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REPORT OF THE PROCEEDINGS
OF THE
INDUSTRIES ADVISORY BOARD

AND OF THE
SCIENTIFIC AND TECHNICAL
COMMITTEE

FOR THE PERIOD 1ST JANUARY TO 30TH SEPTEMBER, 1918,

AND OF THE
Advisory Board of Industry and
Science

FOR THE QUARTER ENDED 31ST DECEMBER, 1918.

*Presented to both Houses of Parliament by Command of His Excellency
the Governor-General.*

Price 1s.

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[U.G. 33-'19.]

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Department of Mines and Industries,
Cape Town,

The Hon. Minister
of Mines and Industries.

15th April, 1919.

I have the honour to forward herewith the report of the proceedings of the Industries Advisory Board and of the Scientific and Technical Committee for the period 1st January to 30th September, 1918, and the Advisory Board of Industry and Science (the outcome of the amalgamation of these bodies) for the final quarter of the year.

The report is divided into two parts. Part I. deals with the organisation of the Board's work, and certain general aspects of its activities. Part II. reports progress in greater detail regarding the various matters which have received the Board's consideration.

The years 1919 and 1920 are likely to have far reaching effects in the industrial development of South Africa and the work of the Advisory Board of Industry and Science thus assumes a far greater importance than might ordinarily be the case in a Report of this nature.

In the first place these years will probably witness the closing down of a considerable number of units of the great industry of the country, that of gold mining, on which the finances and prosperity of the whole Union have so largely depended, due to the exhaustion of the minerals caused by working out of the deposits in many of the older properties.

The rate of cessation of work is also unfortunately likely to be increased by the higher working costs caused by conditions due to the war, which will outlast the signature of Peace, and which have already reduced small profits in poorer mines to actual loss.

While conditions in the Far East Rand are likely in course of time to redress the balance, the equipment and preparatory operations required to bring many properties in that district to the producing stage must take some years.

It becomes of the first importance therefore to the country that other avenues of employment should be opened up in every direction possible, and that the utmost should be done to push on the development and broadening of the Union's industrial production.

In the second place the return of normal conditions after peace may be expected to remove that element of protection which the industries of the country have enjoyed during the years of war.

There is already evidence that the openings in South Africa in skilled trades, and industries generally, are totally insufficient for the numbers of the rising generation, and that unless our rate of industrial growth increases, a few years will see a wave of emigration from the shores of South Africa, of the best and most enterprising of our young white population. It is needless to enlarge on the importance of averting such a calamity faced as we are with vast future problems which, above all, demand a strong, united and highly trained white population. Looked at from this point of view the task in front of the Industries Division of the Department, and of the Advisory Board, assumes an aspect of great importance to the whole community.

Neither the Department, however, nor the Board, nor the Government can create Industry. They can only do their utmost to assist enterprise, encourage research, afford information to those who seek it, smooth the ways of commerce and trade, and create the conditions which will give confidence and stability. These are the lines upon which the Department with the advice and assistance of the Board has been endeavouring to work during the past year.

The "Journal of Industries" has, undoubtedly, done a great deal to draw public attention to the varied and extensive character of the resources of the Union, and to the possibilities of their development; and it forms one of the most important results of the advice tendered to Government by the Board. The other most outstanding features of the Board's work for the year are, undoubtedly, the creation of the Research Grant Board, and the preliminary enquiry being made into Tariff questions, both of which it may be confidently expected will have results beneficial to the Industries of the country.

I have the honour to be,

Sir,

Your obedient servant,

H. WARINGTON SMYTH,
Secretary for Mines and Industries.

UNION OF SOUTH AFRICA.

REPORT of the Proceedings of the Industries Advisory Board and of the Scientific and Technical Committee for the period 1st January to 30th September, 1918, and Report of the Advisory Board of Industry and Science for the quarter ended 31st December, 1918.

Presented to both Houses of Parliament by Command of His Excellency the Governor-General.

PART I.

During the period under review, the Industries Advisory Board held three full sessions—one of which was at Cape Town and the remaining two at Johannesburg. Two full meetings of the Scientific and Technical Committee were held—viz.: one at Cape Town and the other at Durban. Frequent meetings of the Executive Committees of both bodies have taken place at Johannesburg, as well as meetings of standing sub-committees or committees formed for the purpose of considering specific points. In order that it might be in a position to advise you on certain problems, the Industries Advisory Board has also taken evidence on several questions.

AMALGAMATION OF ADVISORY BODIES.

As the work developed, the need for closer co-operation between the Industries Advisory Board and the Scientific and Technical Committee became increasingly apparent and the proposal which you made early in the year to appoint three members of the Industries Advisory Board, viz., Mr. E. Chappell, C.B.E., Sir Thos. Cullinan and Prof. G. H. Stanley as Assessor Members of the Scientific and Technical Committee was welcomed by both bodies. This step enabled the Board to follow more closely the opinions and activities of the Committee and risk of overlapping was avoided.

Though certainly a move in the right direction, this arrangement necessarily involved much waste of time on the part of the three Assessor Members who were forced to discuss the same subjects at the Executive and General Meetings of each body. Moreover, it became clear that many of the subjects awaiting the Committee's attention involved questions of principle and policy so that it would be difficult to avoid a waste of effort unless the two bodies drew still closer together.

At its meeting held in July last, the Scientific and Technical Committee adopted the following resolution, proposed by its Chairman (Mr. Bernard Price):—

“That, in order to take full advantage of South Africa's exceptional opportunity for enhancing production and increasing the industrial development of the country, and in order to assist towards success in the post-war trade campaign, the Committee recommends that the Industries Advisory Board and itself should jointly consider the best means for ensuring that a co-ordinated co-operative scheme of organisation is established on a national basis which shall promote efficiency of manufacture and production throughout the Union and economy of distribution of South African products in home and oversea markets. The Committee is of opinion that a unique opportunity presents itself at the present time for revising and extending existing organisation, thus preparing a way for more rapid progress in the future. Before submitting any recommendation to the Government, however, it would propose that the Joint Committee of the Advisory Board and itself should study the nature of the problem and the various aspects involved and recommend the best method to adopt for undertaking the investigation.”

At the meeting of the Joint Committee called to consider this resolution, the Chairman of the Scientific and Technical Committee submitted a memorandum prepared by himself in which he suggested that in order to facilitate the future work of both bodies and especially the consideration of far-reaching questions such as that referred to in the above resolution, the two advisory bodies should amalgamate. After careful consideration, the Joint Committee unanimously decided to recommend that each body should approach its members with the suggestion that a joint session be held to discuss this question of amalgamation and as the replies were favourable, the two bodies met in joint session on the 24th and 25th September, 1918, at Johannesburg.

It gives the Board much pleasure to report that after a somewhat protracted sitting a unanimous decision was reached in favour of amalgamation on a basis which had been carefully framed during the meeting. Your approval to amalgamation on this basis [U.G. 33—19.]

was received on the 8th October, 1918, together with your decision that the amalgamated body would be styled "The Advisory Board of Industry and Science." Formal notification of this development appeared in Government Notice No. 1384 of the 9th October, 1918, *Gazette* No. 920 of the 11th October, 1918.

EXECUTIVE OFFICERS OF THE AMALGAMATED BOARD.

Mr. C. G. Smith, Chairman of the late Industries Advisory Board, was appointed Chairman of the Amalgamated Board at the joint session held in September last and, in like manner, Mr. Bernard Price, Chairman of the late Scientific and Technical Committee, and Mr. E. Chappell, C.B.E., Vice-Chairman of the late Industries Advisory Board, were appointed Deputy Chairmen of the new Board.

SECRETARIAT.

Mr. A. Canham, upon his appointment as Acting Trade Commissioner to the Union of South Africa in London, relinquished his duties as Secretary of the late Industries Advisory Board on the 6th August, 1918. The Board desires to express its appreciation of the valuable assistance rendered by this officer. From that date until the 25th September, 1918, when amalgamation took place, Mr. W. F. McMullen, of the Industries Section of the Mines and Industries Department, ably carried out the duties of Secretary to the late Industries Advisory Board. In response to a recommendation of the Joint Meeting held on the 8th October, 1918, Mr. A. C. Marsh, Secretary to the late Scientific and Technical Committee was appointed Secretary to the Amalgamated Board. He has met the increasing volume of work with unflinching energy and marked ability, and the Board desires to acknowledge its indebtedness to him for his valuable assistance.

SUBSIDIARY ORGANISATION.

Under the agreed basis of amalgamation, the Advisory Board of Industry and Science will meet at least once in every quarter, and the first meeting is arranged to take place at Cape Town in January next. For the purpose of carrying on the work of the Board in the most efficient manner, a General Purposes Committee, consisting of the Chairman, the two Deputy-Chairmen and six members (three of whom were elected by the late Industries Advisory Board, and three by the late Scientific and Technical Committee), has been formed, which meets as often as may be required.

The subsidiary organisations of the component bodies has been revised and simplified, the following standing committees only being retained:—

1. Agricultural.
2. Editorial.
3. Engineering.
4. Research Grant Board.
5. Tariff.

In addition to the above standing committees, the Fisheries Committee and the Scientific Journals Committee will continue in office until their work is complete, and further *ad hoc* Sub-Committees will be appointed from time to time as necessity may require. Full particulars of the titles and personnel of the Committees are attached to this report as Annexure I.

ASSESSOR AND CO-OPTED MEMBERS.

At the time of amalgamation, the Government decided that with a view to economising the time of Assessor Members, these officials in future should not be asked to attend the meetings of the Board unless matters falling within the purview of their Departments were to be discussed.

As a result of the decision, under reorganisation, to dissolve certain of the standing Committees of the late Scientific and Technical Committee, certain of the Assessor and Co-opted Members of that Committee ceased to act in a similar capacity on the Advisory Board of Industry and Science. To these members the Board desires to tender its thanks for the valuable advice and assistance which they have at all times willingly placed at its disposal.

A list of Assessor and Co-opted Members will be found in Annexure I of this report.

TECHNICAL ADVISER TO INDUSTRIES SECTION.

The Board regrets to report that the Technical Adviser to the Industries Section of the Department of Mines and Industries has not yet been appointed. This question received the earnest consideration of the late Scientific and Technical Committee at its January meeting at Cape Town, when it was felt that it would be impossible to do justice to overseas candidates unless they could be interviewed by representatives of the Union Government, who, by reason of their knowledge of the country and of the functions to be exercised by this officer, would be in a position to gauge first-hand the suitability of each applicant. It was, therefore, resolved to recommend the appointment of an Oversea Committee, and to submit to that Committee an equal number of selected applications from South Africa and from overseas with a request that the overseas applicants be interviewed, and a report be furnished as to their suitability for the post and their qualifications as compared with those of South African applicants. In making this recommendation it

was suggested that the Oversea Committee should be given power to interview and express an opinion on other suitable candidates not mentioned in the list submitted. These recommendations received the approval of the Industries Advisory Board, and were duly transmitted to the Government.

CO-OPERATION WITH OTHER COUNTRIES.

The late Industries Advisory Board and Scientific and Technical Committee have constantly called attention to the need for taking full advantage of existing knowledge in other countries and the Board, in endorsing this policy, would especially urge upon the Government the advantage to be derived from such a course. While it is realised that the Union Government has taken steps to obtain a free exchange of information and publications with the United Kingdom and other Dominions, it is felt that much more might be done in this direction in order to bring about the closest co-operation between South Africa and those countries. South Africa, being a relatively undeveloped country, would, by such action obtain the knowledge and experience of countries more highly developed than itself.

The Board would, therefore, urge that renewed efforts be made to obtain all the available information and data bearing on the measures taken to stimulate industrial expansion in other countries.

Before leaving this subject, the Board feels that its comments would be incomplete unless it referred to the strenuous efforts which are being made in Rhodesia by a similar organisation to itself, viz.: The Rhodesia Resources Committee. It has read with great interest the recent report of that body, and welcomes the arrangements now completed, by which Rhodesia contributes to the expenses of the Board, and Sir F. J. Newton, K.C.M.G., and Mr. J. G. McDonald, O.B.E., have been appointed the Rhodesian representatives on the Advisory Board of Industry and Science.

THE RELATIONSHIP OF GOVERNMENT TO INDUSTRIES.

One of the most important problems of the day is the exact relation of Government to industrial enterprise. The question of how far Government effort should extend towards fostering and promoting industrial activity has been largely in the minds of both political economists and industrialists.

In view of the success which followed Germany's pre-war efforts to capture the world's trade, which was only rendered possible by direct Government assistance of the most liberal and comprehensive kind, public opinion was at one time inclined to the belief that the future prosperity of a country depended to a great extent on Government participation and control in industrial enterprise. Owing to the marvellous achievements of the industries of Great Britain and America during the war, there is no doubt that public opinion has considerably changed. While the leading men who have studied such questions admit that Government can render substantial assistance in research work, by a system of bonuses or tariffs to such industries as may require it (more particularly key industries), and by regulating the means of communication both by sea and land, it is thought that the general initiation in industrial affairs should be left to private enterprise.

The Board concurs with this latter view, and considers that this is a policy suited to the conditions of the Union.

STATISTICS.

The work of the Board, and the two bodies from which it was derived, has been largely handicapped by the lack of statistics and data relative to the subjects it has had under consideration. The Board feels that a vast quantity of information exists in the country at the present time, which only requires collecting and collating to make it of inestimable value to persons who are at present concerned with themselves in industrial problems. The late Industries Advisory Board has repeatedly urged the importance of obtaining statistics of production, and it is pleasing to note that, since the promulgation of the Statistics Act, a creditable effort has been made by the Census Department to supply a long felt want.

The Board has seen with pleasure the initial production of the official Year Book and hopes that, as the machinery becomes perfected, the data contained therein will be so enlarged in its scope as to include the fullest possible statistics relative to raw materials, manufactures, labour, etc. Other countries have realised the enormous advantage to be derived from carefully prepared and tabulated statistics of their activities and resources, and it is felt that a special effort should be made to perfect similar information for South Africa.

"THE SOUTH AFRICAN JOURNAL OF INDUSTRIES."

"*The South African Journal of Industries*," the first issue of which appeared in September, 1917, has been regularly published since that date. As a medium for publishing the reports prepared at the instance of the Scientific and Technical Committee on the raw materials of this country and other subjects (see Annexure II.), it is thought that the journal has served a very useful purpose. It has also proved a means by which much useful information from other available sources could be distributed to those of the public who are interested in the development of resources and products. The Department of
[U.G. 33—'19.]

Mines and Industries is to be congratulated upon this creditable production and upon the increased circulation it now enjoys. In this connection the Board would specially mention the late Editor, Mr. A. Canham, to whose efforts the success and increasing popularity of the journal is in no small measure due.

On Mr. Canham's departure for London the duties of Editorship were placed in the competent hands of Mr. H. J. Choles, of the Department of Mines and Industries. The Editorial Committee of the Board devotes much valuable time to the selection of material for publication and continues to advise on all matters in connection with the production of the journal.

GENERAL.

In concluding the first portion of its report, the Board would briefly refer to some of the more important aspects of its work, particulars of which are more minutely described in Part II.

In authorising the Board to submit its recommendations on those items of the Customs Tariff which, in the interest of the country's industries, require amendment, the Government has taken a most important step. The work involved in carrying this out is of considerable magnitude, but the Board has already made arrangements to obtain the views of industrialists and other sections of the community interested therein, and it hopes to be in a position to report on this matter in approximately nine months' time.

A considerable amount of time has been devoted to the question of fertilizers and every effort has been made to investigate possible sources of supply, in order to replace the continued reduction in oversea shipments. The Scientific and Technical Committee caused certain experiments to be made with the raw phosphate rock from Saldanha Bay, particulars of which will be found in a later portion of this report. It was not considered necessary to bring these experiments to a final conclusion, as, in the meantime, private enterprise had taken the matter up and the Board understands there is every prospect of considerable quantities of phosphatic fertilizer being available early in the new year.

The Board is pleased to report that the Government has responded to its advice and has appointed a Research Grant Board to make recommendations, through the Advisory Board, on all matters pertaining to research. A certain number of Government Research Scholarships and Grants-in-aid of Research will be made and it is thought that the Government's action in this direction will aid industrial development.

A number of other important matters have been considered, amongst which might be mentioned the stimulation of cotton production and the erection of a cotton oil-expressing plant, the carrying out of a fisheries survey, increased food production, flaying and branding of cattle, trade development with other countries, etc., etc.

PART II.

The following is a brief resumé of the progress made with regard to the various specific questions already taken in hand during the year under review by the Industries Advisory Board and the Scientific and Technical Committee, and, later, by the amalgamated Board.

CUSTOMS TARIFF INVESTIGATION.

The Industries Advisory Board has devoted a considerable amount of time to matters referred to it both by the Government and manufacturers which involved alterations in the Customs Tariff. In the main, it has merely dealt with certain anomalies, realising that the question of the tariff revision as a whole, under circumstances of the world war, depended on conditions which at that time it was most difficult to foresee.

A number of applications had been received from industrialists relative to existing anomalies, but, while the Board considered that the evidence adduced undoubtedly proved a need for revision, it was thought that, in the majority of cases, it would be impossible to deal satisfactorily with such anomalies until it was in a position to consider the general question of tariff revision by collecting and tabulating a vast amount of data bearing on the different problems known to exist.

It is a matter for regret that the Government was unable to accept all the suggested minor alterations to the Customs Tariff, which the Industries Advisory Board, after careful consideration, had submitted towards the close of 1917. Certain of its recommendations were, however, agreed to and were embodied in a Bill passed by Parliament in the early portion of the year under review.

Owing to the fact that existing conditions had prevented the Government from placing an adequate staff at its disposal, the Industries Advisory Board was unable to deal seriously with the general question of tariff revision, but, after the amalgamation of the Scientific and Technical Committee and itself in September last, the amalgamated Board was supplied with its own secretary and staff. Taking into consideration, however, the large number of other questions which fell within the purview of the amalgamated Board, together with the knowledge that it was essential to deal thoroughly and scientifically with any proposed revision of the tariff, the Board considered that it would be impossible for it to investigate and report on the latter question unless it was provided with an adequate

staff which could devote the whole of its time to dissecting and tabulating the vast quantity of matter, the collection of which is essential before the Board can be in a position to make any concerted recommendation. In view of this feeling, it was arranged that the Tariff Committee should meet the Minister of Finance, and the interview took place on the 11th October last. The Minister was not prepared to give a definite answer to the Committee's request pending a discussion with his colleagues as to the Government's policy on the general question of tariff revision.

On the 26th November a communication was received from the Secretary for Mines and Industries, which laid down the Government's policy on a Tariff Revision, and the extent to which it was desired the Board should investigate the question. In accordance with this mandate, the Board has now been requested to formulate its views in regard to items which, in the interest of Industry, are thought to call for Tariff amendment or protective measures. The Government further considers that, in the main, the Board will be able to obtain the views of industrialists and agriculturists by correspondence with the organised public bodies in the Union.

The Board hopes, at the forthcoming General Meeting in January next, to discuss its plan of campaign, bearing in mind the various important issues to be considered, which so largely depend on the course of action decided upon by the Imperial and Dominion Governments. The question is of so large and far-reaching a character that the Board deprecates any hasty action which, it considers, would not be in the true interests of industrialists of this country.

In order, however, that the Board may be in the position to set the necessary machinery in action, it has arranged for the Department of Mines and Industries to circularise, on its behalf, the principal organised bodies in the country, with a view to obtaining a concise statement setting out any proposed alterations in the Tariff, and the reasons therefor, together with information on the following points for each and every proposed amendment:—

- (a) The difference in cost of production, in percentages, in South Africa, to that of competing countries under normal conditions.
- (b) The difference, if any, in the efficiency of labour.
- (c) The difference in overhead charges.
- (d) The amount of protection given before the war, *i.e.*, total importing charges, including duty set out in detail with railage where necessary.
- (e) The amount of protection existing under present circumstances.
- (f) The amount of protection asked for.
- (g) Any other factors having a material bearing on production in South Africa.

The Board trusts that it may obtain the co-operation and assistance of the organised bodies on such an important question, thereby enabling it to adjudicate on and recommend a course of action which may be in the interest of the people of South Africa.

CLASSIFICATION OF CUSTOMS STATISTICS.

Shortly before the commencement of the year under review, the Scientific and Technical Committee submitted a revised classification of the headings under which the Customs Statistics were compiled. Further meetings of a sub-committee have been held, when an attempt was made, in consultation with the Commissioner of Customs, to arrive at a decision acceptable both to the Commissioner and to the Committee. The Commissioner pointed out that, by adopting the suggested revision, it would entail 310 new items, of which only a comparatively small number were listed in the United Kingdom, Australia and Canada, and, further, would necessitate an extensive addition to the staff, apart from the fact that the order of the headings would have to be completely re-learned, which would cause a dislocation of the work of the Department.

The opinion of the Commissioner received the careful consideration of the Board at its October meeting, and it was thought that, while the fact that other countries had not adopted certain headings was insufficient justification for leaving them out, in view of the further argument of the Commissioner as to the possibility of concerted action by the Dominions being taken after the war, relative to Customs statistics and classification of items in the Tariff, it might not be desirable to proceed further with the matter at the present time.

In accordance with this view, it was decided to accept the addition of a certain number of headings of a more urgent nature.

FINANCIAL ASSISTANCE TOWARDS DEVELOPMENT.

In view of the desirability of stimulating the development of the resources of the country, the Industries Advisory Board, at its June meeting, had under consideration the question of assisting development by means of bounties or other financial measures. It was thought advisable, in the first place, to obtain particulars of the methods adopted in this direction by more highly developed countries. Information is, therefore, being sought on pre-war conditions as affecting the development of resources, and the means

taken by those countries to assist both by bounties or other action. The Board feels that it would be unwise to arrive at a hasty decision in a matter of such vital importance, and it is, therefore, not prepared to make any recommendations until it has had an opportunity of studying the measures taken in this direction by countries which have reached a more thoroughly organised position.

The Board has also considered the terms of a resolution passed by the South African Federated Chamber of Industries, at its convention held at Johannesburg in June, relative to providing capital for industrial enterprises. The Chamber recommended the Government to approach the Union Banking institutions for the purpose of discussing the possibility of establishing an Industrial Investment Board or, alternatively, the establishment of a National Industrial Bank.

The Board, at the request of the Government, has given considerable thought to the proposal and, while it thoroughly endorses the Chamber's resolution, is of the opinion that care should be taken, in deciding the details, to provide a scheme which will be in the best interest of industrialists. It is understood that there is every prospect of further financial facilities for industrial purposes being available in the near future.

SUPPLY OF FERTILIZERS.

A large amount of time has been devoted during the year, both by the Industries Advisory Board and the Scientific and Technical Committee, in endeavouring to alleviate the position due to the shortage of phosphate fertilizer. It will be noticed, on reference to the Annual Statements of Trade and Shipping, prepared by the Department of Customs and Excise, that South Africa, prior to the war, imported large quantities of various kinds of fertilizer and, in fact, almost entirely depended on outside sources for its requirements in this direction. Owing to the ever increasing demand for shipping for the purpose of transporting the armies of Great Britain and her Allies, and the consequent heavy calls in a similar direction for maintaining supplies, the imports of fertilizers into this country have diminished to an enormous extent. The following figures illustrate the decrease in tonnage during the past four years:—1914, 59,651; 1915, 52,330; 1916, 30,407; 1917, 9,077.

Continuous inquiries have been made in various directions with the object of ascertaining the possibilities which existed for replacing imports by locally manufactured fertilizers. A brief account of the action taken may be given:—

(a) *Treatment of Abattoir and Fishery Waste.*—The Scientific and Technical Committee made strenuous efforts to ensure against wastage of available refuse from abattoirs and fisheries, and, as a result of inquiries, ascertained that the problem was more a matter of obtaining the necessary digester plants than any unwillingness on the part of municipalities and canning companies to utilise their waste products. The Engineering Section of the Committee was informed that there was no insuperable difficulty to manufacturing digester plants locally, and that two or three engineering firms in Johannesburg were prepared to compete if tenders were called for. Steps have been taken by the Department of Mines and Industries to acquaint interested parties of the position now arrived at, but the Board regrets that, as yet, very little has been done to utilise such waste and thereby obtain an appreciable supply of phosphatic fertilizer.

(b) *Production of Basic Slag.*—In the early part of the year, the Industries Advisory Board had under consideration an application for financial assistance for the purpose of carrying out experiments relative to the production of basic slag. The Board referred the matter to the Scientific and Technical Committee, in order to obtain an expression of opinion as to the technical aspects. The Committee was not in favour of the application, as it presumed that the Company concerned would not confine its operations to the production of pig iron, the success of the industry to a large measure depending upon the manufacture of steel, and, in consequence, basic slag would become available as a by-product concurrently with its production. When this stage was reached, it would be an easy matter to ascertain whether it would be an economical proposition to increase the percentage of phosphorus in the pig iron, and consequently in the basic slag by the introduction of Saldanha Bay rock into the blast furnace. The Board acted on the advice of the Committee, and did not recommend the application. It is understood that experiments of the nature of those indicated above, are now being carried out by private enterprise.

(c) *Saldanha Bay Phosphates.*—Having in mind the urgent need of phosphatic fertilizer and the fact that the owners of the Saldanha Bay deposit were not proceeding actively with the commercial treatment of this rock, it was decided by the Scientific and Technical Committee to carry out laboratory tests, employing the well-known "Wolter" process, which involved heating a mixture of the finely crushed rock with bisulphate of soda, carbonate of lime, and powdered coke. These tests were made in the Consolidated Gold Fields' Laboratory, Germiston; the Government Laboratory, Johannesburg; and the Pretoria Cement Factory; and the services of one of the chemists employed by the B.S.A. Explosives Co. were also obtained to assist in this work. The investigations proved that, under laboratory conditions, the "Wolter" process when applied to the Saldanha Bay rock gave satisfactory results, over 80 per cent. of the P_2O_5 being rendered citric acid soluble. Numerous small-scale tests were also made to determine the effect of

variations in the proportion of ingredients, the fineness of grinding, and the period temperature of heating.

Having reached this stage, the Minister's permission was sought to carry out working scale trials of the "Wolter" process by arrangement with an existing factory possessing a suitable furnace.

This proposal met with the Minister's approval, and, after considering the relative advantages of utilising a blast furnace or a reverberatory furnace as a rotary kiln, it was decided to adopt the latter of these types. It was found that the Rand Lime Co., whose factory is situate close to the Slurry Works of the Pretoria Portland Cement Co., was prepared to carry out the trials in its existing rotary kiln, and that, if the trials were satisfactory, it would be possible in quick time and at a relatively small capital cost to instal stationary lime kilns, thus releasing the rotary kiln for the regular commercial production of treated phosphatic rock.

A delay unfortunately occurred in securing the necessary rock and sodium bisulphate required for these working trials and, in consequence, the first trial was only made in July. It will also be appreciated that the grinding and preparation of the mixture had to be fitted in with the commercial operations of the company, and that delays were frequently unavoidable. The result of the trial was not entirely satisfactory owing to loss of material by dusting and probable volatilisation of phosphorus: an analysis of the 23 tons of manufactured product showed from 78 to 94 per cent. of citric soluble P_2O_5 of the total P_2O_5 present, depending upon the lower or higher temperature attained in the rotary kiln.

The Industries Advisory Board approved of the action taken by the Scientific and Technical Committee, and, in view of the desirability of making the finished product available to farmers at a reasonable rate, should the experiments prove satisfactory, it resolved at its general meeting, held on the 10th June, 1918:—

"That the Board requests the Secretary for Mines and Industries to bring to the notice of the Minister the fact that the necessary safeguards must be taken in connection with the experiments now being made in regard to this rock, so as to prevent the possibility of a monopoly being created in this necessary article."

Towards the end of June, the assets of the Saldanha Company were taken over by a new company, and, in consequence, a deputation (representing the Industries Advisory Board and the Scientific and Technical Committee) interviewed the Minister of Mines and Industries, when it was decided to discontinue the investigations which the Committee had in hand. This course was followed, as it was felt that the objective which the Government had in view, namely the commercial treatment of the rock for use as a fertilizer, was in sight, and that the Company could be relied on to take strenuous measures to provide for an adequate supply of fertilizer from this source. The Board understands that a satisfactory process has been evolved, and that the Company will be in a position to supply the finished product in the new year. The termination of the war will bring active competition into play and, therefore, nothing in the nature of a monopoly need be feared.

In view of the fact that many farmers were desirous of using the finely ground raw phosphate-rock from Saldanha, and that it had been suggested to defer the promulgation of the Fertilizer Act (No. 21 of 1918) to enable such a course to be followed, the Scientific and Technical Committee prepared a memorandum at its July meeting in which it was suggested that the Government, in the event of it deferring promulgation, should be extremely careful not to convey to the farming community that it advocated the use of the particular rock or guaranteed any benefits to crops from its use. The Industries Advisory Board subsequently approved of the Committee's views, and the promulgation of the Act has been deferred until the 1st January, 1919.

(d) *Supplies from other sources.*—Considerable inquiries have been directed, other than those previously mentioned in this report, with a view of alleviating the position, and more particularly to provide for the coming wheat crop.

It came to the notice of the Scientific and Technical Committee that a considerable quantity of guano was available and ready for export at the Seychelles Islands, and the Department of Mines and Industries was asked to take the matter up. Negotiations proceeded in this direction, and the Department had even gone so far as to arrange for a vessel to be put at its disposal, when difficulties arose through the Governor of the Islands ascertaining that the matter was in the hands of certain parties in London. It is understood that strong representations were made by the Government to the Secretary of State for the Colonies.

It subsequently transpired that definite offers of over 10,000 tons of phosphatic fertilizer at St. Pierre and other Islands were received, and the information was transferred to the different firms who were interested in obtaining supplies from such a source.

At the suggestion of the Scientific and Technical Committee, the Government has made inquiries into the possibility of obtaining further supplies of guano from the coast line north of Cape Cross, but the latest report goes to show that no appreciable quantity is in sight.

Both the Industries Advisory Board and the Scientific and Technical Committee have consistently urged the necessity of the Government reviewing the position, and it was suggested that the Government should collect all the available data, and, with the facts in front of it, decide as to whether more supplies could be obtained by Governmental action. The Board is informed, however, that the attitude of the Government, apart from the purchase of the Cape Cross guano, is to leave such questions as the supply of fertilizers to the action of private enterprise. While the Board, as a general rule, approves of such policy, it feels that, owing to the pressing need and the inadequate supplies for immediate requirements, the position is such as to warrant Government action.

INCREASED FOOD PRODUCTION.

One of the most serious matters engaging the attention of the Industries Advisory Board and the Scientific and Technical Committee during the year under review was the necessity for stimulating production of food supplies.

The Industries Advisory Board considered this matter towards the end of 1917, and recommended certain action whereby a larger proportion of flour and meal could be obtained in the milling of wheat, also the addition of maize meal to flour for bread-making. The Wheat Conservation Act, No. 17 of 1918, commonly known as "The Burton Bread Act," came into force during this year. The Industries Advisory Board also dealt very fully with the question of food supplies, by means of a memorandum transmitted to the Government on the 10th May, 1918, in which such matters as fertilizers, analyses of soils, wheat breeding, railway rates, etc., were referred to.

Early in the year, the Scientific and Technical Committee, acting on the advice of its Agricultural Section, decided to urge upon the Government the necessity of taking immediate steps to stimulate the production of wheat in this country. With this object in view, a deputation interviewed the Minister of Agriculture, together with the Secretary for Agriculture, and urged the initiation of a comprehensive investigation of the factors at present militating against greater production, and the steps which, in the Committee's opinion, should be taken to increase the output for the 1919 crop. The deputation further suggested that the investigation should be followed by an active campaign, organised and carried through in the manner best calculated to induce the farmer to adopt the measures advocated. The Minister of Agriculture sympathetically received the suggestion, and decided to appoint a Departmental Wheat Growing Committee, with the Under Secretary for Agriculture (Education), Mr. Alex. Holm, as Chairman. It was further arranged that Mr. Holm should organise the carrying out of the investigation and report direct to his Minister.

The Board desires to express its appreciation of the large amount of work performed by the Wheat Growing Committee, and trusts that its efforts may be the means of stimulating the production of wheat in this country.

In addition to the foregoing, evidence was given by Mr. Bernard Price, on behalf of the Scientific and Technical Committee, before the Select Committee of Parliament on Food Supplies.

FARMER'S HANDBOOK.

In considering the best means of stimulating the production of foodstuffs and raw materials for manufacturers, the Agricultural Section of the Scientific and Technical Committee has for some time realised the need for the publication of a Farmer's Handbook on lines somewhat similar to that published by the New South Wales Government in 1911 and re-published in 1916.

On the 13th May, 1918, a recommendation was made to the Government that the Department of Agriculture be asked to prepare and issue a Farmer's Handbook at the earliest possible date, and it was further suggested that, if the Department was too understaffed to allow one or more men to be seconded for the purpose, it should employ a suitable person or persons from outside the service, or, preferably, utilise the services of a competent ex-official of the Department. In making the recommendation, it was pointed out that the book should not consist merely of reprints from Agricultural Journals, Bulletins or Departmental Reports, but should contain short and concise summaries, written in clear and simple non-technical language, in order that it might be readily understood by the farmer.

As a result of a consultation with the Secretary for Agriculture, the Committee was informed that the Department would prefer to carry out the work itself, and it was thought that this might be done in conjunction with the proposed re-publication of the "Agricultural Journal," the Editor of the journal to edit and compile the handbook at the same time. The Committee was subsequently informed that provision would be made on the Government Estimates 1919-20 for the purpose mentioned.

In view of this decision, the Committee advocated that immediate steps be taken by the various divisional officers to collect information in order that the handbook might be published early in the new financial year, but it was informed that, owing to the Department of Agriculture being already understaffed and overworked, it was impossible to take the preliminary measures suggested.

While the Board appreciates the fact that the Department is prepared to undertake the publication of a handbook, it cannot refrain from expressing a regret that so important a work, from the point of view of the farmer, should be allowed to stand over owing to the lack of the necessary staff to carry it out.

COTTON OIL INDUSTRY.

In the last annual report of the Industries Advisory Board, mention was made of the fact that the Board was carrying out investigations in regard to an application from the Rustenburg Farmers' Co-operative Union for financial assistance in the matter of a cotton-seed oil-expressing plant which it was desired to erect at Rustenburg.

This important question engaged the attention of both the Advisory Board and the Agricultural Section of the Scientific and Technical Committee during the year under review.

After careful investigation, the following resolution was submitted to Government in September last by the Industries Advisory Board:—

"That, after due consideration of the subject, this Board desires to recommend that the financial assistance asked for in respect of the erection and equipment of an oil-expressing mill, at Rustenburg, be granted by the Government to a combination of cotton growers, membership in which shall be given to the growers of cotton throughout the Transvaal Province, and this for the purpose of aiding the development of an important industry. The Board is further of opinion that some proportion of the funds required for the purpose should be raised by the members of the said combination of cotton growers, or that satisfactory security for the re-payment of the loan should be furnished."

The Board passed a further resolution emphasising the desirability of carrying these recommendations into effect. This resolution was also transmitted to Government, together with a report, setting out the reasons which influenced the Board in arriving at its conclusions.

It is understood that the financial aspect of the proposal is at present being considered by Government, and that a definite decision will probably be arrived at within the next few months.

The Board realised that before it could deal with an application of this nature, it would be necessary to ascertain at first-hand the stage of development reached by the cotton industry in the Union.

Arrangements were, therefore, made for a small committee of the Board to visit Rustenburg, the chief seat of the industry, early in December, 1917. A special meeting was also held in Johannesburg, when evidence was given on certain points by Mr. Scherffius, the Chief of the Division of Tobacco and Cotton, and his principal assistant, Mr. Taylor.

At a meeting held at Rustenburg in December, 1917, the following proposals were submitted to the Committee by the Rustenburg Farmers' Co-operative Union:—

1. "The Government shall erect a cotton oil press at Rustenburg, to be controlled by the Rustenburg Farmers' Co-operative Union on the pound per pound principle, on the understanding that the existing factory shall be included therein": or that

2. "The Government shall erect a cotton oil press at Rustenburg, to be controlled by the Rustenburg Farmers' Co-operative Union, and shall lease the oil factory to the said Union at a nominal rent, in the same way as the Fermenting Factory of the Magaliesburg Tobacco Planters' Co-operative Union at Rustenburg."

As a result of the above meetings and the investigations of the Agricultural Section of the Scientific and Technical Committee, the following details of the industry were ascertained:—On the establishment of Union, the Government, recognising the importance of cotton cultivation, arranged for the Chief of the Tobacco Division to take over the cotton work of the Union. Experiments in cotton cultivation had previously been carried on at Tzaneen, and these were continued: in addition, experiments were started at Rustenburg, Barberton, etc. From very small beginnings the industry has grown in interest and importance, as indicated by the following figures submitted by the Chief of the Tobacco and Cotton Division (Mr. Scherffius):—

Acreage under cultivation—Season 1917-'18.

Rustenburg District	5,000 acres.
Waterberg District	2,000 ..
Zoutpansberg District	100 ..
Natal	250 ..

In addition to the above, cotton has been grown on a small scale in various other parts of the Union.

[U.G. 33—'19.]

The annual yield since 1910 has been as follows:—

Yield of	1910-11	1911-12	1912-13	1913-14	1914-15	1915-16	1916-17
Seed Cotton, lbs. ...	41,000	60,000	figures not	450,000	523,403	444,666	700,000
Lint, lbs. ...	13,623	18,000	available.	138,000	157,034	133,400	233,000

The Union's crop for 1918 was estimated to be 220,000 lbs. of lint. A much better result was anticipated earlier in the year, but reports received later showed that the crop had been damaged very seriously in the Rustenburg District, firstly, by the cotton boll-worm, and secondly, by frost. This result falls far short of the estimate of the year's production as given to the Board by the Co-operative Union, viz., 5,000,000 lbs. of seed cotton, producing, roughly, one and a half million lbs. weight of lint. It is only fair to say, however, that, given favourable conditions, a crop of 3,000,000 lbs. might not unreasonably have been expected. There are undoubted indications that cotton cultivation in the Union will continue to increase. The consensus of opinion amongst those who know something of the subject is that, on the whole, the conditions in the Union for cotton growing are favourable. In some respects, the Board is informed, they are more suitable than most countries. The question of rainfall at the proper planting season is a drawback, but, on the other hand, South Africa has a more favourable season for harvesting.

As regards the quality of South African cotton, there can be no doubt that the bulk of the cotton produced is of fair marketable quality. Much of the cotton sent to England in normal times realised at least $1\frac{1}{2}$ d. to $1\frac{1}{2}$ d. per lb. higher than the average market rate for cotton of the same type grown in America. This is principally due to the fact that South African cotton growers produce a cleaner article than the American.

The difficulty confronting growers at the present time is their inability to realise the maximum value of their product. At present, the seed is being crushed in its entirety and sold as cotton-seed meal. This is, admittedly, a wasteful process, and only adopted for want of a better outlet.

As the crop bids fair to increase rapidly, the Board is generally agreed as to the desirability of treating the seed on more modern lines, for example, by the expression of the oil and the utilisation of the residue as cattle food, both products being much in demand in the Union. The importation of cotton-seed oil is approximately 400,000 gallons per annum, of a pre-war value of £50,000, whilst the cake is an invaluable feeding material for stock generally.

ADULTERATION OF LEATHER.

In the last Annual Report of the Industries Advisory Board, the steps taken in regard to this important subject were recounted at some length. As a result of the recommendations made by the Board, a Draft Bill was prepared, but, owing to stress of parliamentary business, it was not found possible to include it in the legislative programme for 1918. Several new aspects of the question had arisen in the meantime and, in consequence, copies of the Draft Bill were circulated to members of the Board early in July for their consideration.

As a result of inquiries instituted amongst representatives of the tanning industry in different parts of the Union, it was felt that the Draft Bill, as it then stood, did not quite meet the position desired by Government, and, in consequence, the Board at its General Meeting in September discussed a number of suggested additions and amendments.

The suggested amendments proposed the inclusion of leather as "Adulterated Leather" when mineral or combination tanned and found to contain sodium sulphate or glauber salts. It was pointed out to the Board that glauber salts are manufactured in the Union and, it was alleged, are used by some local tanners as an adulterant.

Roan, Morocco, and Fancy Leathers had been exempted from the provisions of the Act, but it was pointed out that their special exemption was unnecessary, since they are not sold by weight and, in consequence, are never adulterated. Conversely, Valve Hide, which is always sold by weight should, it was pointed out, be brought under the provisions of the Act, since its exemption would provide a loophole for the importation of sole and harness leather under the guise of "Valve Hide Leather."

The Draft Bill empowered authorised officials to enter any premises where it was suspected that South African adulterated leather is manufactured or stocked for sale, but no authority was given to enter premises where it was suspected that imported adulterated leather was held for sale. The Board suggested certain amendments which would overcome this latter weakness, and, as regards examination, generally, pointed out that unless control was applied at the Ports, or at the local source of manufacture, there was a danger of a serious miscarriage of justice, since dealers or merchants holding stocks of imported or locally manufactured leather might unwittingly purchase adulterated material and would, under the Draft Bill, be held liable. The control should, in the opinion of the Board, be such as to prevent the importation of adulterated leather at the port of entry and, as regards locally manufactured material, supervision should be applied at the seat of manufacture.

It was recommended that sample cuttings of different varieties of leather should be kept at the ports for the guidance and assistance of Customs officials in carrying out their duties, and it was suggested that leather invoiced by weight should always be under suspicion. In this connection the Board pointed out that it would not be difficult to compile a list of leathers usually sold by weight or by measurement, and thus relieve the Customs authorities of considerable trouble. The authorities would have to guard against possible circumvention of the Act in the attempted importation of adulterated leather usually invoiced by weight. Such leather could be invoiced by quantity to average a certain weight per piece or per dozen, and, under the proposed regulations, there would be an incentive to do so.

Several further amendments were suggested by the Board, including one pointing out the necessity for making provision for fine or for confiscation in cases of breach of the Act. A statement embodying these recommendations was submitted to Government for inclusion in the new Draft Bill, which, it is understood, will be dealt with by Parliament early in 1919.

FLAYING AND BRANDING OF CATTLE.

The Board notes with appreciation that effect has been given to its recommendations under this head, by publishing in the April, 1918, issue of the *Journal of Industries* a summary of correspondence on this subject, received from leading tanners in the Union. It is hoped that the publication of the summary will be of service in bringing home to owners the importance of this matter, and the resulting value to them of the adoption of a uniform system of branding which would damage the hides as little as possible.

The result of the experiments at the Potchefstroom and Glen Schools of Agriculture, foreshadowed in the last annual report, goes to show that branding on the cheek would appear to be the most satisfactory method. This brand remains quite clear, whilst branding on the fore and hind flanks tends to become indistinct; it can only be done properly, however, if a crushpen is used or if the animal is thrown.

It would appear, however, that the method at present in vogue in this and other countries, namely, fire branding on the hip, is regarded as the most satisfactory one from the owner's point of view. Consolidated legislation enforcing a system of branding which will damage the hide as little as possible will, no doubt, be necessary before owners can be induced to discard the existing method.

The Department of Agriculture has directed inquiries to America, the Argentine, Australia, and New Zealand, for information regarding the systems and methods in force in those countries, and the acquisition of this information may, possibly, disclose a practice which would commend itself to both owners and farmers in the Union.

Meanwhile, the matter is being kept prominently before the Board, which is awaiting the receipt of information referred to above before taking any further action.

As regards the flaying of hides, the Board acknowledges with thanks the receipt of an interesting statement on this subject from the Director of the Imperial Institute in London. In the opinion of the Institute, the question of improved flaying is mainly one of inducing the men who flay the carcases to use care, in order to avoid cutting the skins, and it is thought that improvement in this direction could, probably, be secured by suitable organisation throughout the country.

Such an organisation, known as "The Hides, Leather and Allied Trades Improvement Society," is at present at work in the United Kingdom, and its operations have resulted in a marked improvement in the preparation of hides in that country.

Unfortunately there is no graded market for hides in South Africa. The hide merchant pays the same price for a well-flayed as for a badly-flayed hide.

The matter is still engaging the attention of the Board, which is awaiting receipt of additional data on the whole question before taking any further action.

RESEARCH IN UNIVERSITIES AND MUSEUMS.

The Scientific and Technical Committee has had under consideration for some time past the means to be adopted to encourage scientific research in the several Universities and Museums of South Africa. A sub-committee was appointed shortly after the inception of the Committee, and its reports, prepared as the result of extensive inquiries, was published *in extenso* as Annexure VIII. to the first Annual Report of the Committee. Briefly, it may be stated that the Committee was of opinion that the higher educational institutions in the Union were not sufficiently utilised for purposes of scientific research and, in consequence, the country was being deprived of the direct benefits which it might reasonably expect to obtain from such work.

The question was fully discussed at the Committee's general meeting in January, and the following resolution was passed and submitted to the Government:—

"That the Secretary be instructed to inform the Department of Mines and Industries that the Committee desires to again urge the Government to take the earliest possible steps to carry out the Committee's recommendations as set forth [U.G. 33—'19.]

in the report forwarded on the 11th December last, and that, while it is hoped the Research Board will be established forthwith, it is not thought that any considerable expenditure will be incurred during the ensuing financial year, but that a definite programme of researches could be formulated for the period following thereon."

This resolution, together with the Committee's report, was forwarded by the Government to the newly formed Senates of the different Universities and, as a result of the replies received, the Committee was asked to submit a scheme under which effect might be given to the various recommendations.

The Committee accordingly suggested the appointment of a Research Grant Board which, for the present, and as far as general organisation was concerned, should take the form of a sub-committee of the Scientific and Technical Committee. By adopting this arrangement, it was thought that the Board would be able to take advantage of the organisation of the Scientific and Technical Committee, and ensure a close co-operation between both bodies. It further suggested that the duty of the Board would be to advise the Minister, through the Scientific and Technical Committee, on all matters pertaining to the encouragement of research in the higher Government educational institutions, including museums, and on any other matter referred to it by the Committee. In addition, it was pointed out that among the first matters to be considered by the Board would be the proper *modus operandi* for carrying out the recommendations contained in the previously mentioned report of the Scientific and Technical Committee and the sum of money it was advisable to set apart in the next year's estimates for carrying out those recommendations, which were forwarded to the Government early in September.

The recommendations of the Committee and the personnel of the Board (see Annexure 1.) were formally approved by the Government on the 14th October, but, owing to the amalgamation in the interim of the Industries Advisory Board and the Scientific and Technical Committee, the Research Grant Board was formed as a sub-committee of the present Advisory Board of Industry and Science.

A meeting of the Research Grant Board, under the chairmanship of Prof. R. B. Young, was held towards the end of November, mainly for the purpose of considering what amount it should recommend the Government to place on the Estimates for the ensuing financial year in order to provide for a certain number of Research Scholarships and for grants towards the expenses incurred in the course of research.

The procedure to be followed by the Research Grant Board has been formally approved by the Advisory Board of Industry and Science; and, further, at the wish of the former body, the Board has recommended that the Research Grant Board should not be restricted to the encouragement of research in Universities and Museums, but that its terms of reference should be so enlarged as to enable it to deal with any questions which may arise affecting research in other than educational institutions.

At the general meeting of the Scientific and Technical Committee in July, a resolution was passed to the effect that its sub-committee on Research in Universities and Museums should consider and recommend steps which might be taken for stimulating scientific research in the Universities, pending the adoption of the recommendations before the Government; also to inquire into and report on further means for encouraging the training of researches in Pure and Applied Science, more particularly in connection with South African Industries. As these questions so closely concern the Research Grant Board, they have been referred to that body by this Board for consideration and report.

FISHERIES SURVEY.

The Scientific and Technical Committee has consistently urged the importance of making a thorough survey of the coastal waters, and every effort has been made to obtain the co-operation of the Provincial Administrations of Natal and the Cape Provinces, under whose jurisdiction it would fall, in order that this source of food supply might be fully developed.

A sub-committee, under the chairmanship of Dr. L. Peringuey, made extensive inquiries and careful studies of Admiralty charts, and, as a result of its labours, presented a most instructive report on the area and depth of the sea-bamboo and the possible effect that its removal would have on the haunts of the crayfish. Shortly after the presentation of the report, Dr. Peringuey, who was appointed as a member of the Scientific and Technical Committee, by virtue of his office as President of the Royal Society, vacated his position owing to his term of office expiring, but his services have been retained as a co-opted member.

The sub-committee continued its labours under the chairmanship of Dr. J. D. F. Gilchrist, and lately recommended that the membership should be strengthened by the appointment of two representatives from each of the two Provinces affected. This recommendation was approved by the Advisory Board and acted upon by the Government, and the enlarged Committee has been considering the procedure by which a survey could be started. The immediate problem before it at the present time is to obtain a vessel which would be suitable for the work, and a great difficulty is being experienced in this regard owing to the shortage of shipping of the class required.

The Board trusts that every effort will be made by the Government, to whom the matter has been referred, to arrange with the Admiralty for a suitable vessel to be set aside for the purpose; and that, when this is done, the necessary funds will be made available in order that such an important question may not be any longer deferred.

GEOLOGICAL AND MINERAL SURVEY.

A reference to the first annual report of the Scientific and Technical Committee for the year ended 31st December, 1917, will disclose the fact that the Committee had recommended that steps should be taken to accelerate the Geological Survey and to institute a Mineral Survey of the Union. While noting with satisfaction that an additional geologist has been engaged to devote his time to the latter work, the Board regrets that its further recommendations have not yet been acted upon.

MARKETING OF MINERAL PRODUCTS.

At the January meeting of the Scientific and Technical Committee, it was thought that, in addition to a survey of mineral resources, a branch should be formed for the purpose of assisting the exploitation of minerals, or what might be called "the economic development side of the question."

The Government Mining Engineer, who was present at the meeting in his capacity of Assessor, pointed out that he had already suggested to the Government the appointment of a competent officer for this work, and that his duties would be those proposed by the Imperial Mineral Resources Bureau of Great Britain.

The recommendation was adopted, and subsequently approved by the Industries Advisory Board. The Board is pleased to state that the resolution has been acted upon, and that an officer of the Department has been busily engaged upon this work for some months back.

WATER POWER SURVEY.

The importance of such a question, and the bearing it has on the industrial development of the country has not been lost sight of.

The Board is awaiting a report by Mr. F. E. Kanthack, Director of Irrigation, which, it understands, will be completed in the near future. This report will deal with conservation and utilisation of water power, and will, it is hoped, enable the Board to consider and make recommendations relative to a more detailed survey.

BOTANICAL SURVEY.

The Scientific and Technical Committee has continually urged that a botanical survey of the Union be undertaken and, as a preliminary measure, recommended that a conference of the leading botanists of the country should be held. In coming to this decision, it was felt that the problems to be considered were of so wide and divergent a nature as to necessitate not only the organised efforts of such Government Departments as might be concerned, but the concerted action of all other botanists in the country.

On the 26th April a communication was received from the Secretary for Agriculture, stating that a meeting of Departmental Botanists and other officers interested had been held to discuss the question of a botanical survey, at which recommendations had been made as to its aim and scope, together with the best means for carrying it out, and providing for co-ordination and co-operation between the Government Departments and voluntary workers. It had further recommended that an Advisory Committee of five be formed, one of which should be a representative of the Scientific and Technical Committee, also that a conference should be arranged between the chief Government officers and the Botanical Committee of the Scientific and Technical Committee for the purpose of obtaining the advice and co-operation of the latter body, thus enabling the proposed Advisory Committee to consider the question of calling a convocation of South African botanists. In a subsequent communication, dated the 3rd May, 1918, received from the Chief of the Division of Botany, no mention was made of a meeting between the Government Officers and the Scientific and Technical Committee.

In replying to these two communications, the Scientific and Technical Committee agreed to the proposal of holding a conference between its Botanical Sub-Committee and the chief Government officers concerned, but, at the same time, made it perfectly clear that it was not prepared, at that stage, to enter into the question of the survey itself, as it considered that its original proposal to call a conference of South African botanists to discuss the best means for organising and carrying out such a survey should be adhered to.

The whole question was thoroughly discussed at the General Meeting of the Scientific and Technical Committee held in July, and it was decided in view of the Government's decision to carry out the survey without, in the first place, calling a conference of botanists, that the Committee did not desire to be officially represented on the Advisory Committee of the Survey. As it was understood, however, that a seat on the Advisory Committee had been left vacant, it was resolved to recommend the Government to appoint Professor C. E. Moss thereon.

A further communication was received from the Secretary for Agriculture, in which he conveyed the view that as the Scientific and Technical Committee did not desire to be directly represented on the Advisory Committee, the Department considered that the selection of a representative to fill the vacancy should now be left to the discretion of the officer entrusted with the conduct of the Survey.

INDUSTRIAL AND COMMERCIAL MUSEUMS.

The important part played by Industrial, Commercial and Technological Museums in stimulating industries and commerce is now generally recognised, and the Scientific and Technical Committee considered that the industrial development of the Union had reached the stage at which the establishment of a Museum of this character in the country was highly desirable. A sub-committee was appointed to investigate this matter, and its subsequent report stated that the chief objects of such a museum were:—

- (a) The stimulation of public interest and the dissemination of information regarding the industries of South Africa, both actual and potential.
- (b) The assistance of the producer more directly by providing him with easy access to information regarding the raw products and methods of manufacture of other countries, markets, current prices, etc., and, at the same time, by advertising his goods.

It also recommended that:

- (1) An exhibition of South African Industries and Products be held in Johannesburg in 1919, the permanent exhibits of which to be thereafter the property of the proposed Museum.
- (2) That the Government call together a Committee to consider and report to the Government on the ways and means of carrying out the recommendations.

The report was adopted by the Scientific and Technical Committee, and forwarded to the Government, but a reply was received to the effect that, while the importance of the recommendations under normal conditions was fully appreciated, the Government was only prepared, at that juncture, to authorise expenditure for strictly essential and urgent work. The decision of the Government subsequently received the approval of the Industries Advisory Board, as it was thought that, in view of present conditions and the necessity for curtailing expenditure, the matter should be allowed to stand over until the conclusion of hostilities.

The recommendations contained in paragraph (1) are partially covered by a suggestion which recently appeared in editions of *Ons Land* and *De Volksstem*, where the holding of annual industrial fairs was advocated.

The Board has had this matter under consideration, and, while it thoroughly recognises the advantages to be gained by such fairs, it considers that they could be best arranged in conjunction with the principal Agricultural Shows, and has recommended that the question be taken up jointly with the various Agricultural Unions and the South African Federated Chamber of Industries.

RESEARCH IN THE GOVERNMENT MECHANICAL LABORATORY.

The attention of the Scientific and Technical Committee was drawn to the necessity of providing research facilities at the Mines Department Laboratory at Johannesburg, used almost entirely for commercial testing work, the testing of winding-ropes, and the investigation of safety appliances. In consequence of the recommendations of its Engineering Committee, the Committee at its July meeting passed the following resolution:—

“ That this Committee recommends that a sum of £2,500 be voted to defray the cost of a 500-ton Compression Tester, also the outlay in repairing the foundations of the existing 200-ton machine; and further, to provide housing accommodation for such new compression machine.”

Shortly after the amalgamation of the Industries Advisory Board and the Scientific and Technical Committee, a request was received from the Government for the Board to consider whether, in view of the necessity for curtailing expenditure, the money could be more advantageously applied in other ways. At the request of the Board, the Engineering Committee again considered the question in the light of the Government's remarks, and submitted an extensive memorandum setting forth the reasons which prompted it in adhering to its original recommendations. The chief reasons which actuated the Committee in its decision may be briefly described as

- (a) The necessity for providing means for investigating the properties of engineering and building materials, as has been done in other countries, where completely equipped national laboratories have been in vogue for many years.
- (b) That the existing 200-ton machine was specially designed for the purpose of carrying out tensile tests, and was not adapted even within its range, for testing stone and bricks in compression, or beams and columns in bending.

- (c) That the machine which the Committee had in view was especially intended for stone and concrete, cubes, bricks, heavy mining timbers, girders and columns in built-up steel and reinforced concrete, for which there was no provision at present for testing in South Africa.
- (d) That the present machine was likely to be damaged if utilised extensively for the testing of bricks, etc.
- (e) That the Committee considered the time had arrived for an extension of the scope of the laboratory with a view to its carrying out research work of a national investigatory nature.
- (f) That it was thought that the new machine would create a demand for the more extensive testing of materials, and that the fees obtained would practically defray its cost and upkeep.

The Board endorsed the opinion of its Engineering Committee and recommended to the Government the necessity for providing the additions to the Laboratory.

STANDARDISATION OF ELECTRICAL EQUIPMENT.

At the request of the Mines and Industries Department, the Board was asked for an expression of opinion on the necessity, or otherwise, for controlling importations into South Africa of inferior electrical machinery, bearing in mind that it had been found necessary in Canada to provide legislation for such purposes. The Board, acting on the advice of its Engineering Committee, considered that the necessity for protection in this country was not so great as in Canada, as the latter country had also to consider the problem from the point of view of its manufacturers. It was decided, however, to ask the Engineering Committee further to consider the safety aspects of the matter, and make recommendations as to whether legislation on these lines was desirable.

The safety question is now under consideration and the Board trusts it will be in the position to report more fully on the matter early in January next.

PRODUCTION AND UTILISATION OF POWER.

The Board was asked to give its opinion on a suggestion received from Sir William Hoy that expert opinion should be invited in reference to the production and utilisation of electric power for industrial purposes. The view was expressed by the Government that, though there may be at present no demand or scope for separate power plants, if large plants were erected at various centres for the electrification of railways, they might serve as valuable centres for the generation of power for disposal to industrial concerns.

In giving its opinion on the suggestion, the Board considered that the first essential, from the technical standpoint, was to ensure a co-ordinated policy for power production in the Union. The design of the plants to secure maximum efficiency and reliability of supply might be left to the experts employed by the undertakings concerned, but it was important that, in choosing the type of system to be adopted, such undertakings should conform to a general scheme for the country as a whole. While it was realised that distances in this country were relatively great and that, consequently, the ultimate inter-connection of individual sources of power was less likely to prove economical than in smaller and more densely populated countries, inter-communication should, nevertheless, prove possible and desirable within certain areas, and, with this in view, and in order to secure the other advantages which always result from standardisation, every effort should be made to obtain, as far as possible, a standard type of system and uniformity of frequency and pressures.

The Board was also of opinion that, as far as it was economically possible to do so, the generation of power should be concentrated at points where the cost of fuel and other operating expenses, together with the capital charges, will be a minimum. It is hardly necessary to point out that it is by combining the supplies to consumers of diverse character and by concentrating production in large generating stations equipped with machines of large capacity (and, therefore, of relatively low capital and operating costs) that power can be most cheaply produced. In a widespread country, such as South Africa, the cost of transmission to a number of consuming districts from a single source of supply may often outweigh the saving in generating cost as compared with separate generating plants for each consuming district, but, nevertheless, it is desirable to standardise the type of system adopted in such districts, so that connection to a common system of supply may be facilitated if and when such a course becomes an economical proposition.

The Board understands that this important question of standardisation of system for power supply is already being considered by the South African Engineering Standards Committee, and suggested that the Government should request that body to furnish particulars of the recommendations it ultimately makes.

As regards the suggestion of inviting expert opinion, the Board considered that, in so far as the technical aspects of the question were concerned, experts and authorities already in the country, who were intimately acquainted with local conditions, were in the best position to furnish the Government with any advice which might be required.

The Board also pointed out that legislation already exists in the Transvaal for the control and regulation of electric power supply undertakings including the prices to be charged for power, and when necessary such legislation would, doubtless, be extended on suitable lines to other Provinces.

TIMBER RESOURCES.

The importance of this question was not lost sight of by either the Industries Advisory Board or the Scientific and Technical Committee. The former body devoted a great deal of time to the consideration of the various problems and the means by which a systematic investigation could be carried out. The Board considered that a careful survey of the position was necessary owing to the threatened scarcity of the world's timber supply and, more particularly, to the heavy cost of imported timber for building and other purposes. The Board was also of the opinion that, in the first place, an endeavour should be made to meet a large portion of the local demand, and secondly, to increase the forest and plantation areas with a view to supplying future requirements.

The necessity for concerted action in this regard is at once apparent, and the Board considers that a thorough and careful survey of the timber resources of the country should be carried out under the supervision of the Chief Conservator of Forests, in order that such questions as the value of timbers, their suitability for industrial purposes, seasoning, etc., etc., may be ascertained and made available to the public. Attention was called to this important matter in the recent report of the Industries Advisory Board, and, while it is realised that a survey of this nature would involve considerable financial outlay, it is thought that the benefits to be derived in the future would thoroughly justify any expenditure.

The Board has also dealt with, and made recommendations on, such questions as railway rates on South African Shooks, suitability of South African timbers for the manufacture of hogsheads, and the marketing of timber from Government Forests.

At the request of the Mines and Industries Department, the Industries Advisory Board considered the question of seasoning of local timber and the desirability of establishing a Government Seasoning Depôt for experimental purposes. It thoroughly endorsed a suggestion, put forward by the Chief Conservator of Forests, to appoint a qualified person who could devote his time to this particular aspect of forestry.

The necessity for research, in connection with the seasoning of timber, was also drawn attention to by the Scientific and Technical Committee, which considered it was of the greatest importance that steps should be taken to collect existing data in regard to the properties of the different kinds of South African timbers, and urged that a whole-time officer should be appointed for this purpose. The Board understands that an appointment has not yet been made owing to the difficulty in obtaining a suitable official. It trusts that this question will not be lost sight of, and that investigations will be started at the earliest possible date.

IMPORTATION OF SECOND-HAND BOOTS.

It will be remembered, in connection with this matter, that the Board, during the year 1917, made recommendations to Government on two occasions, emphasising the undesirability of permitting this traffic to continue. The Government was not, however, prepared to move in the matter at that time.

A further development occurred during the year under review. The Government was approached by the Imperial authorities with a proposal that worn and discarded military boots be despatched to the Union for sale to large employers of Native labour who could, in turn, dispose of them to their employees.

The proposal was referred to the Board which, after going thoroughly into the matter, recommended that it should not be entertained. The Board felt very strongly on the whole question of the importation of second-hand boots into the Union, and took the opportunity of again impressing on Government the desirability of prohibiting such importation. The Government decided to accept the recommendation of the Board and to stop the importation of second-hand boots from Great Britain generally.

In the absence of legislation prohibiting importation it was decided to request the Controller of Shipping not to allocate space for this class of traffic in future.

The whole question will, however, require to be reviewed when control of shipping ceases.

INDUSTRIAL ALCOHOL.

The use of alcohol for industrial purposes was carefully considered by the Industries Advisory Board towards the end of last year. The use of cheap industrial alcohol in other countries has undoubtedly led to a great expansion in trade, and it was realised that, provided duty-free alcohol were obtainable in the Union for manufacturing purposes, a similar expansion might be reasonably expected in this country.

In consequence of extensive enquiries in this direction, the Board, on the 29th November, 1917, recommended the Government to adopt the following alterations to the Customs Tariff:—

- (1) That, with the exception of spirits used in preparation of medicinal articles, perfumery and the like, industrial alcohol, suitably denatured, may be used for manufacturing purposes, duty free.
- (2) That spirits used in the manufacture of such preparations, *i.e.*, for medicinal purposes, perfumery, etc., should pay a duty of 2s. per proof gallon, the final product to be unpotable as a beverage.
- (3) That spirits required by scientific and teaching institutions for teaching and research purposes, may be obtained free of duty in the pure and un-denatured state, under proper safeguards and restrictions.

The Board is pleased to note that its recommendations have now been agreed to, and are embodied in the Customs and Excise Duties Act, 1918.

The denaturing formula, used in the manufacture of motor fuel from alcohol, adopted by the Government in 1917, on the recommendation of the Scientific and Technical Committee, has remained in force. In view, however, of the difficulty experienced in obtaining wood naphtha and the urgent necessity for supplying a substitute for petrol, the Committee was asked to consider an application from the manufacturers of "Natalite," to dispense with the requisite quantity of wood naphtha in the manufacture of 30,000 gallons. The Committee decided to recommend a departure from the authorised formula, in so far as an additional 30,000 gallons were concerned, provided 2 per cent. of wood naphtha was replaced by $\frac{1}{2}$ per cent. of pyridine bases, making 1 per cent. of pyridine bases.

In arriving at this decision the Committee desired to make it clear that its recommendation was only made as a temporary expedient and that, not only did it adhere generally to its original opinion, but it was in entire accord with the Commissioner of Customs who stated that wood naphtha was the most important denaturing agent in use, and further that it possessed an enormous advantage over other substances, as it was only possible, with great trouble and expense, to obtain a clean drinkable spirit from it.

The Committee also considered, at the request of the Mines and Industries Department, the use of acetylene and acrolein as a denaturant in alcohol used for motor fuel. The opinion was expressed that they were not suitable as a substitute for wood naphtha.

EXCISE DUTY ON ETHER.

An application was addressed to the Board early in the year, relative to the alleged anomaly in regard to excise duty on ether for manufacturing purposes. It was pointed out that the cost, in England, of ether of a specific gravity of .72 was 15s. 6d. per gallon, including excise. The cost landed at works in South Africa amounted to 21s. 6d. per gallon. Supplies of local manufacture were obtainable at about 4s. per gallon, but on this locally manufactured article 12s. 6d. excise duty had to be paid per proof gallon, on the quantity used in the manufacture of ether, for any purpose except motor fuel. This meant that, as 5 gallons of 96 per cent. alcohol are used to make four gallons of .72 ether, the excise alone per gallon of ether amounted to over 25s. The duty of 12s. 6d. per proof gallon on a gallon of 96 per cent. alcohol amounts to rather over 20s., owing to this being 65 per cent. over proof. It was therefore evident that, although spirit could be produced locally at a reasonable figure, it was cheaper for a manufacturer to import from England.

It was further pointed out that no consideration had been given to the use of ether for any other purposes than as motor fuel, and since ether was largely used in other industries it was suggested that regulations be framed to provide for the refund of excise on suitably denatured ether produced in the country and used for manufacturing purposes.

The matter was referred to the Alcohol Sub-Committee of the Industries Advisory Board for consideration, and the view was expressed that this case was parallel to that of acetic acid manufacture, and was, therefore, covered by recommendations made by the Board in November, 1917. These recommendations were fully set out in the last report of the Board. In order that full representation might be given to the case of ether the following report, proposed by the Alcohol Sub-Committee, was submitted to the Government early in the year:—

"The Sub-Committee on Industrial Alcohol, having considered this matter, is of the opinion that, so far as excise duty is concerned, the manufacture of ether from alcohol is entirely parallel to that of acetic acid manufacture, and that, therefore, where the ether is to be used for manufacturing purposes, apart from medicinal preparations, alcohol used for this purpose should be duty-free.

It is therefore recommended that in the previously suggested amendments to section 6 (2) of Act No. 37 of 1913, an addition to this effect shall be made in paragraph 2 (b) after "acetic acid manufacture" so that it shall read:—

- 2 (b) In the case of spirits, methylated or denatured for industrial purposes, or used for manufacture of ether for industrial purposes or used for acetic acid manufacture, a rebate of the whole duty."

The Board notes with interest that while the whole of the excise on ether used for manufacturing purposes has not been rebated it has been decided to rebate the duty down to 2s. per gallon.

COAL DISTILLATION.

At the request of the Industries Advisory Board the Scientific and Technical Committee inquired into the possibilities of obtaining supplies of motor spirit, from the distillation of coal, with a view to making good the shortage of petrol.

It was thought that the yield of motor spirit, even from suitable coal, would not be sufficient to warrant the erection of a plant solely for that purpose, as a market for the coke produced would be essential in order to give such a scheme a chance of success. Further, owing to the limited quantity of motor spirit obtainable from one ton of coal (approximately $2\frac{1}{2}$ to 4 gallons by usual methods), it was necessary to extract the other by-products, such as tar and ammonium sulphate. In addition, the Committee pointed out that there was no evidence before it as to whether South African coal would be capable of yielding payable quantities of the motor spirit required.

The Committee was impressed with the importance and far reaching effect of the problem, and the bearing it had on South African industries, and, therefore, recommended that the Government should endeavour to ascertain whether experimental work in connection with the distillation of South African coal could be carried out in the recently erected Testing Station of the Fuel Research Committee in Great Britain.

The Committee's report was considered by the Industries Advisory Board at its September meeting, and it was decided, in view of the fact that the question of coal by-products was engaging the attention of experts in Great Britain, to await the result of anticipated developments.

POSSIBILITIES OF TRADE DEVELOPMENT WITH MADAGASCAR.

The Board has had under consideration the possibility of retaining and developing the increasing trade with the Union's near neighbour, Madagascar.

Owing to the prevailing abnormal conditions, merchants in Madagascar, who formerly drew the bulk of their supplies of foodstuffs, etc., from France, were compelled to look to the Union to supply their requirements. The result has been the rapid development of an important trade connection with Madagascar, and it is felt that an effort should be made to establish this connection on a permanent foundation against the return of normal conditions.

The Board has taken action, through the Department of Mines and Industries, to obtain detailed and reliable data regarding the conditions governing commercial intercourse between the two countries, with particular reference to the operations of the Madagascar Customs Tariff. Statistics of imports and exports are also being collected, as well as a statement showing the classes of produce most in demand in the island.

Upon receipt of this information the Board proposes to investigate the subject thoroughly with a view to determining what course of action would be most suitable in the circumstances.

Arrangements are being made to supply the British Consul on the island with copies of Union trade publications and other information for the free use of merchants.

FABRIC LEGISLATION.

As noted in the last annual report, the Board discussed the provisions of a draft Factory Bill submitted to it for consideration, and suggested a number of amendments. The Board notes with pleasure that this measure has now been placed on the Statute Book under the title of "The Factories Act, 1918."

The Act deals mainly with the registration of factories, the regulation of hours of employment, the prevention of sweating and the provision of holiday periods for workers. Sanitary conditions of employment and the protection of employees engaged in dangerous occupations are also provided for.

REPORTS FOR PUBLICATION.

As pointed out in the first report of the Scientific and Technical Committee, an attempt was made to obtain a clear view of the present position, in regard to the resources, products, and industrial development of the country, by inviting certain authorities to prepare reports on carefully selected subjects. Many of these reports have now been received and, in order that they may be brought to the notice of the public, are pub-

lished in the *Journal of Industries*, which is a monthly publication, under the aegis of the Mines and Industries Department. A list of the subjects to be dealt with is published as Annexure II. to this report. It will be noticed that a large number of reports had not yet been received, and, as it is thought that the information to be obtained will be of the utmost importance, every effort is being made to expedite their completion.

During the year under review, it has been decided to extend the scope of reports so as to obtain information on such important matters as supply of capital, co-operative movements, systems of taxation, transport methods, etc., etc., all of which should be of the greatest interest to industrialists.

In view of the extensive nature of some of the reports and the care which has been taken by reporters to deal with the various aspects of the subjects allotted to them, the Department of Mines and Industries has agreed to a certain number being published as "Special Memoirs." This course will obviate the necessity for publishing the more lengthy reports in serial form in successive issues of the *Journal of Industries*.

CENSUS OF SCIENTIFIC LITERATURE.

At a recent meeting of the Scientific and Technical Committee, attention was called to the great need felt by scientists and investigators for a co-ordinated catalogue of all the scientific and technical publications contained in the various libraries of South Africa.

The Committee recognises that means should be provided whereby persons desirous of engaging in research can fully acquaint themselves with the latest results and discoveries obtained by researches in other countries, thus obviating unnecessary duplication of work and hastening the attainment of results.

The constantly increasing number of such publications makes prohibitive the cost of providing sets of each one of them in every library in the country; while some of those more frequently referred to must of necessity be maintained in several of the larger centres of population, others might well be restricted to one or at most, a few, of the leading libraries, provided that investigators could ascertain where copies can be seen, and that a system of loans could be maintained between one library and another. Such a system would avoid unnecessary duplication, and would increase the purchasing power of the funds at the disposal of each library, and make it more possible to ensure that all the Scientific and Technical publications will be available in one or other of the South African libraries.

The sub-committee has been fortunate in obtaining the assistance of Mr. A. C. G. Lloyd, Librarian of the South African Public Library, Cape Town, who has already published a similar work for the Cape Peninsula. It is intended to print 250 copies of the list of serials in order that they may be available for the principal libraries of the Union, and the Government has provided a sum of £200 for the purpose.

The Board desires to express its appreciation of the kind offer of Mr. Lloyd to act as Editor for the work proposed.

PURCHASE OF SCIENTIFIC AND TECHNICAL LITERATURE.

Early in the year the Scientific and Technical Committee submitted to the Government a list of scientific and technical literature bearing on industrial problems, which it recommended should be purchased and stored at the Seymour Memorial Library. It was thought that the books selected would not only assist the Scientific and Technical Committee and the Industries Advisory Board in their deliberations, but would be of service to the general community on questions concerning the industrial development of the country's natural resources.

This recommendation was approved by the Government, subject to the reservation that the books should be kept at the office of the Advisory Board, Room 155, New Law Courts, Johannesburg. The Board is pleased to state that just under 100 volumes have now arrived, together with a large number of bulletins and technical papers.

In order that the public, and more particularly those who are interested in the industrial expansion of the country, may have every opportunity of perusing these works, the Board has obtained the Government's approval to their being allowed out on loan, subject to certain conditions, particulars of which may be obtained on application to the Secretary of the Board. Catalogues have been prepared and circulated to the principal Libraries of the Union, and as new literature arrives, lists of additions to the library will be prepared and distributed.

CHAS. G. SMITH,

Chairman.

A. C. MARSH,

Secretary.

31st March, 1919.

ANNEXURE I —PERSONNEL OF BOARD AND COMMITTEES.

Mr. Chas. G. Smith (*Chairman*).

Mr. Bernard Price, Mr. E. Chappell, C.B.E., *Deputy Chairmen*.

Dr. J. C. Beattie.	Dr. J. D. F. Gilchrist.	Prof. J. Orr.
Mr. J. Burt-Davy.	Mr. W. R. Jackson.	Mr. J. Pyott.
Dr. W. A. Caldecott.	Mr. G. A. Kolbe.	Prof. B. de St. J. van der Riet.
Mr. L. Colquhoun.	Mr. W. J. Laite.	Prof. G. H. Stanley.
Sir Thomas Cullinan.	Prof. D. F. du Toit Malherbe.	Prof. R. B. Young.
Mr. A. J. Chiappini.	Mr. F. T. Nicholson.	

GOVERNMENT ASSESSORS ON BOARD.

Mr. F. E. Kantlack, C.M.G.	Lt.-Col. Charles Murray.	Dr. A. W. Rogers.
Sir R. N. Kotzé.	Dr. R. E. Montgomery.	Mr. F. B. Smith.
Mr. C. E. Legat.		

GENERAL PURPOSES COMMITTEE.

Mr. Chas. G. Smith (*Chairman*).

Mr. Bernard Price, Mr. E. Chappell, C.B.E., *Deputy Chairmen*.

Dr. W. A. Caldecott.	Sir Thomas Cullinan.	Mr. F. T. Nicholson.
Mr. L. Colquhoun.	Mr. W. J. Laite.	Prof. R. B. Young.

AGRICULTURAL COMMITTEE.

(a) Mr. J. Burt-Davy (*Chairman*).

(a) Dr. W. A. Caldecott.	(c) Mr. T. Kleinenberg.	(c) Mr. F. Mottram.
(b) Mr. E. O. Challis.	(c) Mr. C. W. H. Kohler.	(b) Mr. I. B. Pole-Evans.
(b) Mr. R. A. Davis.	(a) Mr. G. A. Kolbe.	(b) Mr. W. H. Scherffius.
(c) Mr P. Greathead.	(b) Mr. C. P. Lounsbury.	(c) Mr. S. B. Woollatt.

EDITORIAL COMMITTEE.

(a) Prof. R. B. Young (*Chairman*).

(a) Mr. J. Burt-Davy. (a) Mr. E. Chappell, C.B.E.

ENGINEERING COMMITTEE.

(a) Prof. John Orr (*Chairman*).

(c) Mr. G. S. Burt-Andrews.	(c) Mr. J. F. Martyn.	(b) Mr. J. A. Vaughan.
(c) Mr. S. E. T. Ewing.	(c) Mr. H. Newbery.	

RESEARCH GRANT BOARD.

(a) Prof. R. B. Young (*Chairman*).

(a) Dr. J. C. Beattie.	(b) Sir Robert Kotzé.	(b) Prof. B. de St. J. van der Riet.
(c) Prof. J. W. Bews.	(b) Dr. J. McCrae.	(b) Mr. F. B. Smith.
(a) Mr. L. Colquhoun.	(a) Mr. Bernard Price.	(c) Sir Arnold Thieler.
(a) Sir Thomas Cullinan.		

TARIFF COMMITTEE.

(a) Mr. E. Chappell, C.B.E. (*Acting Chairman*).

(a) Sir Thomas Cullinan.	(a) Mr. W. J. Laite.	(a) Prof. G. H. Stanley.
(a) Mr. W. R. Jackson.	(a) Mr. F. T. Nicholson.	

FISHERIES SURVEY COMMITTEE.

(a) Dr. J. D. F. Gilchrist (*Chairman*).

(a) Dr. J. C. Beattie.	(b) Mr. L. Mabsergh, I.S.O.	(a) Prof. B. de St. J. van der Riet.
(b) Mr. F. C. Hollander.	(c) Dr. L. Peringuey.	(c) Mr. Romer Robinson.
(c) Mr. G. D. Irvin.		

SCIENTIFIC JOURNALS COMMITTEE.

(a) Dr. J. C. Beattie (*Chairman*).

(a) Dr. J. D. F. Gilchrist. (a) Prof. B. de St. J. van der Riet.

(a) Denotes "Member."

b Denotes "Assessor."

(c) Denotes "Co-opted Member."

ANNEXURE II.—REPORTS CALLED FOR BY THE ADVISORY BOARD OF INDUSTRY AND SCIENCE.

RECEIVED.

Subject.	Reporter.
1. Oil Shales, Mineral Oils and Bitumens	Dr. Wagner.
2. Iron and Steel Industries	Prof. Stanley.
3. Hides, Skins and Leather Manufactures	Mr. Swale.
4. Electro-Chemical Industries	Prof. van der Merwe and Prof. Roble.
5. Pottery	Mr. Adams.
6. Economics of Production of Staple Crops, <i>e.g.</i> , Maize, Beef, Mutton and Wool, and Statistics of Farm Products and Acreage ..	Prof. Lohfeldt.
7. Tartaric Acid and other by-products of Wine Industry ..	Dr. Hahn.
8. Cotton and Products.	Mr. Taylor.
9. Tanning and Dyeing Materials, including Wattle Bark and Extracts ..	Mr. Williams.
10. Certain Minerals used in Arts and Industries	Dr. Wagner.
11. Paper	Dr. Juritz.
12. Fertilizers	Dr. Marchand.
13. Wool and Mohair Products	Mr. Mallinson.
14. Inorganic Chemicals	Dr. Rindl.
15. Soap, Candles (raw materials other than oils) and by-products (including Glycerine)	Dr. Rindl.
16. Native Timber Trees	Mr. Sim.
17. Preparation of Vegetables and Fruits for Export	Mr. Pickstone.
18. Fibre Plants (other than Cotton and Brush Materials). ..	Mr. Holmes Smith.
19. Base Metals and their Production	Dr. Versfeld.
20. Coal—its qualities, etc.	Prof. Wilkinson.

IN COURSE OF PREPARATION.

1. Fish and Fishery Products	Dr. Gilechrist.
2. Butter, Cheese and other Dairy Products	Mr. Challis.
3. Conservation and Utilisation of Water Power.	Mr. Kantback.
4. Soil Conservation including Erosion	Mr. T. R. Sim.
5. Wool, Fat and other Animal Fats	Dr. Juritz.
6. Maize and Maize Products	Mr. Burt-Davy.
7. Cereals (other than Maize and their Products)	Mr. Neethling.
8. Preparation of Foodstuffs (other than meat) for Export—Eggs and Poultry.	Mr. W. O. John.
9. Vegetable Foods (other than cereals and fruits)	Mr. Burt-Davy.
10. Sugar and Sugar Products	Dr. Juritz.
11. Drug-yielding and Poisonous Plants and Products	Mr. Muller.
12. Tobacco and Products.	Mr. Scherffins.
13. Vegetable Oils, Waxes and Resins	Dr. Rindl.
14. Diseases affecting the Development of Crops—Preventative Remedial Measures	Mr. Pole-Evans.
15. Cultivated Foodstuffs for Livestock	Mr. Wolfe.
16. Essential Oils including Eucalyptus	Mr. Santhagen.
17. Review of Government Action regarding Industrial Development by Dominions and other countries, <i>e.g.</i> , Japan, Germany and United States	Dr. Flint.
18. Wines & Spirits	Dr. Perold.
19. Fruit and Fruit Products	Mr. R. A. Davis.
20. Rubbers	Mr. T. R. Sim.
21. Cultivated Timber Trees.	Mr. T. R. Sim.
22. Timber and Wood Products (including Charcoal, Boxwood, etc) ..	Mr. T. R. Sim.
23. Dips and Disinfectants	Dr. Green.
24. Artificial Stockfoods and their Manufacture	Mr. S. B. Woollatt.
25. Meat Industry, Hides, Horns, Hoofs, etc.	Mr. S. B. Woollatt.
26. General Review of Agricultural and Pastoral Possibilities ..	Mr. McDermott.
27. Tea	Mr. Clayton.
28. Barley, Hops and Brewing Materials	Mr. Shaw-Scott.
29. Chicory and by-products	Mr. Fisher.
30. Power for use of Farmers	Mr. Cleghorn.
31. Review of System of Taxation in vogue in South Africa in reference to the Development of its Industries and Resources	Mr. Sheridan.
32. The Co-operative Movement in Natal in regard to Producing, Buying and Distributing Commodities	Mr. E. W. Evans.
33. The Economic and Natural Factors affecting the Establishment of Industries in South Africa	Mr. S. E. T. Ewing.
34. Insect Pests and Remedial Measures	Mr. Lounsbury.
35. Olive Industry	Mr. Tribolet.

NOT YET DEFINITELY ACCEPTED.

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|----|--|----|----|----|----------------|
| 1. | South African Export Trade and its Possibilities | .. | .. | .. | Mr. Chiappini. |
| 2. | Economic Plants at Kirstenbosch | .. | .. | .. | Prof. Compton. |

SUGGESTED, BUT NOT YET ALLOTTED.

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| 1. | The present position of Transport Methods in South Africa in reference to the Development of its Industries and Resources. |
| 2. | The Supply of Capital available for the Development of the Natural Resources of South Africa. |

Summary.

Reports received	..	..	..	..	20
Reports in course of preparation	..	..	..	..	35
Reports not yet definitely accepted	..	..	..	..	2
Reports suggested, but not yet allotted	..	..	..	..	2
					<hr/>
Total	..	..	..	..	59

PUBLICATIONS OF THE UNION OF SOUTH AFRICA MINES DEPARTMENT—(continued).

		Price Post free in South Africa).			Price (Post free in South Africa).
Geological Memoirs—(continued).		s. d.	Miscellaneous—(continued).		s. d.
Report on a Reconnaissance of the North-west Zoutpansberg District. By T. G. Trevor and E. T. Mellor: 40 pages and 16 plates (including 1 map)		2 6	Malmania Gold Fields Commission—Report of the—1903		5 0
GEOLOGICAL SURVEY SHEET MAPS each accompanied by an Explanation.			Manufacture of Iron and Steel in the Transvaal. By F. W. Harbord (English or Dutch) (T.G. 21—1910)		0 6
No. 1.—Pretoria (Explanation by H. Kynaston)	5 0		Memorandum re Iron and Steel Industry (T.G. 30—1909)—English or Dutch (Transvaal)		0 6
No. 2.—Pienaars River (Explanation by H. Kynaston)	5 0		Midas Deep Gold Mining Company—Report on the—1910 (T.A. 5—1910)		1 0
No. 3.—Middelburg (Explanation by E. T. Mellor)	5 0		Miners' Phthisis Board—Reports on the Working of the—to the 30th November, 1912, and for the first six months ended the 31st January, 1913 (U.G. 13—1913)		0 6
No. 4.—Rustenburg (Explanation by W. A. Humphrey)	5 0		Miners' Phthisis Prevention Committee—Preliminary Report of the (U.G. 55—1912)		1 0
No. 5.—Zeerust (Explanation by A. L. Hall and W. A. Humphrey)	5 0		Miners' Phthisis and Pulmonary Tuberculosis on Mines within the Union of South Africa—Report of a Commission on (U.G. 19—1912)		2 0
No. 6.—Mafeking (Explanation by A. L. Hall and W. A. Humphrey)	5 0		Mines and Works Act, 1911, and Mines, Works and Machinery Regulations, 1911, together with Index and Chart of Conventional Signs		3 6
No. 7.—Potgietersrust (Explanation by H. Kynaston, E. T. Mellor, and A. L. Hall)	6 0		Mines Benefits Funds (Transvaal)—Report of the Committee of Inquiry on—(U.G. 9—1911)		1 0
No. 8.—Sekuniland (Explanation by A. L. Hall)	5 0		Mines Commission (Natal)—Report of—1909		1 0
No. 9.—Marico (Explanation by W. A. Humphrey)	5 0		Mines Department Report (Orange Free State) (U.G. 24—1911)		1 6
No. 10.—Nylstroom (Explanation by H. Kynaston, E. T. Mellor, and W. A. Humphrey)	5 0		Mines and Minerals of Natal (Dr. Hatch), 1910		5 0
No. 11.—Lydenburg (Explanation by A. L. Hall)	5 0		Mining by Single Outlet Commission—Report of the—1907		7 6
Geological Survey, Sheet 12 (Pilandsberg), with Explanation	5 0		Mining Industry Commission (Transvaal)—Minutes of Evidence of the (T.G. 2—1908)		10 6
Geological Survey, Sheet 13 (Olifants River), with Explanation)	5 0		Mining Industry Commission (Transvaal)—Report of the (T.G. 2—1908)—English and Dutch		1 0
MISCELLANEOUS:			Mining Industry of Natal—Report on the—1909		2 6
Act to provide for the Licensing of Persons carrying on undertakings for the Supply of Power and for other purposes, also Regulations	0 6		Mining Regulations Commission (Transvaal)—Minutes of Evidence of the—1910		7 6
Coal Testing Committee (Natal)—Report of—1904-05	3 0		Mining Regulations Commission—Interim Report of the (T.G. 32—1909)—English or Dutch		1 0
Coking Tests of Transvaal Coals—Notes on (U.G. 41—1911)	1 0		Mining Regulations Commission (Transvaal)—Final Report of the—1910		7 6
Explosives Act, 1911, with Index. Act to Consolidate and Amend the Laws in force in the Union, regulating the Manufacture, Storage, Sale, Transport, Importation and the Use of Explosives	1 0		Modderfontein Explosion—Report of Inquiry on the (T.G. 1—1908)		3 6
Explosion at British South Africa Company's Factory at Modderfontein, Transvaal—Report on (U.G. 28—1911)	1 0		Prospecting—Report of the Commission on (Orange Free State)		5 0
Explosion at British South Africa Company's Works at Modderfontein, Transvaal, on 1st April, 1912—Report on (U.G. 48—1912)	0 9		Winding Ropes, Safety Catches, and Appliances in Mine Shafts—Reports of the Commission appointed to inquire into—1907		7 6
Explosion at British South Africa Company's Works at Modderfontein, Transvaal, on 24th September, 1912—Report on (U.G. 3—1913)	1 0		Report by Major A. B. Denne on an Accident which occurred in L3, a large Dynamite Cartridging Hut in Factory 11, British South Africa Explosives Company's Works, Modderfontein, on the 24th September, 1912 (U.G. 3—1913)		1 0
Explosion at Cape Explosive Works, Somerset West—Report on (U.G. 20—1912)	1 0		Report by Major A. B. Denne on an Accident which occurred in E6, known as a "Packing House," in the "Dynamite System" of the Cape Explosives Works at Somerset West, on the 3rd January, 1913 (U.G. 11—1913)		1 6
Explosion at Kynoch's Factory (Natal)—Report on (U.G. 18—1912)	1 0		Reports on the working of the Miners' Phthisis Board to the 30th November, 1912, and for the first six months ended the 31st January, 1913 (U.G. 13—1913)		0 9
Explosions of Gas and Coal Dust in the Coal Mines of the Province of Natal—Report of a Committee on (U.G. 52—1912)	0 6		Miners' Phthisis Prevention Committee—Interim Report, 1913 (U.G. 45—1913)		0 6
Geological Commission (Cape)—Report of the—1910 (U.G. 31—1911)	2 6		Report by Major A. B. Denne on an Accident which occurred in No. 47, a "Mixing" or "Kneading" House at the Explosive Works of Messrs. Kynoch, Limited, Umbogintwini, Durban County, Natal, on the 21st August, 1913 (U.G. 49—1913)		0 6
Geological Survey of Natal and Zululand, First Report, 1902	7 0				
Geological Survey of Natal and Zululand, Second Report, 1904	7 0				
Geological Survey of Natal and Zululand, Third Report, 1907	7 0				
Gold Mines situated in the Transvaal Area—Detailed Statistics relating to the—from June, 1902, to October, 1906	31 6				

