as indicators of thermal metamorphism.
2. J.D. Burgess: Microscopic examination of kerogen in petroleum exploration.
3. J.R. Castano and D.M. Sparks: Interpretation of vitrinite reflectance measurements in sedimentary rocks etc.

4. H.H. Damberger: Coalification patterns of Pennsylvanian coal basins of eastern U.S.A.
5. P.A. Hacquebard and J.R. Donaldson: Rank studies of coals in the Rocky Mountains etc.
6. R.R. Thompson and L.G. Benedict: Vitrinite reflectance as an indicator of coal metamorphism for coke making.

Hacquebard's contribution consisted of assisting with the organization of the symposium and in the critical reading of all manuscripts.

21. HACQUEBARD, P.A. and DONALDSON, J.R. 1974. Rank studies of coals in the Rocky Mountains and Inner Foothills Belt, Canada. Geological Society of America, Special Paper 153, p. 75-93.

Rank changes (determined by vitrinite reflectance) in ten stratigraphic sequences show that coalification in Foothills Belt is pre-orogenic and not affected by tectonic deformation; thermal metamorphism is considered the primary agent. The effect of the coalification gradient on the availability of coking coals is discussed, and the value of Ro rank determinations for correlating coal seams is pointed out.

Hacquebard wrote the paper, coordinated the analytical work, and initiated the project.

22. HACQUEBARD, P.A. 1975. Pre- and post-deformational coalification and its significance for oil and gas exploration. Centre National Recherche Scientifique, Paris, Collogue International de "Petrographie organique et potentiel petrolier", p. 225-241.

Paper explains fundamental differences in coalification patterns between the coals of the Rocky Mountain and Maritime regions. The significance of these patterns for evaluations of coking coals and appraisals of hydrocarbons is pointed out. For the Maritime region a combined Mesozoic (from offshore wells) and Carboniferous coalification curve has been constructed. It encompasses coals in 4700 m of strata, and is useful to delineate most favourable interval of oil or gas potential in exploration wells. The effect of time on the coalification process is dealt with also.

23. HACQUEBARD, P.A., CAMERON, A.R., FORGERON, S.V., POTTER, W.C., SHAW, W.S. and SMITH, E.W. 1978. Geology of Carboniferous coal deposits in Nova Scotia. Toronto '78 Field Trips Guidebook, published by Geological Association of Canada, p. 43-64.

The guidebook describes the geology of the Sydney, Mabou, and Pictou coalfields. For each area the sedimentological setting and general coal geology is presented with measured shore sections, cross-sections and descriptive notes. The differences between the paralic and limnic environments of coal deposition formed one of the main themes of the field trip.

Hacquebard coordinated the various phases of the field trip and wrote the major portion of the guidebook.

24. HACQUEBARD, P.A. 1979. A geological appraisal of the coal resources of Nova Scotia. Canadian Institute of Mining and Metallurgy Bulletin, v. 72, no. 802, p. 76-87.

Based on new data obtained from both onshore and offshore drilling programs carried out to December 1977 the remaining coal resources of five fields in Nova Scotia are evaluated. The grand totals of the measured, indicated and inferred categories amount to 232 m, 646 m, and 993 m tons, respectively. Included in the paper are discussions and illustrations of the geological setting of each field, with reference to its depositional environment.

25. HACQUEBARD, P.A. 1980. Geology of Carboniferous Coal Deposits in Nova Scotia - Field trip 7 of G.A.C.-Halifax '80; 37 p. guidebook distributed by the Geological Association of Canada.

N.B. This is an updated and revised version of bibliography item 2-23.

26. HACQUEBARD, P.A., BUCKLEY, D.E. and VILKS, G. 1981. The importance of detrital particles of coal in tracing the provenance of sedimentary rocks. Bulletin des Centres de Recherches Exploration, Production ELF-Aquitaine, v. 5, no. 2, p. 555-572.

Detrital particles of coal from two localities in NW Atlantic Ocean are discussed. Those from Sohm Abyssal Plain (760 km E of Bermuda) show that the turbidite in which they are contained must have travelled at least 1800 km. On the basis of petrographic composition, rank and spore content these coaly fragments can be related to the Sydney coalfield of Nova Scotia. The particles obtained from Orphan Knoll (situated 550 km NE of Newfoundland) were derived from Jurassic sediments. They can be traced to the S. Wales or S. Ireland coal deposits because of their high rank and low

germanium content. Speculations about continental drift, following Jurassic sedimentation, can be made from this correlation.

Hacquebard examined the coaly material, wrote the report and coordinated the effort. The samples were provided by the co-authors, who also gave detailed information on the age and nature of the turbidite deposits, and collected the samples at sea.

27. HACQUEBARD, P.A. and AVERY, M.P. 1982. Petrography of the Harbour seam in the Donkin Reserve Area of the Sydney coalfield, Nova Scotia; Proceedings 64th Annual Meeting, Chemical Inst. Canada, Halifax, 1981, v. I, p. 79-86.

Paper presents petrographic profiles of 11 offshore borehole intersections in terms of macerals, vitrinite reflectance and coke stability calculations. Results show that per seam average a bright coal with 77-87% reactive components is represented. Ro values range from 0.90- 1.10%, and CSF vary between 30 and 56. both the reflectance and the coke stabilities improve with depth (or seaward). - Pyrite, as determined microscopically, is concentrated in roof and bench coal, and decreases markedly from west to east in the Donkin Area. A separation of pyritic sulphur, organic sulphur and residual sulphur has been made and is of value to predict coal cleaning possibilities.

Hacquebard directed the investigation, collected the samples and wrote the report; Avery carried out the analytical work and organized the computer programs used to plot the petrographic profiles.

28. HACQUEBARD, P.A. 1983. Coal rank changes in the Sydney and Pictou coal fields of Nova Scotia: Cause and economic significance. Canadian Institute of Mining and Metallurgy, Bulletin May 1984, p. 33-40.

Points out that with increase in depth of mining the Sydney coals will reach the rank of MV bituminous and those of the Acadia seam in the Pictou field a rank of LV bituminous and even semianthracite. In addition, there exists an easterly increase in rank within one seam at same depth in Sydney field. This causes MV coal to occur at 800 m depth in Lingan - No. 26 area, and at 700 m depth in the Donkin Reserve area. The LV coal reserve in Acadia seam is considered suitable for blending purposes with Sydney metallurgical coal and could therefore displace imported LV American coal. It is the only known LV coal deposit in eastern Canada. The rank variations within the Sydney field indicate changes in the geothermal gradient, as has been deduced from variable coalification gradients obtained in twelve borehole intersections.

29. HACQUEBARD, P.A. 1983; 1984. Geologic development and economic evaluation of the Sydney coal basin, Nova Scotia, Canada. Proceedings of 9th Carboniferous Congress, held in Urbana, Illinois, May 1979, v. 3, pt. 1, p. 61-71; also in G.S.C. Paper 83-1A, p. 71-81. - See Bibliography item 6(a)-b.

Paper gives a detailed picture of present day knowledge of this coal field, with a discussion of: (1) age and stratigraphy; (2) structure of offshore Sydney Basin; (3) environment of deposition and development of coal seams; (4) splitting of seams; (5) coalification and variations in rank; (6) coal resource estimates; (7) availability of coking coal.

30. HACQUEBARD, P.A. 1984. The Carboniferous of eastern Canada (originally published in 1972 in C.R. of 7th Carboniferous Congress. - See Bibliography item 2-19) republished in: Benchmark Papers in Geology, no. 77, "Geology of Coal", p. 44-67, published by Hutchinson Ross Publishing Co., Stroudsburg, Pa. (Libr. Congr. Catalogue No. 83-8521).

31. HACQUEBARD, P.A. and AVERY, M.P. 1986. Geological and geothermal effects on coal rank variations in the Carboniferous basin of New Brunswick, Canada. Comptes Rendus of 10th Carboniferous Congress held in Madrid, Spain in 1983, Tome 3, p. 383-397. (Also published in Geological Survey of Canada, Paper 84-1A, p. 17-28); See Bibliography item 1(a)-8).

Trend-surface analyses on 162 Ro measurements show a progressive increase in rank from HV-"C" bituminous coal in the east to anthracite in the southwest. This correlates with progressively older formations in same direction, but to obtain the high rank of anthracite additional heat is required. It was likely provided by the high thermal conductivity of underlying igneous rocks. The distribution of these rocks is shown with a Bouguer gravity map, and abnormally high present day heat flow measurements in SW New Brunswick also supports this interpretation.

Hacquebard directed the investigation and presented the paper; Avery carried out the analytical work and prepared the samples, which were provided by the New Brunswick Department of Mineral Resources.

32. HACQUEBARD, P.A. 1986. The Gulf of St. Lawrence Carboniferous Basin; the largest coalfield of eastern Canada. CIM Bulletin July 1986, p. 67-78.

Five offshore wells indicate the presence of two continuous coal zones underneath the Gulf of St. Lawrence. These zones correlate with onshore deposits at various places around the Gulf, including those at Mabou Mines and Inverness. In the latter areas, new(submarine) mineable resources of respectively 115 and 215 million (metric) hours were delineated as a result of this study. They have been supported by offshore seismic surveys carried out in 1978 and 1985.

33. HACQUEBARD, P.A. 1987. Notes for the October 10, 1987 field trip to the Joggins and Springhill coalfields of Nova Scotia. Field trip guide Parrsboro and Joggins areas, Nova Scotia, Canada, published by American Association of Stratigraphic Palynologists, Halifax, 1987, p. 9-19.

34. HACQUEBARD, P.A. 1989. The wanderings of Donsexinis Stach, 1957, alias Densosporites S.W. and B., 1944 in the North Atlantic Ocean: A forensic geology investigation. International Journal of Coal Geology, v. 14, p. 15-27.

Donsexinis Stach, 1957 refers to a microspore exine present in polished sections of Carboniferous coals, but also occurs in coals of Early Cretaceous age. This has caused stratigraphic confusion and provenance complications and led to writing this paper in an unusual manner, namely as a detective story. The three locations are all submarine and occur at 1) east of Bermuda in the Atlantic Ocean, 2) in the Labrador Sea, and 3) in Davis Strait.

35. HACQUEBARD, P.A. and CAMERON, A.R. 1989. Distribution and coalification patterns in Canadian bituminous and anthracite coals. International Journal of Coal Geology, v. 13, p. 207-260.

The rank variations in the 16 principal coal-bearing basins of Canada, ranging in age from Devonian to Tertiary, are presented. Detailed coalification patterns are described in the southern Rocky Mountain coal belt and in the Maritimes basins. In the former the coals range from H.V. bituminous to anthracite (from 0.61 to 2.63% Ro.max.). In the Maritimes Basins the rank is nearly all bituminous, varying from 0.5 to 1.2% Ro.max. In both regions the coalification is predominantly postdeformational, being controlled by the depth of burial since deposition.

36. HACQUEBARD, P.A., GILLIS, K.S. and BROMLEY, D.S. 1989. Re-evaluation of the coal resources of western Cape Breton Island. Nova Scotia Department of Mines and Energy, Paper 89-3, 47 p.

Four coalfields are discussed, namely Port Hood, Mabou, Inverness and St. Rose-Chimney Corner. They occupy small land areas but have extensive submarine reserves. Offshore drilling in 1984 has delineated the respective areas. The coals are Westphalian A (Port Hood and St. Rose) and Westphalian C and D (Mabou and Inverness). The rank is H.V. B. and C. bituminous. They represent the onshore part of the Gulf of St. Lawrence coal basin.

37. CAMERON, A.R. 1991. Peter Hacquebard - Pioneer in Canadian Coal Petrology. International Journal of Coal Geology, v. 19, p. 3-8.

Gives a biographic account presented at the 1991 Calgary Symposium on "Recent Advances in Organic Petrology and Geochemistry". It includes a selected bibliography of 31 entries.

38. HACQUEBARD, P.A. 1992. Reflections on 150 years of coal geology investigations by the Geological Survey of Canada in the Atlantic provinces. C.I.M. Bulletin, v. 85, no. 965, p. 79-86.

The early history of the Geological Survey of Canada in Atlantic Canada is closely connected with coal geology. W. Logan measured the Joggins section in 1843; detailed mapping of the coalfields was carried out by H. Fletcher in the late 19th century and early 20th century. During the 1920-1940 period the stratigraphy of the Carboniferous was established by W.A. Bell. This was followed by geological investigations of A.O. Hayes, W.S. Dyer, E.A. Goranson, G.W.H. Norman, J.E. Muller, T.B. Haites and P.A. Hacquebard.

39. HACQUEBARD, P.A. 1993. The Sydney coalfield of Nova Scotia. International Journal of Coal Geology, v. 23, p. 29-42.

This is the largest coalfield in eastern Canada. During 205 years of mining it has produced 410 million tons, and the remaining "demonstrated" resources, present in ten seams, have been calculated at 1,800 million short tons. The coal rank is H.V.-A bituminous, and increases with the depth of mining. Cross sections through five seams illustrate the phenomenon of depositional splitting and rejoining, caused by the interaction of fluvial sedimentation and peat accumulation. Fossil rivers forming "wants" or "wash-outs" in the coal seams are the principle geological obstructions to mining. Structural difficulties are minor as the field is only gently folded. Petrographically, a normal banded, bright coal is represented. In each seam four coal facies types can be recognized, namely forest-moor, forest-terrestrial-moor, reed-moor and open-moor. The forest- and reed-moor facies predominate. The coal is very low in ash (only 5-9%), but generally high in sulphur (2.5-6.2%).

40. HACQUEBARD, P.A. 1993. Alexander Rankin Cameron, renowned Canadian coal petrologist. *International Journal of Coal Geology*, v. 24, p. 1-5.

Gives a biographic account presented at the Wolfville Symposium of the Geological Association of Canada in May 1992, organized in Cameron's honour. It includes a selected bibliography containing 35 entries.

41. HACQUEBARD, P.A. 1993. Petrology and facies studies of the Carboniferous coals at Mabou Mines and Inverness in comparison with those of the Port Hood, St. Rose and Sydney coalfields of Cape Breton Island, Nova Scotia, Canada. *International Journal of Coal Geology*, v. 24, p. 7-46.

This paper deals with the structure, the petrography and coal facies aspects of the coal seams present in small land areas along the west coast of Cape Breton Island. The extent of the offshore coal resources and their accessibility are discussed. Whole seam facies comparisons with the coals at Sydney, Port Hood and St. Rose are given. Detailed petrographic profiles of 8 coal seams present at Mabou Mines and Inverness are included.

42. HACQUEBARD, P.A. 1995. Contributions of palynology to Carboniferous biostratigraphy and coal geology of the Atlantic provinces of Canada. *Review of Palaeobotany and Palynology*, v. 95, p. 7-29.

This paper was presented at the First Walter A. Bell Memorial Symposium, held in Sydney, Nova Scotia in May 1995. Presented are five plates with photomicrographs of miospores, diagnostic of 21 stratigraphic subzones ranging in age from Middle Devonian to Lower Permian. Detailed coal seam correlations from miospore histograms, as an aid to structural and stratigraphic interpretations are given for the Mabou and Pictou coalfields, as well as for the coal deposits in central New Brunswick. A palyno-petrographic profile of the Harbour seam of the Sydney coalfield is included also, with coal facies designations.

43. HACQUEBARD, P.A. 1998. Petrographic, physico-chemical, and coal facies studies of ten major seams of the Sydney coalfield of Nova Scotia. *Geological Survey of Canada, Bulletin 520*, 46 p.

### 3. Unrefereed publications and abstracts.

1. HACQUEBARD, P.A. 1954. Review on "Microscopy of Coal, Coke and Brown Coal" of Dr. H. Freund's handbook of Microscopy in Technology. Canadian Institute of Mining and Metallurgy Bulletin, June 1954, p. 59.

The review discusses the scope and subject matter of this outstanding handbook of 759 pages (on high gloss paper), which is one of a series entitled: Handbuch der Mikroskopie in der Technik.

2. HACQUEBARD, P.A. 1955. On the vitrinite component of coal. U.S. Bureau of Mines Special Publication, January 1955, p. 5-6.

The method of etching polished surfaces of coal in order to bring out the structure of vitrinite is presented; it makes possible under reflected light to recognize two vitrinite components, namely telinite and collinite.

3. HACQUEBARD, P.A. 1960. Canadian contribution for colloquium on Carboniferous stratigraphy. Proceedings of 4th Carboniferous Congress, Heerlen, Holland, September 1958, v. 1, p. 233-235, Table 3.

Presents a detailed table and brief text on Carboniferous stratigraphy and paleontology of the Maritime Provinces; the table shows the thickness and lithology of each group, together with the characteristic fauna, flora and spore florules; correlations with Europe and USA are indicated.

4. HACQUEBARD, P.A. and BARSS, M.S. 1960. Panel on "Microscopic Coal Research" in display book of the Department of Mines and Technical Surveys; reproduced in pamphlet issued by the Department in 1960, p. 9.

Consists of one panel in 7 foot high display book which depicts the activities of the Department of Mines and Technical Surveys; the panel shows with diagrams, photomicrographs and brief descriptions the following: coal constituents, applications of CP and spore investigations.

Hacquebard contributed the design and the text.

5. HACQUEBARD, P.A. and CAMERON, A.R. 1970. Coal Geology in "Background papers on the Earth Sciences in Canada" prepared by Science Council of Canada. Geological Survey of Canada, Paper 69-56, p. 36-42.

The authors have expressed their views on: significance of coal research; practical applications of coal geology; historical development; present level of activity; need for increased activity; training; recommendations for future work. A cooperative effort by both Hacquebard and Cameron.

6. HACQUEBARD, P.A. 1972. Report on Carbonaceous material from Orphan Knoll. Initial Reports of the Deep Sea Drilling Project - Site 111, Bedford Institute Contribution 293, p. 51.

A brief report on rank determination of detrital particles of coal in Jurassic sediments. Of significance to continental drift interpretations and to oil and gas possibilities in relation to degree of organic metamorphism.

7. HACQUEBARD, P.A. 1975. Book review of: "Inkohlung und Erdol" (Coalification and Petroleum) - published in Fortschritte Geologie Rheinland und Westfalen, Band 24, 184 p., 1974 - Review published in Bulletin of Canadian Petroleum Geology, v. 23, no. 2, p. 351-354.

8. HACQUEBARD, P.A. 1976. Book review of: "Stach's Textbook of Coal Petrology" by E. Stach, M.-Th. Mackowsky, M. Teichmüller, G.H. Taylor, D. Chandra and R. Teichmüller-Gebr. Borntraeger, Berlin, Stuttgart, 428 p., 159 fig., 39 tables; review published in Geoscience Canada, v. 3, no. 4.

9. HACQUEBARD, P.A. 1976. Geological appraisal of submarine coal resources in Sydney field of Nova Scotia, Canada. Abstract In: Program of 1976 Annual Meeting of G.S.A., Denver, Colorado, p. 898.

Paper shows the development of stone partings and how hinge lines of splitting seams can be projected from old workings into reserve areas. In addition, a method to identify coal cuttings from rotary wells with respect to seam representation or cavings is presented. The method permitted a petrographic and rank evaluation of several seams intersected in a rotary well located in the submarine area, some 22 miles from the shore. Results of this well and offshore seismic studies show that the known (partially onshore) portion of the Sydney coalfield is part of a major Carboniferous basin that extends nearly to the Newfoundland coast. An area of some 14,000 sq. miles (equal to 70% of

land area of Nova Scotia) may be present, and likely will contain coal resources amounting to several billion tons.

10. HACQUEBARD, P.A. and AVERY, M.P. 1978. Appraisal of coal seam quality in boreholes using sidewall core samples. Abstract In: Program of 1978 Annual Meeting of G.S.A., Denver, Colorado, p. 898.

In the offshore coal drilling program at Sydney, Nova Scotia, the coal seam intersections have been sampled with a series of sidewall cores spaced at 3 to 6 cm intervals. The reliability of this method of sampling has been tested on three Harbour seam intersections by (1) a comparison with analytical results from conventional core obtained at same intersection; (2) a study of the variability in coal petrographic profiles between wells and in relation to known patterns previously determined. Results show that the sidewall core technique can provide reliable qualitative data, but not as precise with regard to seam positioning as conventional cores.

Hacquebard directed the investigation and presented the paper; Avery carried out the petrographic analyses.

11. HACQUEBARD, P.A. and BECKERING, A.R. 1978. Offshore drilling techniques and geological interpretation of results obtained in the Sydney coal basin, Nova Scotia. Abstract In: Program of 1978 Annual General Meeting of Canadian Institute of Mining and Metallurgy, Vancouver, p. 55-56.

The authors discussed the technique and procedures used in the offshore coal drilling program, and the difficulties encountered in obtaining good conventional core. The 1977 drilling explored three areas with six wells for a total footage of 13,201 ft. At Lingan-No. 26 and Donkin 150 m tons of "measured" and 765 m tons of "indicated" coal resources were delineated. In the third area, at Morien Bay, no minable coal was encountered because of structural complications, interpreted from offshore seismic reflection observations and one well. Also discussed were (1) rational of well site selection; (2) seam correlations; (3) thickness and partings of coal intersections as deduced from electro logs and sidewall cores; (4) coal quality with regards to ash, sulphur and reflectance.

12. HACQUEBARD, P.A. and AVERY, M.P. 1982. Geological and geothermal effects on coal rank variations in the Pennsylvanian Basin of New Brunswick. Abstract In: Atlantic Geoscience Society "Colloquium on Current Research in the Atlantic Provinces", Amherst, Nova Scotia, January 1982, p. 6 (updated version was submitted to X Carboniferous Congress, Madrid, September, 1983).

Trend-surface analyses on 162 Ro measurements show a progressive increase in rank from HV-"C" bituminous coal in the east to anthracite in the southwest. This correlates with progressively older formations in same direction, but to obtain the high rank of anthracite additional heat is required. It was likely provided by the high thermal conductivity of underlying igneous rocks. The distribution of these rocks is shown with a Bouger gravity map, and abnormally high present day heat flow measurements in SW New Brunswick also supports this interpretation.

Hacquebard directed the investigation and presented the paper; Avery carried out the analytical work and prepared the samples, which were provided by the New Brunswick Department of Mineral Resources.

13. HACQUEBARD, P.A. 1983. Coal rank changes in the Sydney and Pictou coal fields of Nova Scotia: Cause and economic significance. Abstract In: program of Atlantic Geoscience Society Fredericton '83 symposium "The history, development and economic potential of sedimentary basins in eastern and offshore Canada". Also in: Program 1983 CIM Annual Meeting, Winnipeg, p. 13-14.

Points out that with increase in depth of mining the Sydney coals will reach the rank of MV bituminous and those of the Acadia seam in the Pictou field a rank of LV bituminous and even semianthracite. In addition, there exists an easterly increase in rank within one seam at same depth in Sydney field. This causes MV coal to occur at 800 m depth in Lingan - No. 26 area, and at 700 m depth in the Donkin Reserve area. The LV coal reserve in Acadia seam is considered suitable for blending purposes with Sydney metallurgical coal and could therefore displace imported LV American coal. It is the only known LV. coal deposit in eastern Canada. The rank variations within the Sydney field indicate changes in the geothermal gradient, as has been deduced from variable coalification gradients obtained in twelve borehole intersections.

14. HACQUEBARD, P.A. 1983. Sediment transport in Bermuda triangle. A geological detective story. *Geolog*, v. 12, pt. 2, p. 40-41.
15. HACQUEBARD, P.A. 1985. Paleoenvironmental and tectonic control on coal deposition in eastern Canada. Abstract In: Atlantic Geoscience Society "Symposium on Tectonic Models for the Evolution of the Appalachian Region"-Wolfville, Nova Scotia, January 1985 - Program with Abstracts, p. 8.

In Eastern Canada Carboniferous coal deposition occurred under both orogenic and epeirogenic conditions. Of the five coalfields discussed in this paper, only the Sydney field originated in a subsiding foreland basin, probably in the alluvial region of a large paralic coalfield. The other fields represent intra-continental basins affected by variable epeirogenic dislocations, such as quiet but continuous subsidence or pronounced vertical movements in tectonic grabens. These conditions existed in the St. Rose, Springhill, Minto, and Pictou coalfields. The paleoenvironment of these basins is deduced from: (1) overall seam development with regard to thickness, continuity and termination, and (2) maceral and microlithotype composition of the coal substance itself.

16. HACQUEBARD, P.A. 1986. The Gulf of St. Lawrence Carboniferous Basin; the largest coalfield in Eastern Canada. Abstract In: Atlantic Geoscience Society colloquium on "Current Research in the Atlantic Provinces", Amherst, Nova Scotia, January 18, 1986. Program with abstracts, p. 13.

Five offshore wells indicate the presence of two continuous coal sources underneath the Gulf of St. Lawrence. These sources correlate with offshore deposits at various places around the Gulf, including those at Mabou Mines and Inverness. In the latter areas, new (submarine) minerable resources of respectively 115 and 215 million (metric) tonnes were delineated as a result of this study. They have been supported by offshore seismic surveys carried out in 1978 and 1985.

#### 4. Internal Reports, including Open File.

1. HACQUEBARD, P.A. 1949. Progress report on coal petrological investigations of the Harbour seam in the Sydney Mines district, Nova Scotia; 12 p., 6 encl.

A petrographic study of 15 column samples showing variations in seam composition, both vertically and laterally; includes remarks on CP nomenclature and classification and method of making polished sections of coal.

2. HACQUEBARD, P.A. 1949. Microscopic examination of a sample of coal from the Groundhog area, British Columbia; 9 p., 1 encl., 1 pl.

It is demonstrated that in this anthracite coal the original botanical structure can be observed microscopically when using etched polished sections; chromic-sulphuric acid was used as the etching solution.

3. HACQUEBARD, P.A. 1950. Micro-structure in coal. A microscopic study of strongly contorted coal samples from the Coleman district, Crowsnest area, Alberta; 6 p., 2 pl.

With ten photomicrographs of polished sections it is shown that "plastic" deformation of coal is accompanied by micro-fracturing, micro-faulting and micro-folding; the different coal constituents react differently to mountain pressures.

4. HACQUEBARD, P.A. 1950. Coal petrology; lectures at Nova Scotia Technical College - typed report; 49 p.

Topics covered are: A. Principles of C.P., with re. to thin section and polished section techniques and origin of coal constituents; B. C.P. applied to coal geology, with re. to seam correlation, thickness variations, washouts; C. Technical application of C.P., with re. to coal preparation, carbonization and hydrogenation.

5. HACQUEBARD, P.A. 1952. Petrographic analyses of polished sections of coal from Alberta and British Columbia; 8 p., 2 pl.

Polished sections of four coals from Lethbridge, Canmore, Fernie, and Coleman were examined to verify if the nomenclature and classification based on Carboniferous coals can be applied also to Cretaceous coals; 12 photomicrographs accompany the report.

6. HACQUEBARD, P.A. 1952. Petrographic analyses of coal samples from Alberta and British Columbia; 32 p., 4 pl.

Maceral analyses and textural descriptions are given of 16 samples obtained from the following coal areas: Coleman, Fernie, Canmore, Cadomin, and Coal Valley. The variations in composition are illustrated with 24 photomicrographs.

7. HACQUEBARD, P.A. 1952-53. Detailed logs of boreholes No. 1,2,3,4, and 5 drilled at Mabou Mines in 1952-53, totalling 3243 feet, 26 p. (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia, and Mr. W.N. Macdonald of Sydney, Nova Scotia).

Detailed lithological descriptions of cores from five diamond drill holes, based on personal observations.

8. HACQUEBARD, P.A. and BIRMINGHAM, T.F. 1953. The correlation of the Joe seam in the Canmore area, Alberta; 19 p., 2 encl., 2 pl.

Hacquebard reviewed the petrographic data, compiled the percentage diagrams and affected the correlation.

9. HACQUEBARD, P.A. and BIRMINGHAM, T.F. 1956. Petrographic analyses of column samples from Bellevue No. 1 and Greenhill No. 2 seam of the Crowsnest coal area of Alberta; 6 p., 3 encl., 3 pl.

A comparison between petrographic composition and physico-chemical data as provided by the Fuels Division of the Mines Branch.

Hacquebard coordinated the analytical work and wrote the report.

10. HACQUEBARD, P.A. and DONALDSON, J.R. 1956. Petrography of Mabou coals, Nova Scotia; 38 p., 16 encl.

Report gives analytical data regarding macerals, banded ingredients, ash and sulphur on 15 column samples representing

possibly 13 different coal seams. A brief structural and stratigraphic interpretation, based on petrographic and palynological seam correlations is included in this report.

11. HACQUEBARD, P.A. 1957. Report on boring for coal at Boularderie West, Cape Breton Island; 1 p., 1 encl. (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

A description of a coal prospect drilled at location referred to.

12. HACQUEBARD, P.A. and BARSS, M.S. 1958. Progress report on a spore study of the coal deposits in the Minto, Chipman and Beersville areas of New Brunswick; 20 p., 3 fig., 1 pl.

By means of fossil spores it is demonstrated that the Beersville, Salmon River, and Minto coal deposits belong to different zones of the Pictou Group. Therefore, they are not of the same age. With spore histograms coals of 15 separate locations have been identified as separate seams, or have been correlated. A total of 34 spore genera are present in these coals.

Hacquebard initiated the project, contributed to the spore counts and wrote the report.

13. HACQUEBARD, P.A. 1959. Detailed logs of 45 boreholes drilled at Springhill coalfield in 1959, totalling 14,636 ft; 105 p. (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

Lithological descriptions of cores from 45 diamond drill holes, based on personal observations.

14. HACQUEBARD, P.A. 1960. Different structural developments of spore coat in equatorial region in Paleozoic spores. Report submitted to 1960 Sheffield (England) meeting of the International Committee for Microflora of the Paleozoic; 6 p.

An outline of structural differentiations of cingulate, zonate and saccate miospores, valuable for taxonomic considerations.

15. HACQUEBARD, P.A. and BIRMINGHAM, T.F. 1960. Report for the Commonwealth Committee on fuel research on petrographic composition of the British and Australian coals, that were submitted for exchange program; 5 p., 4 tables.

Detailed maceral determinations of several coals circulated for a comparative analysis between different laboratories.

Both authors carried out the determinations, so that results within one laboratory could be compared.

16. HACQUEBARD, P.A. 1961. Report on the prospects of mining relatively low ash coals in the Springhill coalfield; 5 p. (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

The prospects of the Nos. 3, 1, 7 and 6 seams in six different parts of the coalfield (outside old workings) are discussed in relation to the geological maps referred to under item 18.

17. HACQUEBARD, P.A. and BIRMINGHAM, T.F. 1961. Report for the Commonwealth Committee on Fuel Research on Petrographic Composition of the Canadian, Indian, South African and New Zealand Coals, that were submitted for exchange program; 8 p., 7 tables.

Detailed maceral determinations of coals circulated for a comparative analysis between different laboratories.

Both authors carried out the determinations, so that results within one laboratory could be compared.

18. HACQUEBARD, P.A. and DONALDSON, J.R. 1961. Remarks on the prospects of finding minable coal in the northern part of the Springhill coalfield, with reference to six maps, showing old mine workings on the No. 3, 1, 2, 7, and 6 seams, and proposed borehole locations; 5 p., 6 maps, at scale of 400':1" (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

The locations and depths of six boreholes are indicated, which on the seams mentioned may outline a reserve of 3 million tons of coal to a cover of 1000 feet.

Hacquebard interpreted the structure contours, spotted the proposed drill holes and wrote the report.

19. HACQUEBARD, P.A. and DONALDSON, J.R. 1961. Atlas of geological maps of the Springhill coalfield, Nova Scotia; 14 maps at scales of 400':1" and 800':1".

The following maps are included: outcrop map of Springhill coalfield; contour plans, seam section plans and coal reserve plans of the No. 3, 1, 7, and 6 seams. These plans incorporate the data obtained with the 1959 drilling of 45 boreholes (see item 13).

20. HACQUEBARD, P.A. 1962. Microscopic coal research; course of four lectures prepared for Dalhousie University; typed report, 31 p.

The course consists of following topics: (1) Principles of C.P.; (2) Applications of C.P., with re. to coal geology and coal utilization; (3) Principles of Palynology; (4) Applications of Palynology, with re. to biostratigraphy and coal seam correlation.

21. HACQUEBARD, P.A. 1962. Microscopic coal research; single lecture prepared for 1962 Maritime lecture tour; typed report, 9 p.

A condensation of Item 20.

22. HACQUEBARD, P.A. 1962. Review of coal petrological investigations in Canada; lecture prepared for presentation in Soviet Union; typed report, 17 p.

Discusses activities in C.P. in both Eastern and Western Canada; text was translated into Russian and circulated at Geological Institute at Akademie Nauk in Moscow.

23. HACQUEBARD, P.A. 1962. Canadian contributions in Carboniferous palynology; lecture prepared for presentation in Soviet Union; typed report, 20 p.

Discusses results of spore investigations carried out in the Carboniferous of the Maritimes and at South Mahanni River in Northwest Territories (re. outside publication No. 10); text was translated into Russian and distributed at Geologic Institute in Moscow.

24. HACQUEBARD, P.A. 1963. Report on a visit to the Soviet Union, as part of an exchange of scientists between N.R.C. and the Soviet Academy of Sciences, October 2 to November 14, 1962; N.R.C.-Soviet Academy Exchange Agreement; report no. 17, 31 p.

Official report of visit to Geologic Institute of Akademie Nauk in Moscow and V.S.E.G.I. Laboratories in Leningrad, submitted to N.R.C. in Ottawa.

25. HACQUEBARD, P.A. 1965. Preliminary report on the structure and mining possibilities of the Syndicate Mine at Springhill, Nova Scotia; 4 p. with contour plan of No. 3 seam at scale of 1":100' (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

This report is based on personal geological observations in the underground workings of this mine, which is seriously affected by faulting.

26. HACQUEBARD, P.A. and BARSS, M.S. 1966. Views on remaining mining reserves in the Pictou coalfield, Nova Scotia; 7 p., 4 fig. (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

Views are expressed on the reserves of the Acadia and Scott seams underneath Stellarton area, on Third and Fourth seams of Westville, on Foord seam west of Forster Pit and in "Burnt Mines" area, on Hardscabble seam west of New Glasgow. Spore correlations and age assignments have played a part in assessing the remaining coal reserves of the Pictou field.

Hacquebard compiled the report and made the assessments; he was not involved in the spore correlation work.

27. HACQUEBARD, P.A. 1967. Report on three detailed sections of the Foord seam obtained from boreholes drilled in 1966-67 in Forester Pit area of the Pictou coalfield (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

The 40-foot thick seam sections are described in detail with reference to: coal, shaly coal, coaly shale and black shale.

This was done from cores, and of each interval (of comparable types of coal) the ash content has been determined also. A virgin area with Foord coal containing tons (with % ash content) has been delineated.

28. HACQUEBARD, P.A. 1970. Progress report on 1969 drilling for coal in Miller's Corner area of Springhill coalfield, Nova Scotia., with appendix of logs of boreholes 6, 7 and 8 (submitted to Nova Scotia Department of Mines, Halifax, Nova Scotia).

Report discusses the mining prospects (at shallow depths) of the No. 1 seam to the rise of old workings. The logs of eight core holes are included in the report, as well as a map showing the position of the old workings and borehole locations.

29. HACQUEBARD, P.A. 1970. The correlation of the main seam in the Tantalus Butte coal mine at Carmacks, Yukon Territory. Geological Survey of Canada, Topical Report 140, 19 p.

Petrographic profiles of three column samples, taken from areas separated by faulting in the Tantalus Butte Mine, show that they can be correlated and that only one seam is present. Typical of the Tantalus Butte main seam is the presence of 13 "tonstein" bands, which are of value for seam correlation. This is first time that "tonstein" bands have been reported from coals in Western Canada.

30. HACQUEBARD, P.A. 1972. Petrographic correlation of the Tantalus and Tantalus Butte coal seams at Carmacks, Yukon Territory. Geological Survey of Canada, Technical Report 115 I/1-3.

The correlation is done with petrographic percentage diagrams; "ton stein" horizons occur in both seams and support the correlation; an explanation of the difference in rank is given.

31. HACQUEBARD, P.A. 1972. Report on meeting of North American Coal Petrographers, held at Pennsylvania State University, June 5-6, 1972.

An attendance report with remarks on "Petrography of Western Canadian coking coals" and "Vitrinite reflectance and oil exploration".

32. HACQUEBARD, P.A. and DONALDSON, J.R. 1972. Petrography of eight coal seams from upper part of Gething Formation in Carbon Creek area, British Columbia. Geological Survey of Canada, Technical Report 93-0/15-1, 12 p.

The report evaluates the suitability of these coals for metallurgical coke on the basis of their rank and petrographic composition.

Hacquebard coordinated the analytical work and compiled the report.

33. HACQUEBARD, P.A. 1973. Report of visits to coal and petroleum research centres in France and attendance at meeting of I.C.C.P. in Paris during September 1973; 32-page report submitted to N.R.C. as part of requirement of award to visit France under Franco-Canadian exchange of scientists agreement.

Report gives much factual information on current procedures and programs in Coal Petrology, and in applied MOD studies (mat re organique disperses) carried out by two major French oil companies (Aquitaine and Elf).

It also includes summaries of most important results reported at MOD colloquium in Paris during presentation of 16 papers.

34. HACQUEBARD, P.A. and BIRMINGHAM, T.F. 1973. Petrography of the Val d'Or and Mynheer Seams, Coalspur Coal Area, Alberta. Geological Survey of Canada, Technical Report 83-F/2-1, 21 p.

Report evaluates the suitability of these coals for metallurgical coke on the basis of their rank and petrographic composition.

Hacquebard coordinated the analytical work and wrote the report.

35. HACQUEBARD, P.A. 1974. Report on trip to Stellarton, Nova Scotia., from September 16-20, 1974, with reference to project 740106 (Geological assistance with provincial coal drilling project in Nova Scotia); 11 p.

Reports on progress that has been made in the Pictou coalfield since the drilling commenced in July 1974 (re. Foord and

McGregor seams).

36. HACQUEBARD, P.A. 1974. Geological conditions affecting the minability of the Hub seam in the Sydney coalfield, Nova Scotia. Geological Survey of Canada, Technical Report 11-K/G-75-1, 11 p., 5 fig.

Report discusses the regional development of the Hub seam with the aid of stratigraphic correlations of individual seam benches and with lithofacies maps. An area with best seam development suitable for a new mine is indicated.

37. HACQUEBARD, P.A. 1975. 1975 Revision of coal resource calculations of the Maritime Provinces; 9 pages of tables, 30 sketch maps.

Tables showing coal resource calculations based on up-to-date information in all known areas of the Maritimes; the grand totals are as follows: measured resources - 277,297,000 short tons; indicated resources - 682,676,000 short tons; inferred resources - 610,125,000 short tons. The tables are accompanied by 30 sketch maps, showing the aerial extent of each seam used in the calculations.

38. HACQUEBARD, P.A. 1976. Distribution and amounts of thermal and metallurgical coal resources in the Sydney field of Nova Scotia. Geological Survey of Canada, Technical Report 11-K/G-76-1, 29 p., 6 fig., 1 table, 11 maps.

Report gives a brief outline of the geology and seam characteristics of the 11 minable coals present in the field. On the basis of rank and sulphur content a distinction is made between thermal and metallurgical coal. The amounts and distribution of these coals are given in a detailed table, which is accompanied by 11 small-scale maps. The total "demonstrated" resources of thermal coal is 558 m.t. and of metallurgical coal, it is 314 m.t.; to this may be added "inferred" resources of 253 m.t. for thermal coal and 287 m.t. for coal of "unknown quality". The grand total of all resources is 1413 m.t., which has been calculated to a distance of 5 miles from shore, or a cover of 4000 feet, whichever comes first.

39. HACQUEBARD, P.A. 1976. A geological appraisal of the Phalen seam in the Lingan and No. 26 reserve areas, Sydney coalfield, Nova Scotia. Geological Survey of Canada, Technical report 11-K/G-76-2, 9 p., 3 fig., 1 table.

With the aid of a three-dimensional diagram the geologic structure and development of the Phalen seam with regards to bone bands, stone partings, total height and sulphur content is illustrated in the worked areas adjacent to the reserve blocks.

Projections show that favourable conditions can be expected in the reserve areas, with (revised) "demonstrated" resource data of met. coal amounting to 142 m.t., with a seam thickness of 7 to 9 ft.

40. HACQUEBARD, P.A. 1976. The development of the Harbour seam in the Lingan and No. 26 reserve areas, Sydney coalfield, Nova Scotia. Geological Survey of Canada, Technical Report 11-K/G-76-5, 12 p., 4 fig. 1 table.

This is a companion report to the one of the Phalen seam. A three-dimensional diagram accompanies this report also. In the reserve areas, a minable seam of 5 to 7 ft in thickness can be expected. The revised "demonstrated" resources of met. coal amount to 104 m.t.

41. HACQUEBARD, P.A. 1976. Appraisal of coals intersected in Murphy off-shore well (North Sydney P-05) of Sydney coalfield, Nova Scotia. Geological Survey of Canada, Technical Report 11-K/G-76-3, 12 p., 4 fig., 1 table, 3 pl. with photomicrographs.

From electrologs and examinations of rotary cuttings the presence of 11 coal seams, 1 to 6 feet thick, is indicated. The best developed seams occur in the upper part of the coal-bearing section, and can be correlated with the three top seams of the Sydney coalfield. In addition, two younger seams, hitherto unknown in the Sydney succession, are present. Coal petrological evaluations have revealed that with few exceptions the seams are high in reactive components, that the rank remains in the HV bituminous category and that sulphur content is as variable as it is in the Sydney seams. The investigation indicates that very considerable reserves likely are present in the offshore portion of the Sydney coalfield. A calculation on only one 4 foot thick seam (the Point Aconiseam), in the 374 sq. mile triangle between the Murphy well and the coast, gives an in situ resource of 1.7 billion tons of coal. This figure is even larger than the resources of the entire Sydney field (on 11 seams and to 5 miles from shore) which have been calculated at 1.4 billion tons.

42. HACQUEBARD, P.A. and AVERY, M.P. 1976. A petrographic evaluation of selected samples of the Phalen seam, Sydney coalfield, Nova Scotia. Geological Survey of Canada, Technical Report 11-K/G-76-4, 11 p., 2 fig., 3 tables.

On the basis of a petrographic evaluation, it is predicted that met. coke produced from the Phalen seam will have somewhat better properties than the presently manufactured coke from the Harbour seam. As the largest reserves of met. coal are in the Phalen seam (142 m.t.) this is an economically most important result.

Hacquebard directed the study and wrote the report; Avery carried out the analytical work.

43. HACQUEBARD, P.A. and AVERY, M.P. 1976. On the petrography, rank and predicted coke stabilities of Acadia seam coal, Pictou coalfield, Nova Scotia. Geological Society of Canada, Technical Report 11-E/10-76-1, 25 p., 4 fig., 4 tables; accepted for publication in a volume on "Coal Resources of Pictou Field" by the Nova Scotia Department of Mines.

The 18 million tons of coal blocked out in the reserve area of the 10 foot thick Acadia seam, between depth of 2000 and 3500 feet, may be classed as an LV bituminous coal, when vitrinite reflectance is used as the rank parameter. As such this is a unique deposit, because no other coal of similar high rank is known in Eastern Canada. In addition the petrography shows that the Acadia coal may be suitable as a blend with HV coals of Sydney for the manufacturing of high grade metallurgical cokes. The study is based on detailed petrographic analyses of five columns of the Acadia seam and two columns of Sydney coals.

Hacquebard directed the investigation and wrote the report; Avery carried out the analytical work and organized the computer programs used to determine the blending characteristics.

44. HACQUEBARD, P.A. and AVERY, M.P. 1976. Four analytical reports written in 1976 on vitrinite reflectance measurements of coals intersected in the Bjarni, Gudrid, Snorri and Karl Sefni wells drilled on Labrador Shelf. Confidential reports EPGs-DOM.1, 22, 53, 54.

These reports give the change in vitrinite reflectance with depth and provide information on the level of oil and gas maturation.

45. HACQUEBARD, P.A. 1977. Development and mining prospects of the Mullins seam, Sydney coalfield, Nova Scotia. Geological Survey of Canada, Technical Report 11-K/G-77-1, 9 p., 4 fig., 1 table.

A detailed seam study, comparable to those carried out for Phalen and Harbour seams (items 39 and 40). The study recommends drilling in the New Waterford District, where a substantial reserve could be present within the land area. The Mullins seam is the only major seam that has not been mined previously in the Sydney coalfield.

46. HACQUEBARD, P.A. 1977. Selection of offshore drill sites in Sydney coal field based on geological and mining considerations. In: Report of Nova Scotia Department of Mines on: Nova Scotia Coal Inventory Offshore Cape Breton. Drilling Program Committee Proposal, March 1977, p. 19-25, 2 fig., 1 table.

Site selection was carried out in consultation with the Project Development Department of Devco's Coal Division. Correlation diagrams for seam identification and projected depths of major seam intersections were prepared for the 1977 drilling program.

47. HACQUEBARD, P.A. 1977. Six reports on condensed logs of (offshore) boreholes H-1A; H-3; H-6; H-7; H-8; H-8B, drilled in the Sydney coalfield during 1977. Confidential reports EPGs-LITH. 2-77 to 7-77.

These reports give position and thickness of coals intersected in the boreholes referred to.

48. HACQUEBARD, P.A. 1978. Detailed logs of 22 major coal seams intersected in eight offshore boreholes drilled in the Sydney and Mabou coalfields during 1978. On file at the Eastern Petroleum Geology Subdivision in Dartmouth, Nova Scotia.

These are records of the megascopic subdivisions of the coal cores, based on personal observations and measurements. The subdivisions were later utilized for the so-called proximate "ply" analyses by EMR's Coal Laboratory at Point Edwards, Nova Scotia, as well as by Montreal Engineering.

49. HACQUEBARD, P.A. 1978. Revision of coal resource estimates in Langan No. 26 and Donkin reserve areas of the Sydney coalfield, based on 1977 offshore drilling results. Geological Survey of Canada, Technical Report 11-K/G-78-1, 15 p., 5 fig., 5 tables.

Report includes resource maps for Phalen, Harbour, Hub and Lloyd Cove seams showing structure and seam

development. Discussions on stone partings and trends of hinge-lines are included. Remarkable is presence of three or possibly four well developed coals in Donkin area. Three of these had deteriorated in the previously known part of the coalfield. As a result of the drilling the resources in Lingan No. 26 increased by 22% to 302 m.t., and those at Donkin are estimated at 623 m.t. of "demonstrated" coal.

50. HACQUEBARD, P.A. 1978. Geological prognosis of nine offshore wells in Sydney coalfield, proposed for 1978 drilling season. Geological Survey of Canada, Technical Report 11-K/G-78-2, 14 p., 2 fig.

This is a companion report to item 46, and was written for the 1978 drilling program. Great care was taken to give accurate depth predictions of the major seam intersections, as only those would be cored with other footage being drilled by the rotary method.

51. HACQUEBARD, P.A. 1978. Nine reports on condensed logs of offshore boreholes H-2, H8C, H-8D, H-12A, H-12, M-1, M-2A, H-12B, H-8A drilled in the Sydney and Mabou coalfields during 1978. Confidential reports EPGS-LITH. 2-78 to 10-78.

These reports give position and thickness of coals intersected in the boreholes referred to.

52. HACQUEBARD, P.A. and AVERY, M.P. 1978. Four analytical reports on vitrinite reflectance measurements of coals intersected in the Sable Island, Cohasset, Demascota and Herjolf wells, drilled on Scotia and Labrador Shelves. Confidential reports EPGS-DOM.5, 6, 7, 8.

These reports give the change in vitrinite reflectance with depth and provide information on the level of oil and gas maturation.

53. HACQUEBARD, P.A. 1979. Detailed logs of ten major coal seams intersected in offshore boreholes P1-P6 drilled in 1979 in the Sydney coalfield; On file at Eastern Petroleum Geology Subdivision in Dartmouth, Nova Scotia - This represents the 1979 continuation of item 48.

54. HACQUEBARD, P.A. 1979. Six reports on condensed litho-logs of offshore boreholes P1-P6 drilled in 1979 in the Sydney coalfield. Confidential reports. EPGS-LITH. 1-79PAH to 6-79PAH.

This represents the 1979 continuation of item 51.

55. HACQUEBARD, P.A. and AVERY, M.P. 1979. Vitrinite reflectance measurements of coals and dispersed organic matter of Eastcan et al. Skolp E-07 well. Confidential report. EPGS-DOM.3-79PAH.

This report gives the change in vitrinite reflectance with depth and provides information on the level of oil and gas maturation.

56. HACQUEBARD, P.A. and FORGERON, S.V. 1979. Geological and coal quality aspects of manufacturing metallurgical coke at Sydney. Geological Survey of Canada, Technical Report 11-K/G-79-1, 13 p., 14 figs., 1 table.

This study was undertaken as part of a DREE program to evaluate the feasibility of producing metallurgical coke at Sydney for export market. Four aspects have been considered, namely: (1) variations in coal rank; (2) coke stability predictions based on petrography and reflectance; (3) sulphur distribution as deduced from results of 1978 and 1979 offshore drilling programs; (4) reserve calculations. The latter show a total of 234 million tons of recoverable metallurgical coal, in two areas (Lingan/No. 26 and Donkin) and in two seams (Harbour and Phalen).

Reserve calculations and corresponding maps were made by S.V. Forgeron of Devco; remainder of the port was done by Hacquebard.

57. HACQUEBARD, P.A. and AVERY, M.P. 1980. Three analytical reports on vitrinite reflectance measurements of coals intersected in the Hibernia P-15, Hibernia 0-35 and Egret K-36 wells. Confidential reports EPGS-DOM.6, 7, 8 - 80.

See item 55 for annotation.

58. HACQUEBARD, P.A. and AVERY, M.P. 1981. Two analytical reports on vitrinite reflectance measurements of coals intersected in the Venture D-23 and Ben Nevis I-45 wells. Confidential reports EPGS-DOM 6, 7-81.

See item 55 for annotation.

59. HACQUEBARD, P.A. 1982. Presentation of the Mining Society of Nova Scotia to the McCleave Commission on "Uranium Inquiry - Nova Scotia". - typed submission, 9 p.

The submission states that uranium exploration can be carried out safely and that the moratorium on uranium exploration imposed by the Provincial government has a detrimental effect on the mining industry in Nova Scotia.

The text of the submission was formulated by a special committee of the Mining Society. It was then edited and put together by Hacquebard, who also gave the oral presentation to the McCleave Commission.

60. HACQUEBARD, P.A. 1982. Coal, the original and enduring fuel of the industrial age. - typed copy of Presidential address at 95th Annual Meeting of the Mining Society of Nova Scotia, held at Keltic Lodge, June 1982; 14 p.

Gives a historical overview of the role coal has played in modern civilization, and accents the developments in Nova Scotia. Personal involvements with this are also mentioned.

61. HACQUEBARD, P.A. 1982. Composition origin and geology of coal. - "Syllabus" of course of 12 lectures given at Dalhousie University; 147 p. text and 110 p. with illustrations.

This extensive "syllabus" deals with the subject matter under the following main headings: (1) General characteristics; (2) Principles of coal petrology; (3) Environment of deposition; (4) Coalification; (5) Coal mine geology; (6) The coals of eastern Canada. These topics are described under 57 subheadings, all accompanied by instructive diagrams and photomicrographs.

Included also is a bibliography consisting of 146 references.

62. HACQUEBARD, P.A. and AVERY, M.P. 1982. Vitrinite reflectance measurements on samples taken from recent sediments in the MacKenzie Delta, Beaufort Sea - Confidential report EPGs-DOM.2-82MPA, 4 p.

Two different ranks of coal are present in the detrital particles, namely lignite and H.V.-"C" bituminous. Both can be traced to occurrences of similar rank coals in the MacKenzie Delta, signifying that transport over a distance of about 300 km has taken place. Hacquebard directed the study and Avery wrote the report and carried out the analytical work.

63. HACQUEBARD, P.A. 1983. Composition, rank and depth of burial of two Nova Scotia lignite deposits. Geological Survey of Canada, Technical Report 11-E/3 F/14-83-1, 11 p. (Also published in Geological Survey of Canada, Paper 84-1A-See Bibliography item 1(a)-7).

Analytical data (equilibrium moisture, B.T.U. and R o 's) on two corehole intersections of Cretaceous lignites are presented and have been described megascopically. Maximum depth of overburden of 762 m and 779 m have been deduced from these analytical data.

64. AVERY, M.P. and HACQUEBARD, P.A. 1984. Vitrinite reflectance measurements on coal bearing samples from selected exploration drill hole cores of the Yava Mine, Salmon River lead deposit, Cape Breton Island, Nova Scotia. Report No. EPGs-DOM.10-84MPA, 6 p.

Ten samples of coal fragments contained in sandstone were examined. Readings of 0.8 to 1.3% Ro were obtained, which may be correlated with paleotemp. of 110-150 C for the strata-bound lead-zinc mineralization of this deposit. However, some of the higher values may be due to "primary" oxidation and should be regarded with suspicion.

65. AVERY, M.P. and HACQUEBARD, P.A. 1984. Vitrinite reflectance and petrography of a coal core sample from the Padloping Trough, Baffin Island. Report No. EPGs-DOM.14-84MPA, 4 p.

The rank of this Lower Cretaceous (Albian) coal is H.V.-B bituminous with an Ro value of 0.67%. The coal consists of microbrecciated or mylonitized material, comprising of tri-maceral banded particles. It also shows microfolding and microfaulting indicating proximity to tectonic disturbance. The high/inertinite/content may point to a relatively cold climate at this location during Albian time.

66. AVERY, M.P. and HACQUEBARD, P.A. 1984. Vitrinite reflectance measurements on coal samples taken from the Sydney 82-1 drill hole. Report No. EPGs-DOM.18-84MPA.

Ro readings on ten coals collected over a distance of 890 m showed no appreciable increase with depth. This unusual result is probably related to the presence of sandstone throughout the sequence, which conveyed the same geothermal

heat to all coals, regardless of their vertical separation, because of uniform thermal conductivity.

67. AVERY, M.P. and HACQUEBARD, P.A. 1984. Coal petrographic analyses of samples collected for liquefaction tests by the Nova Scotia Research Foundation. Report No. EPGs-DOM.33-84MPA, 5 p. and DOM.11-85MPA.

Maceral and Ro determinations were carried out on eleven samples from the Lingan and Prince collieries of the Sydney coal field and the No. 6 seam of Illinois. Comparable petrographic results were obtained, indicating that the Sydney coals will give high yields similar to the Illinois coals, upon liquefaction.

68. AVERY, M.P. and HACQUEBARD, P.A. 1985. Vitrinite reflectance determinations on coals sampled in the Mabou area. Report No. EPGs-DOM.4-85MPA.

Study was undertaken to obtain time of faulting on West side of Cape Breton Island. A post-Permian, probably Early Triassic age of this faulting could be established.

69. AVERY, M.P. and HACQUEBARD, P.A. 1985. Round robin examination, organized by Can. Coal. Petr. Group on sample West Canadian coking coal. Report No. EPGs-DOM.5-85MPA.

70. AVERY, M.P. and HACQUEBARD, P.A. 1985. Coal petrographic analyses of two samples for liquefaction tests by the Nova Scotia Research Foundation and additional V-type data. Report No. EPGs-DOM.11-85.

Additional samples from Prince Mine and Lingan Colliery were examined and support the statement regarding liquefaction mentioned under item 66.

71. AVERY, M.P. and HACQUEBARD, P.A. 1985. General petrography including vitrinite reflectance of two small coal samples from ODP, Leg 105, 1985. Report No. EPGs-DOM.14-85MPA.

72. HACQUEBARD, P.A. and AVERY, M.P. 1988. Petrography and predicted coke stability of Harbour seam channel sample from Donkin Tunnel of Sydney coalfield, Nova Scotia, compared with 1979 offshore drilling results. Geological Survey of Canada, Open File 1965, p.1-16.

73. HACQUEBARD, P.A. and AVERY, M.P. 1989. On the development and petrography of the Phalen seam in the Lingan Colliery and adjacent areas of the Sydney coalfield, Nova Scotia. Geological Survey of Canada, Open File 2066, 15 p., 6 figs.

A bright-banded coal is present in the seven corehole sections examined. Coke stabilities range from 25-63 and increase with depth, as does the coal rank, which changes from H.V.-A. to M.V. bituminous at -600 m. Sulphur varies between 1.8 and 3.8% and is due mainly to high pyrite in roof and bench layers. The best developed area of the Phalen seam is in the Lingan-No.26 Reserve, where the seam is 2.1-2.4 m thick.

74. HACQUEBARD, P.A. and AVERY, M.P. 1990. On the development and petrography of the Lloyd Cove seam in the Sydney coalfield, Nova Scotia. Internal Report, submitted by "P.A. Hacquebard, Coal Geology Enterprises", 23 p., 8 figs., July 1990.

This seam is not uniformly developed over the width of the coalfield, but in the central part is split into two leaves. Where joined, the thickness varies from 2 m at Sydney Mines to 3.5 m at Donkin. The MINABLE coal reserves are confined almost entirely to the submarine areas, and amount to 75 million tonnes at Sydney Mines and 200 million tonnes at Donkin. Coal rank is H.V.-B and H.V.-A bituminous. It increases from 0.7 to 0.97% Ro.max. from west to east. The ash content averages 9% and sulphur runs between 4 and 5%. A bright-banded coal interbedded with eight thin dull bands is represented. Maceral and microlithotype examinations on six borehole samples have been carried out. Pyrite distribution curves show high concentrations in the roof coal, which is 0.7 to 1.1 m thick, and has as much as 10% total sulphur. Per seam total the sulphur varies between 2.8 and 5.5%. Coke stability factors calculated from maceral and Ro. determinations vary between 31 and 39 in the Donkin area. Blending with L.V. coal therefore will be necessary to obtain an acceptable coke strength of at least 50.

75. HACQUEBARD, P.A. and AVERY, M.P. 1992. The development and petrography of the Hub seam in the Sydney coalfield, Nova Scotia. Geological Survey of Canada, Open File ..., 22 p., 11 figs., 11 tbls.

The seam is 1.9-3.6 m thick and one of the most variable ones of the coalfield. This is illustrated with 36 measured sections, and outline three MINABLE reserves containing 496 million tonnes. Maceral, pyrite, Ro and coke stability determinations on 15 seam sections are presented.