THE REFRACTORIES INSTITUTE

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Reports to the Membership

FALL MEMBERSHIP MEETING

STOUFFER'S UNIVERSITY INN
COLUMBUS, OHIO
NOVEMBER 15, 1968

INDEX

MINUTES OF MEMBERSHIP MEETING OF THE REFRACTORIES INSTITUTE

Held November 15, 1968 at Stouffer's University Inn, Columbus, Ohio. Attendance list of 95 men is appended.

President Max Muller presided and Executive Secretary Avery C. Newton acted as secretary of the meeting.

During the course of the meeting the chairman welcomed as distinguished guests: Dr. Harold A. Bolz, Dean of the College of Engineering, Dr. J. Otis Everhart, Chairman of the Department of Ceramic Engineering and Dr. Ralston Russell, Professor of Ceramic Engineering, all of The Ohio State University.

Minutes of the last Membership Meeting held at The Homestead, Hot Springs, Virginia on June 10-11, 1968, previously submitted by mail, were approved.

Mr. William F. Porter, Treasurer, thereupon presented a statement, copy appended, of The Institute's receipts and disbursements for the six months' period from April 1 to September 30, 1968.

The chairman then reminded the members that the main purposes of holding this Membership Meeting in Columbus were to, (1) review, especially for the benefit of our newer members, the history of our refractories testing and research activities dating back over 50 years and, (2) inspect our new facilities on the campus of The Ohio State University.

To review the history of our Refractories Fellowship, the chairman introduced Mr. Louis J. Trostel who retired in 1963 after 40 years of service in the research department of General Refractories Co. He reminded the members that Mr. Trostel had served as chairman of our Technical Advisory Committee from the time The Refractories Institute was founded in 1951 until his retirement in 1963. Since then he has served as secretary of Committee C-8 on Refractories of A.S.T.M. and as judge in The Institute's Annual Award Contest for the best papers on refractories.

Mr. Trostel thereupon presented a most interesting report on the history of the Refractories Fellowship at Mellon Institute, copy appended.

The chairman thereupon introduced Mr. Robert A. Barr, vice president and general manager of the Refractories Division of The Babcock & Wilcox Co. and immediate past president of The Refractories Institute. Mr. Barr was the last chairman of our Mellon Institute Committee and was intimately involved in all the problems relating to the transfer of our Fellowship from Mellon Institute to The Ohio State University.

Copy of Mr. Barr's report is appended.

The chairman thereupon called on Dr. Arthur J. Metzger, professor of Ceramic Engineering and the Director of our Refractories Industry Research Center at The Ohio State University. Copy of Dr. Metzger's report on the organization and services to industry of our R.I.R.C. is appended.

The chairman thereupon called on Mr. William J. Kenney, General Counsel to The Institute, for a report on the current status of the depletion regulations. Copy of Mr. Kenney's report is appended.

It being close to 10:30, the meeting was declared adjourned so that the members could board the buses for the trip to The Ohio State University for an inspection tour of the laboratories and testing facilities of our Refractories Industry Research Center in Lord Hall as well as an inspection of the High-Temperature Laboratories and equipment in

The group thereupon returned to the hotel for a reception and luncheon, after which the chairman introduced our guest speaker, Mr. Ralph C. Padfield of the research department of Bethlehem Steel Corporation. In his introduction, the chairman advised that Mr. Padfield had received a Batchelor of Science degree in Ceramic Engineering from The University of Missouri at Rolla in 1949 and the professional degree of Ceramic Engineer from the same university in 1967. In 1965 he was awarded a Master's degree in Business Administration from Lehigh University. Mr. Padfield currently is chairman of the Refractories Division of the American Ceramic Society and chairman of the A.I.S.I. Technical Committee on Refractories.

Summary of Mr. Padfield's remarks follow:

Thanks were given to President Max Muller for the opportunity to speak and compliments extended to Dr. Arthur Metzger for progress in organizing the Research and Testing Center. Praises were given to the refractories industry for the new products developed in the past 15 years, among them direct-bonded basic brick and a variety of BOF refractories.

The key point of the presentation was to emphasive the increasing sophistication of steel company research laboratories in applying, among others, all available techniques of microstructural analysis in evaluating refractory properties and relating the results to service performance. The need for the manufacturer to relate his process variables to microstructural effects is clear. The trend to higher purity materials eventually will require control of the process to achieve a desired microstructure.

Knowledge existing in the fields of metallurgy and materials science will be applied in the bulk refractories industry. Among those properties which may soon require control of quality are: grain growth, preferred crystal orientation, and pore size distribution. Among the manufacturing processes that may be required are hot pressing, hot forging and perhaps even hot rolling.

In a nutshell: much must be learned about the character of microstructure of refractory grain within refractory products and its relation to physical properties and performance. This will ultimately require that the quality-control programs of the modern refractory manufacturer be extended to assure desired microstructures and crystal orientation with the grain.

The chairman thereupon expressed the thanks of the membership for Mr. Padfield's instructive and thought-provoking remarks.

There being no further business to come before the meeting, on motion, adjourned.

AVERY C. NEWTON

BRIEF HISTORY OF THE REFRACTORIES FELLOWSHIP AT MELLON INSTITUTE

Presented by: LOUIS J. TROSTEL

A brief history of the Fellowship as this title suggests cannot be expected to be more than a portrayal of some of the more salient features of its nearly 50 years of existence. There is no question that its accomplishments far exceeded the hopes of its early sponsors and that it has been one of the important factors in developing the technical consciousness so apparent in the industry today.

The Fellowship was first established in 1917 by the then five-year-old Refractories Manufacturers Association in Pittsburgh and was transferred to Ohio State University in

Howe who died prematurely in 1923. He was followed by MacDonald Booze who remained until 1926 and left to exploit the then new mineral mullite with Chas. Taylor & Sons in Cincinnati. Then came Stuart Phelps who was to remain until his retirement in 1962. The last Fellow was Frank McRitchie until the transfer to Columbus in 1965. The first facilities were located in a few small rooms in the old buildings of the University of Pittsburgh on top of the hill in Schenley Park. In 1937 the Fellowship moved into more spacious quarters about four times larger located in Mr. Mellon's beautiful, new Doric temple on Fifth Avenue next to the present Cathedral of Learning. The Fellowship was to remain here for 25 years.

What sort of an industry did we have back in 1917? It was concerned mostly with clay and silica and a little basic. Brick and mortars were the thing and plastics and castables unheard of. The hand made and stiff mud processes dominated in clay brick manufacture with slop mud and hammered brick in silica. The dry press and tunnel kiln were still just over the horizon. Large tonnages of clay brick were still in use for locomotive arch tile, for lining power stations and in rotaries. Silica made from ganister was the open hearth roof brick. It was a craft industry with few engineers in either manufacture or useage of the products. The chief testing tools were the rule and hammer for determining size and burn.

World War I ended at the close of 1918 and with it the frenzy of high production and high prices. The industry became highly competitive and a new word was introduced into selling -quality.

A prominent steel man complained that the superintendents and managers of the brick companies were most interested in making the cheapest product possible and gave only trifling attention to quality; and futher, the chief bricklayers, skilled as they were in laying brick, knew very little about quality or of those things which affected refractories in service.

Pressure began developing from the steel industry and coke oven builders for controlled size and quality. For one thing, Carnegie Steel had actually set up a small laboratory with a chemist and a ceramic engineer to test refractories for quality and to determine the causes for their failure at times. For another thing, a committee called C-8 had been organized in the American Society for Testing Materials in 1914. Its purpose was to design and standardize tests, specifications and nomenclature for refractories. The committee was to be formed of producers, general interests and consumers with the latter two to dominate in the membership list. The committee was small at first and comprised of 19 members, but included such knowledgeable experts of the time as J. S. Unger of Carnegie Steel, C. L. Norton of MIT, who was later to invent the silica drop machine for molding brick, Albert Bleininger of the Bureau of Standards, who had devised the first hot compressive or load test for evaluating brick for the Panama Canal job, Edward Orton, founder of the first Ceramic School in this country and Dean of Engineering at The Ohio State University in addition to being the manufacturer of the famous Orton Pyrometric Cones, Ross Purdy, then Manager of the Research Laboratory at the Norton Co. and later the long-time Secretary of the American Ceramic Society and W. H. Fulweiler of the United Gas Improvement Co. of Philadelphia. Some of the well known industry men were Kenneth Seaver of Harbison-Walker Co., Arthur Taylor, Charles Claiborne of the Union Mining Co., George Balz of the Seaboard Refractories Co. and R. D. Hatton of Laclede-Christy.

The only actual refractories tests at the start were the load test and the PCE test, then called the fusion test. This small group of men and its few tests have since grown to a body of over 100 individuals, 21 special sub-committees and sections and 90 some standards of all types applying to refractories.

The Fellowship from the start was to play a leading part in the investigations and formulation of these many standards and point out their usefulness to the industry. In fact, all the several Fellows were members of C-8, not only serving as chairmen of sub-committees but also as officers. The third Fellow, for instance, was secretary for a long time and the Vice Chairman.

Somewhere, presumably, the objectives of the Fellowship were spelled out but such a statement is not now available. It could have been to furnish a service by which the manufacturers could get their products and processes under the technical control being urged by the consumers. New products and processes could be expected to develop to meet customer demand. To attain these objectives, the Fellowship had to have both a testing and a research laboratory as well as furnish consulting service.

The early Fellowship was conscious of two problems. One was the fear of some producers that their raw materials and mixes might be disclosed to their competitors. The other was the dearth of engineers by users and their inability to suggest tests for the control of properties of refractories which affected their behavior in service. Accordingly, there was little of the cooperative testing of roof and wall panels that is now so commonplace. It was part of the job of the first Fellows to overcome these problems.

In 1925 the Technical Advisory Committee of what was now called American Refractories Institute was formed under the leadership of J. Spotts McDowell. It was comprised of 10 technical men representing a broad cross-section of the producing industry. One of its major functions was to consult and cooperate with the Fellowship in its research programs.

The Fellowship, the TAC and Committee C-8 were to form a triad of immense technical importance to the industry. Many of the details of the early C-8 standards were hammered out in meetings of the Fellowship and the TAC. The latter have further conducted numerous round robins of testing required before test procedures could be standardized.

One result of this close liaison was to prevent the Fellowship from working in a vacuum insofar as an appreciation of manufacturing problems were concerned.

The productivity of the Fellowship over the years, while not always a matter of record, is well known. Its name is not attached to any of the C-8 standards but it is recognized that many of the tests originated or were revised as the result of Fellowship investigations.

It is not the intent to catalog herein all the tests which originated in the Fellowship. It is interesting, however, to direct attention to one procedure which from its inception was to prove of inestimable value to the industry. This was the Panel Spalling Test.

The apparatus, as many of us know, is composed of large panels of brick representing a wall section. In the test these are subjected to high temperatures to produce incipient vitrification. They are then cooled and taken by an overhead trolley system to another furnace where they are reheated and blasted with an air-water spray to induce spalling. After cooling the panels are taken apart and the spalled fragments measured. Several days are required for

the complete procedure. The apparatus is costly and the operation is expensive. In spite of this, the Fellowship had furnished about 125 sets of drawings for prospective builders.

The practical results of this one test should not be lost sight of. In this connection it is important to remember that this test was able to prove for the first time that dry press brick were more superior in spalling resistance than hand made and stiff mud as well as furnishing a means of distinguishing super duty from high duty brick.

A fact to be remembered is the highly ethical manner in which the Fellowship testing work was always handled. For this reason, it developed into a national reference laboratory and its certificates of test accepted by purchasers everywhere including government, state and municipal agencies.

The tests originating in the Fellowship, diverse in character and usefulness as they were, give only a hint of the basic conceptions which stimulated so much of the research carried out over the years.

For instance, it goes without saying that the unit operations of mining the raw materials, grinding and screening, mixing, pressing, drying and burning have always been the special skill and responsibility of the operating departments. What they did not always fully understand in the past was the effect of variations in performing these unit processes on the properties of their products.

Someone had to investigate how variations in such properties as chemical composition, screen analysis, porosity, strength and thermal conductivity affected such furnace behavior phenomena as shrinkage or expansion, subsidence under load, spalling, wear from abrasion or slag and heat loss through walls. Many studies were made not only to relate the properties as made to the ultimate furnace behavior but also to the devising of appropriate tests. While these facts are rather well understood today, their determination was to serve as the body of most of the research of the Fellowship for many years.

The many researches of the Fellowship have been recorded in The Institute Technical Bulletins, the American Ceramic Society and other technical journals. Besides their specific value to the industry, they have enhanced the technical literature on refractories technology in general. A total of 115 of these papers were published, about 70 of which are attributed to the third Fellow, Stuart Phelps, during his long tenure of service of about 40 years.

History is not composed entirely of the recording of mere dates events but must include the men who influenced them. Accordingly, in this brief history, the outstanding influence of Phelps must not be overlooked. He was a teacher amongst other things. Under his rigorous tutorage, an appreciable number of young ceramic engineers, acting as assistants, received the equivalent of a post graduate training. These men were eagerly sought by both manufacturers and users of refractories and today hold important technical positions. They carried away with them some of the concepts of how furnace behavior patterns are related to product properties and how to measure them.

The professional reputation of the Fellowship is in part reflected in the honors awarded to Phelps. He was made a Trustee and Fellow and received the Alfred Bleininger Award of the American Ceramic Society. He received the Award of Merit of the American Society for Testing and Materials. Further, following World War II, he was part of the team of Technical Intelligence experts on refractories sent to Germany. Visiting foreign experts on refractories always included a visit to the Fellowship laboratories and Phelps as part of their tour in this country because of the laboratory's reputation for technical excellence.

Then, in the 50's the end of an epoch in the life of the Fellowship could be detected. Many of the objectives of the original sponsors of the Fellowship had been achieved represented by the technical sophistication of the industry. Practically all the manufacturers of refractories and many of their customers had engineers and technical men on their staffs, many of them in executive positions. Further, they had their own laboratories, some in the million dollar class. The income from the Fellowship testing work, which had previously supported the research investigations, had declined considerably. It became necessary to make deficit appropriations for the Fellowship maintenance and special appropriations for research. Spiraling overhead charges by the Mellon Institute management of the order of 50-60 percent for the use of their facilities were encountered. An assessment of the situation indicated a change was required preferably to one of the universities with a well established department of ceramic engineering. Here the resources of The Refractories Institute could be employed in assisting in the training of more engineers, still in short supply, and where the faculty could supervise the more sophisticated research in demand.

The transfer of the Fellowship from the Mellon Institute in Pittsburgh to The Ohio State University in Columbus might be looked upon as only a transitory phase in the further developments of the overall objectives of the original Fellowship sponsors. While the transfer may be coupled with some sentimental regret, there cannot be any regret over the thousands of dollars spent over the years at Mellon Institute. The returns are represented in the transformation of this early craft industry into the highly specialized and scientific one of today.

Of all the numerous Fellowships which have inhabited Mr. Mellon's Doric temple, the one on refractories was the second oldest, but this distinction is far outweighed by its contributions to the industry.

TRANSFER OF FACILITIES FROM MELLON INSTITUTE TO THE OHIO STATE UNIVERSITY

Presented by: ROBERT A. BARR

Lou Trostel has given you a brief history of our Refractories Fellowship at Mellon Institute, from its inception in 1917 to its closing in 1965—48 years of continuous operation—perhaps a record for any industry association.

Now, particularly for the benefit of our newer members, I am going to briefly review the problems we faced in the early 1960's which led us finally to transfer our testing and research center from Mellon Institute to The Ohio State University.

Under our agreement with Mellon Institute, they hired and supervised the staff, determined the salaries, furnished the supplies and provided the space. In lieu of rent, The Refractories Institute reimbursed Mellon for all salaries paid, supplies and equipment purchased, plus 60% overhead. In 1951, when this refractories association was founded, the overhead charge was 33⅓%. In 1957 it was increased to 43% and in 1958 it went to 60%. The Institute received all income from tests and this service was limited strictly to members of T.R.I.

During the years 1960 to 1964 the average net cost of operating the Fellowship rose to $50,000 a year and further increases could be anticipated. All efforts to cut the losses

were to no avail. We increased test charges, we discontinued the research department of our Fellowship, we extended the privilege of tests to all government agencies, ceramic engineering schools and research institutes, we constantly appealed to our members to give us more of their test business. Gross income kept dropping and costs kept mounting.

The Directors of The Institute felt and they still do, I believe, that our industry and its customers need an unbiased and independent laboratory for tests on refractories. There was no where else that a company could go for a test if it did not have the equipment in its own laboratory, or to provide a double-check on its own lab results, or to furnish proof of compliance with customer specifications, commercial or governmental.

We explored many avenues of relief during 1964:

1. We offered to give Mellon Institute our equipment plus $10,000 a year. They to receive all income from tests and to extend the service to anyone interested, regardless of membership in The Institute. The answer was "No, thank you."

2. We offered to donate our equipment to a commercial laboratory--Pittsburgh Testing Laboratory. They to conduct a full line of tests in accordance with A.S.T.M. standards as a part of their business. The answer again was, "No."

3. We then explored possibilities with three universities having Ceramic Engineering Departments.

The University of Missouri was interested but they did not have space for our equipment at the moment, and we needed some 5,000 sq. ft. If we could wait two years until their new engineering building was completed, they would be glad to work out a deal with us. We could not wait.

The University of Illinois was interested and agreed to accept our equipment and run the tests but we had to guarantee a minimum contribution of $64,000 for the first year of operation alone to meet their estimate of operating deficits. That would be like jumping out of the frying pan into the fire.

We finally negotiated an agreement with The Ohio State University, effective April 1, 1965.

Under that agreement we gave the university all of our equipment--some 60,000 pounds—paid the cost of transportation--some $3,500--and gave the university $15,000 to cover the cost of equipment renovation and set-up. The university receives all income from tests, available to any interested company regardless of membership in The Institute and was to meet all expenses of operation.

By the way, when we terminated our agreement with Mellon Institute and moved out, we contributed $17,500 to Mellon, matched by an equal contribution from them, to provide reasonable severance pay for the staff of our Fellowship--and remember, they were not our employees.

One of the principal objectives of the agreement with O.S.U., in addition to the test service, was the establishment of a substantial research program concerned with improvement of refractories evaluation and performance. To that end, The Refractories Institute agreed to provide funds at the earliest possible date and the university agreed to provide personnel and facilities.

It soon became apparent that even with the extension of the test facilities to any producer or consumer regardless of membership in T.R.I., and continuing publicity and promotional efforts by the university and The Institute, the testing division was not going to be self-supporting. At the end of the first year of operation and for each succeeding year, The Institute has contributed up to a maximum of $20,000 a year toward the deficit.

Partly because of this unexpected obligation, The Institute has not yet organized and financed a specific research and test development program and that is one of the reasons for our being here in Columbus today. However, as Art Metzger, the Director of our Refractories Industry Research Center at O.S.U. will probably tell you today, our Foundation in Refractories Education (F.I.R.E.) has made some contributions to research and test development at the university. F.I.R.E. has contributed $10,000 for the purchase of thermal conductivity test equipment, and has contributed $33,000 to support three graduate fellowships at the university.

That is a brief run-down of our problems - mainly financial--in transferring our testing and research center from Mellon Institute to The Ohio State University.

REFRACTORIES INDUSTRY RESEARCH CENTER

April 1 - September 30, 1968

I would like to introduce this report by thanking, publicly, all of those member companies who have sent refractories to the Research Center for the relining of the furnaces in our new laboratory.

An analysis of the use of the testing service of the Research Center shows that members of T.R.I. have been the backbone of our support. We should point out, however, that a few of the "vertebra" have been missing recently. The following tabulated figures show the percentage distribution of our billings between member and non-member companies:

Year	*Member*	*Non-Member*
1965	72%	28%
1966	76	24
1967	57	43
1968 (1st half)	67	33

While the change in the percentages might appear to indicate a lessening of the work sent to us by T.R.I. members, this is not actually the case. The dollar figures for member companies has held rather constant with the percentage shift being due, mainly, to an increase in work done for non-member companies.

The level of operations for 1968-69 continues at a favorable pace. Although the billings for the first six months are slightly behind those for the same period a year ago, we have orders completed through October which will put us ahead of the equivalent period a year ago. On the basis of these figures and the rate at which work is being booked we are hopeful that total billings for the year will equal or exceed those of last year.

We are engaged in an analysis of our test work by type and frequency to better enable us to plan for equipment automation as well as make decisions relative to the advisability of adding new equipment. As an example, even if the Foundation In Refractories Education had not underwritten the construction of the thermal conductivity apparatus, the number of inquiries we have received for this service would have fully justified its acquisition.

Many people, we fear, think only in terms of our testing services. Actually, the Research Center is designed to render many more services to the Refractories Industry. Among these are research carried out through the work

lishment of fellowships by F.I.R.E., companies, or individuals. We can also handle work of a proprietary nature through the medium of research projects established through the Department of Ceramic Engineering.

The tour which will follow this morning's session will serve to show you the location of the R.I.R.C. Laboratory Areas. Those in Lord Hall being devoted principally to the more conventional and heavier items of refractories testing equipment, while the facilities of Watts Hall and MacQuigg Laboratories are in the realm of more sophisticated testing. Here are housed X-Ray, D.T.A., recording thermal expansion, and other similar items of equipment. In these laboratories, too, our F.I.R.E. and other refractories fellowship holders carry out their researches.

Respectfully submitted,

A. J. METZGER
Director

REPORT OF GENERAL COUNSEL

Final Regulations were issued July 26, 1968 covering methods of arriving at gross income (valuation) for the percentage depletion computation. A portion of the regulations covering ordinary treatment processes included in mining (cut-off point) had been re-proposed. The Institute protested these proposals at the public hearing on September 25, 1968. It was indicated that the re-proposed regulations would be revised to meet this protest and to allow crushing and grinding to the refractories industry without any requirement that the crushing and grinding be necessary to bring to shipping grade and form. It is anticipated that final cut-off regulations will be published before December 31, 1968.

Publication of final regulations will trigger completion of Internal Revenue Service audits of the tax returns of the refractories industry for 1961-1967, which have been suspended *pending final regulations.*

I

Cut-Off Point Regulations

If, as anticipated, the Final Regulations covering cut-off point embody the changes and modifications urged by The Refractories Institute, the following rules will apply to the refractories industry:

Refractory Clay will be entitled to "crushing" and "coarse grinding" as ordinary treatment processes, viz., grinding no finer than the point at which at least 5% of the product will be retained on a 30 Mesh U. S. Standard Sieve.

Refractory Silica will be entitled to "crushing" only as an ordinary treatment process, viz., grinding no finer than the point at which at least 5% of the product will be retained on a 20 Mesh U. S. Standard Sieve.

II

Valuation at the Cut-Off Point

The value of the mineral for depletion purposes at the cut-off point is to be established in the following order of preference:

1. Actual receipts from sales by taxpayer of the mineral sold at or prior to the cut-off point must be used for all mineral so sold by taxpayer (§1.613-3(b)(2)).
2. Where all or part of the mineral is processed beyond the cut-off point, the value of the mineral so processed measured at the cut-off point will be:
   a. Representative market or field price for the mineral at the cut-off point as shown by weighted average of competitive sales by other producers in the market area of minerals of like kind and grade to that of taxpayer (§1.613-3(c)). Taxpayer's own sales are to be considered, if representative; or
   b. If no representative field price exists, or if a field price exists but its use is prohibited by the regulations, then the value of the mineral at the cut-off point will be determined by use of the proportionate profits method applied to taxpayer's sales of its "*first marketable product or group of products*" processed beyond the cut-off point as expressed by the formula (§1.613-3(d)(1)):

$$\frac{\text{mining costs to cut-off point}}{\text{total costs to first marketable product}} \times \left\{ \begin{array}{l} \text{gross sales of first marketable product and constructive sales of product processed beyond first marketable product.} \end{array} \right.$$

The value at the cut-off point thus reached either by the use of the field price or proportionate profits will then be the value of all minerals processed and sold beyond the cut-off point.

The *foregoing simplified outline* is complicated by two limitations upon the use of the field price method:

1. *Sales at Cut-off Point Not Representative* (§1.613-3(c)(4)).

   "(4) *Type of sales which may be considered in determining the representative market or field price for the taxpayer's ore or mineral.*"*** "*For the purpose of determining the representative market or field price for the taxpayer's ore or mineral, exceptional, insignificant, unusual, tie-in, or accommodation sales shall be disregarded....*"

   Thus sales at the cut-off point will not be regarded as establishing a representative field price if they are "*insignificant,*" which is defined in *Webster's Third New International Dictionary* (1968): "*insignificant*"—"of little size or importance." "*significant*"—is not defined in terms of size or quantity.

2. *Denial of Field Price If Manufacturing Loss Results From its Use* (§1.613-3(c)(6)).

   "(6) *Limitation on gross income from the property computed under the provisions of this paragraph.* It shall be presumed that a price is not a representative market or field price for the taxpayer's ore or mineral *if the sum of such price plus the total of all costs of the nonmining processes* (including the nonmining transportation) *which the taxpayer applies to his ore or mineral regularly exceeds the taxpayer's actual sales price of his first marketable product or group of products....*" "For example, if the total of all costs of nonmining processes applied by the taxpayer to coal for the purpose of making coke is $12 per ton, and if the taxpayer's actual sale price for such coke is $18 per ton, a price of $7 per ton would not be a representative market or field price for the taxpayer's coal."

Application to Refractory Clay and Silica

The Regulations are not designed to liberalize the depletion deductions for the refractories industry or any other industry. Indeed, the contrary is true. However it will be possible for the refractories industry to chart a course under the Regulations which will produce a reasonably satisfactory depletion result.

If a field price at the cut-off point exists in an area which is not based upon "insignificant" tonnage, its use will prob-

ably not produce a manufacturing loss where tested by the taxpayer's costs and sales of refractory specialties as the "first marketable product or group of products." Further, the field price may be reinforced by the proportionate profits computation applied to refractory specialties as the "first marketable product." These opportunities are created by the definitions of "first marketable product or group of products" (§1.613-3(d)(1)(iv)):

"(iv) As used in this section, the term '*first marketable product* or group of products' means the product (or group of essentially the same products) produced by the taxpayer as a result of the application of nonmining processes, in the form or condition in which such product or products are first marketed in significant quantities by the *taxpayer or by others in the taxpayer's marketing area*. For this purpose, bulk and packaged products are considered to be essentially the same product. The first marketable product or "group of products does not include a product or group of products additionally refined, beneficiated, altered, or manufactured as a result of the application of additional nonmining processes. For example, if a cement manufacturer sells his own finished cement of various types in bulk and bags and also sells concrete blocks or dry ready-mix aggregates containing additives, the finished cement of various types, in bulk and bags, constitutes the first marketable product or group of products produced by him. Similarly, if an integrated iron ore and steel producer sells both pig iron in various sizes and rolled sheet iron or shapes, his first marketable product is the pig iron in its various sizes. Further, if an integrated clay and brick producer sells both unglazed bricks and tiles of various shapes and sizes and additionally manufactured bricks and tiles which are specially glazed, the unglazed products, both packaged and unpackaged, constitute his first marketable product or group of products."

Thus refractory clay plants which produce and sell refractory specialties such as mortars, ramming mixes, plastic fire brick, castables, gunning mixes, etc., in "significant" quantities may well be able to justify the field or market price by proportionate profits applied to specialties. Likewise, under the Regulations, competitors' area plants which do produce and sell specialties but not in significant quantities are entitled to look to sales of area plants which do manufacture and sell specialties to establish "significant" sales.

Summary

The Regulations, so far as the refractories industry is concerned, create a "springboard" from which it is possible to launch an approach to a reasonably satisfactory depletion deduction for post-1960 tax returns. The approach would be as follows:

(1) There is a field price for crushed and ground clay and silica based upon "significant" sales.

(2) The use of the field prices does not produce a manufacturing loss when applied to taxpayer's sales of specialties as the "first marketable product."

(3) Proportionate profits when applied to taxpayer's sales of specialties will produce a constructive value at the crushed and ground stage reasonably justifying the field price.

The two most critical concepts of the Regulations in this approach are:

(1) "*Like kind and grade.*" Under the Regulations (§1.613-3(c)(2)), this is determined by reference to similarity of chemical, mineralogical or physical characteristics and end-use of the mineral.

(2). "*Insignificant*"—"*Significant*" which are not defined by the Regulations.

Both of these tests must be met in the evaluation of the field or market price at the cut-off point. Thus the sales of clay and silica at this point, to be representative must both be of "like kind and grade" in quality (§1.613-3(c)(3)) and "significant" in quantity (§1.613-3(c)(4)).

Only the latter test must be met for the purpose of

(a) establishing the "first marketable product or group of products" by which the manufacturing less test is to be measured (§1.613-3(c)(6)), and

(b) establishing the "first marketable product or group of products" to which to apply the proportionate profits formula prescribed to establish a constructive value of clay and silica at the cut-off point. (§1.613-3(d)(iv)).

It is difficult to evaluate the quantity of sales (measured either as percentage of total tonnage or of total sale dollars) which will be accepted by the Internal Revenue Service as being significant or refused as being "insignificant." The indications are that previous efforts of Treasury to establish a uniform percentage have now been abandoned in favor of a case by case determination.

However the Regulations do provide that "significant" for both purposes (a) or (b) above is to be determined not by taxpayer's sales alone, but by sales of all producers in taxpayer's market area.

Thus in the case of a particular taxpayer, while its individual sales of refractory specialties may be regarded as "insignificant," the taxpayer may, nevertheless, be entitled to measure the value of his ground clay and silica by proportionate profits applied to the few sales of specialties it may have. This is due to the provision in the Regulations that the problem of whether the specialties sales are "significant" is determined not by a particular taxpayer's sales, but by sales of specialties by its competitors in its market area.

It seems evident that Treasury is determined notwithstanding certain pressures, to finalize depletion regulations quickly, a matter which has been in limbo since 1954. This, in view of the political changes, must be done within the next thirty days. Thus the refractories industry may well be quickly in the throes of Internal Revenue Service examinations. It is of utmost importance that these examinations be coordinated through the office of General Counsel. I will be able to furnish information and suggest approaches which have been successfully used.

There are many problem areas in the use of the proportionate profits method as applied to refractory specialties sales. We have had no prior experience in this area and new and unforeseen problems may arise in each member's audit. It is important that, to the extent possible, these problems be handled on a uniform basis. We, of course, will attempt to develop an industry pattern in the interest of uniformity and equality of treatment for all refractory producers.

Respectfully Submitted,

WILLIAM J. KENNY
General Counsel

TREASURER'S REPORT

Six Months, April 1 - September 30, 1968

Receipts		
Dues	$88,695.00	
Operator's Meeting Fees	3,050.00	
Miscellaneous	696.77	
		$92,441.77
Disbursements		
Audit and Legal	$ 5,581.60	
Committee C-8	534.31	
Dues and Subscriptions	578.31	
F.I.R.E.	7,500.00	
Firesphere Exhibit	2,149.55	
Furniture and Fixtures	1,164.68	
Meeting Expense	7,976.43	
Office Expense	3,491.06	
Operating Reserve	12,500.00	
Pension Premium and Reserves	2,826.15	
Printing and Publishing	5,108.85	
Refractories Industry Research Center	10,000.00	
Rent	2,124.00	
Salaries, net	11,432.88	
Travel	1,252.98	
Telephone	473.19	
Taxes and Insurance	4,411.04	
Miscellaneous	48.44	
		$79,153.47
Add to Reserve		$13,288.30
Cash on hand April 1, 1968		77,429.67
CASH BALANCE SEPTEMBER 30, 1968		$90,717.97

ATTENDANCE LIST

Active Members

The Babcock & Wilcox Co.
R. A. Barr
W. C. Bohling
C. L. Norton

Basic Incorporated
Max Muller
H. N. Barrett
A. M. Caito

C-E Refractories
L. J. Jacobs
F. C. Steimke
R. T. Hegeman

The Carborundum Co.
C. R. Landback

Cedar Heights Clay Co.
M. E. Morgan
D. E. Morgan

Chicago Fire Brick Co.
H. R. Pedersen

Dolomite Brick Corporation of America
G. G. Abraham
E. E. Childs, Jr.

Electro Refractories & Abrasives
K. S. Cowlin
J. G. Matchulat

General Refractories Co.
J. P. Rhein
F. Campbell
D. L. Garrison
L. R. Lebauer
W. M. Troutman

Globe Refractories, Inc.
W. F. Porter

A. P. Green Refractories Co.
W. S. Lowe
J. J. Offutt

Inland Fire Brick Co.
M. F. Myers
L. A. Bennett

Interpace Corp.
R. V. Lawrence

Johns-Manville Sales Corp.
H. E. Konrad
S. E. Wooley

Kaiser Refractories
J. F. Knight
J. C. Hicks

Lavino Division
A. H. Bergey
H. M. Mikami

Lawrence Refractories Co.
E. W. Sharp
L. E. Williams
R. Wolfensperger

Louisville Fire Brick Works
N. C. Updegraff
C. W. Stevens

Maryland Refractories Co.
R. T. Oxnard
R. T. Oxnard, Jr.

Monofrax Corp.
E. L. O'Meara
J. E. Coffman

Negley Refractories
John Perry

North American Refractories Co.
W. R. Ramsay

Norton Co.
B. F. Meyer
R. A. Alliegro

Ohio Lime Co.
George Judd
J. E. Partlow

Plibrico Co.
R. W. Schaefer
S. B. Pieters

Quigley Co.
F. H. McRitchie

Resco Products, Inc.
W. T. Tredennick
C. R. Enoch
R. F. Poeluszny

Shenango Refractories
R. C. Scholts
D. Spore

The Chas. Taylor Sons Co.
R. W. Knauft
Addison Maupin

Valley Dolomite Corp.
H. P. Day
J. P. Holt

Wahl Refractory Products Co.
D. H. Lease

Wellsville Fire Brick Co.
W. R. Weiss
H. D. Smith

Associate Members

Alcan Sales Inc.
R. M. Mathieson
J. G. Lindsay

The Asbury Graphite Mills
F. H. Murphy

Battelle Memorial Institute
L. S. O'Bannon

Chisholm, Boyd & White Co.
R. F. Poole

M. H. Detrick Co.
C. B. Edgar

Dow Chemical Co.
J. A. Kelly

Kyanite Mining Corp.
Carroll Kay

Mining Machine Parts, Inc.
J. D. Gibson
R. M. Wilson

Oak Hill Foundry & Machine Works
G. T. Needham

Philadelphia Quartz Co.
J. R. Forrest
W. B. Esmonde
R. W. Holmes
C. W. Klein

Republic Steel Corp.
R. W. Limes

Swindell-Dressler Co.
F. Eyman
K. Lange

Others

H. A. Bolz, Dean, The Ohio State University
G. C. Breidenbach, T. J. Gundlach Machine Co.
J. O. Everhart, The Ohio State University
W. J. Kenney, T.R.I. General Counsel
A. J. Metzger, The Ohio State University
A. C. Newton, T.R.I. Executive Secretary
J. W. Norwood, Forrest Paschal Machinery Co.
E. Obersehmidt, Brick and Clay Record
K. C. Redfield, Bethlehem Steel Corp., Guest Speaker
D. D. Phelps, Darco Corp.
Ralston Russell, Jr., The Ohio State University
R. F. Tatnall, Ceramic Age
L. J. Trostel, Guest Speaker