

The Second

American Natural Cement Conference

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Century House Historical Society

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Welcome New Members

468-F Edward & Cassandra Stone — Newport, RI

469-F Robert & Marie Kassai — Elmwood Park, NJ

470-I Jim Luckner — High Falls, NY

471-I Brian Jaffer — Tillson, NY

Images of Rosendale's Past

Ann Gilchrist, has self published a booklet which is filled with many post card images and some real old photos as well as modern photos taken by the author. She has also added copies of various sections of the 1898 Sanborn map of Rosendale.

If you are interested in obtaining a copy contact the Rosendale Women's Club.

YOUR SOCIETY MEMBERSHIP DUES FOR 2006 ARE DUE

Please check your membership dues notice in this issue. You will find a pre-addressed envelope. Don't forget that you can also add a donation along with your dues payment.

Thank Rosendale

We still have a few copies of Peter Genero's new book, *Thank Rosendale*, available. The cost is \$16.65 + \$4.45 S&H (New York residents must add sales tax)

Additions to the Society Library

1. Geological Survey of Kansas. Vol. V. Report on Gypsum and Gypsum Cement Plaster. Topeka, Ka. 1899.
2. Pulverized Coal. [for cement kilns] Bulletin No. 15. Fuller Engineering Co. Allentown, Pa. 1919.
3. Roads & Pavements. Fred P. Spalding. New York 1895. (1st Edition)
4. Roads & Pavements. Fred P. Spalding. New York 1904. (2nd Edition)
5. A Girls Life Eighty Years Ago, Selections from the Letters of Eliza Southgate Bowne. Clarence Cook. New York. 1887.
6. Oregon Engineer Vol. 1. No. 1. April 1909.
7. On the Composition of Ancient Cements and Rosendale Cements. Arthur Beckwith. Read at the June 16, 1869 Meeting of the American Society of Civil Engineers.

Message from the President

What do we do when the Society outgrows the available space for its collections, archives and library? Last year the Society was the recipient of a grant [Through the office of New York State Assemblyman, Kevin Cahill] which added shelving, bookcases and tables for its archives. When we submitted the grant application in 2003 we thought that it would be years before archival storage space would again be an issue. None of the existing Society buildings, Century, Tenant, and Carriage house, Piggery and Museum can easily be enlarged for such purposes. The ideal would be to have a standalone secure fireproof building built for that purpose. It may be time to do some preliminary planning for such a building. Maybe we can organize a design competition for the building. Surely we have some Society members with such talent.

At the same time we have to give serious attention to the upkeep and maintenance of the existing buildings. This spring the first order of business will be the necessary roof repairs. The Society will need to raise the funds to make these repairs possible. A part of the membership dues notice will have a section that you can check for a donation to the 2006 Repair Fund. Remember all donations are tax deductible to the extent allowed by the IRS.

Dietrich Werner

Consolidation of the Rosendale Cement Industry 1902

The Richard Ross Collection

1902 marked a very important milestone in America's natural cement industry. In that year, at the beginning of a new century, several of the major cement manufactures located in Ulster County, New York, were consolidated to form the Consolidated Rosendale Cement Company. Six formerly independent companies joined to form the new company. The six companies, F.O. Norton Cement Co. [Norton's brand]; New York & Rosendale Cement Co. [Brooklyn Bridge brand]; Newark & Rosendale Lime & Cement Co. [Newark-Rosendale brand]; Lawrence Cement Co. [Hoffman brand]; Lawrenceville Cement Co. [Beach's brand]; and Hiram Snyder's Cement Co. [XXX brand] were some of Ulster county's best known and established cement works.



A letter head showing all six brand names of the best know brands of the formerly independent cement companies that we consolidated in 1902 to form the Consolidated Rosendale Cement Company

In 1902 the total production of natural cement in the United States was 8,044,305 barrels. Of the total US production 3,577,340 barrels were manufactured in New York state, and of the New York total a good portion was manufactured in Ulster County by these six companies. Only A.J. Snyder & Sons in Lawrenceville, Miller's New York Cement Co. in Tillson, and the Newark Lime & Cement Co. in Rondout remained independent.

The details of this consolidation had been lost in the mists of the passing 100 plus years. This spring and summer Society member, Richard Ross, allowed the Society to scan and photocopy his collection of documents relating to the consolidation of the Rosendale cement industry, over 800 pages.

Every asset, both real property and personal property, of the F.O. Norton, Newark & Rosendale, Lawrence, and Lawrenceville cement company's are listed in great detail. The inventory of each company goes into such detail that it even lists office items; 1 typewriter, 1 box pencils, 1 box pins, and 1 water pitcher.

The six cement company's had a veritable fleet of vessels. Each steamer, barge and boat, often by name, are listed. (see the table for a listing the Newark & Rosendale Cement Company's fleet.) The steamers, were steam powered tugs and the barges were used on the Hudson River. The boats were

Newark & Rosendale Transportation Account

Steamer "Zenobia"

Steamer "Oregon"

Barge "Miller"

Barge "Whiteport"

Boat "J.A. Philbrick"

Boat David Scott"

Boat "F.M. Hoag"

Boat Charles E. Murtagh"

Boat "Henry P. Robinson"

Boat "John R. Brown"

A list of steamers, barges and boats owned and operated by the Newark & Rosendale Cement Company in 1901. [R. Ross Collection]

used on the Delaware and Hudson Canal to bring the cement to tidewater at Eddyville.

Of particular value are the detailed yearly reports created by E. Doremus, [see the Spring 2004 issue of Natural News for more about E. Doremus.] the superintendent of the Newark & Rosendale Cement Co., showing the cost of manufacturing cement. The Doremus reports covers the years 1858 through 1901. The 1858 report shows the following quantities of cement barrels manufactured:

March	4,214
April	13,697
May	14,307
June	15,582
July	15,604
August	12,027
September	12,631
October	14,285
November	11,835
December	5,640
Total for 1858	119,822

That is a lot of cement! Each barrel contained about 300 pounds cement. Thanks to Richard Ross all this information is now available to the public.

Another Barrel of Rosendale Cement Sold !

Mr. D. P. Murphy, located in Everett, Mass., a dealer in coal, wood, drain pipe, lime, cement, hair, etc. sold one barrel of Rosendale Cement to G. Cockran for \$1.25 plus sand valued at 25 cents on May 1, 1903. There is also a note on the in-

voice (shown below) that the cement was to be delivered to Browns house at Ellwood Place in Revere, Mass. One barrel of cement weighed about 300/315 pounds equal to about 3 to 3 1/2 bags of our modern cement.



Troubles at the Cement Works at Whiteport

Transcript of a letter written by Hugh White in 1838.

Greenkill Mills 26 April 1838

My Dear Wife

I arrived here this morning safe and sound but found matters going rather dull; first the vessel by which we expected 6 or 700 emty Barrels has not arrived; consequently we are And obliged to let the cement run upon the floor. The Kilns are rather cool, therefore we do not as much cement as usual, they are rather delicate chickens— (which puts me in mind of setting some hens, You have nothing to do but to leave 12 or 14 fresh eggs under the hens which incline to set.) wanting close and unremitted attention. I have not been about far enough to see how all things are moving in the woods; but from Lewis report they are rather sick. I wish you to send Richard to Waterford, and tell Samuel Barker to call upon you; you can give him the following instructions: Let him prepare to come here, put up his cloths &c; go to Albany, call upon Charles A. Keeler; and inquire whether the waggons have been sent up from Hudson, if they have and the harnesses with them, let him return and take the team I purchased of Him, and hitch it before 2 of the waggons; and come down here with them; at the same time let our man go down with the other horses and take the other two waggons home; and I will send a man from here after them; in case the waggons have not arrived let Barker come directly here, and go with me to Sing Sing. Let him call at Frys Hardware store in South Market St. Albany, directly opposite to E. Connings & Co. Store, and get 4 plane irons; which I left on the counter; last evening; I bought 4 coopers adds there, & a Molasses gate at Frys; and went off, without the Plaine irons, which I bought of Conning & Co. The plaine irons are for Coopers Jointers, 4 in one paper; I will repeat the directions about the field and lumber ; I want Richard to go every day to Peabadus Shop, and take what Barrels he has ready to the Bru... mill, and have Lebas fill them as I him; and as soon as the vessel arrives, let both teams, i.e. the double waggon & Richard take the filled barrels to the vessel, not waiting for them to unload, and as soon as the barrels are delivered let the double team begin and draw the boards, from Harvey Scotts; 1000, in number to the vessel; & 500 home to the house. And pile them up in the cow lot or pasture near the pond and pine tree. Let Richard get the Barrels from Peabodus, and take them down to the vessel, after they are filled, until the vessel is ready to leave. I expect he will have about 100 ready by Tuesday next;— but let them be brot away as fast as they are ready filled and when the vessel arrives put them on board,— I want the waggons to take ten at each load i.e. the double waggon; when they cart to the vessel. Let the man busy himself in taking all the manure out of the barn yard and spread it on the corn field; Richard will attend to the Garden. The Team is waiting and I must close now please understand the matters as they are written.

Your husband H. White

David Oliver Saylor

Cement Manufacturer

It is with great pleasure that we reprint (with permission granted by Troy Boyer, Executive Director of The Pennsylvania German Society) a paper read by Benjamin L. Miller at the Pennsylvania German Society's thirty-eighth Annual Meeting held at Easton, PA, on October 12, 1928 and published by the Society in 1930. David Saylor, who was born in 1827, the same year that natural cement was first commercially shipped via the Delaware and Hudson Canal from the Rosendale area. I have taken the liberty of adding images to Miller's paper. The title of Miller's paper was; CONTRIBUTION OF DAVID O. SAYLOR TO EARLY HISTORY OF THE PORTLAND CEMENT INDUSTRY IN AMERICA.



David Oliver Saylor

Photo: Radford's Cyclopedia of Construction. 1921.

The beginnings of any important industry are of general interest and particularly so when the industry attains a position where it contributes materially to the comfort and happiness of a large part of the population. The Portland cement industry belongs to this type and justly deserves to be ranked among the foremost forces contributing to the development of the present industrial age in which personal comforts and pleasures are greater than in any earlier stage of civilization. Some persons have suggested the designation of "the new stone age" for the present period because of the wide and ever-increasing use of Portland cement and imply by the use of this term an epoch comparable to the "old stone age" in the progressive development of the human family. Few of the warmest advocates of Portland cement, however, would attribute a preponderating influence to this one product, although readily admitting that it has been highly important in the progress made during the last half century and promises even more for the future.

Henry Ford has frequently been called the greatest benefactor of this generation, especially by Europeans, but the

automobile without good roads could not have accomplished what it has in the way of broadening and enriching human life. Of course, Portland cement is not the only good road-making material, but it certainly is the best as indicated by its increasing use for this purpose and therefore properly shares with the automobile in the advancement of transportation. The person or persons mainly responsible for the present Portland cement industry may therefore deservedly be termed the benefactors of existing and future populations.

Turning to another branch of our industrial life, we wonder what would have happened in our structural trades without Portland cement. With lumber supplies decreasing and costs increasing, some substitute was needed. Natural stone, of course, exists in enormous quantities and has the advantage of greater permanence, but is entirely too expensive for most structures because of the amount of high-priced labor required in the quarrying and dressing of the product. Iron and steel have come into more general use in building structures as this important metal industry has progressed, but they are too expensive for many purposes and also not well-suited in certain cases. Surely the coming of Portland cement was a God-send and it appears almost providential that David O. Saylor appeared on the horizon as an eager and intelligent experimenter during the days of reconstruction following the Civil War.

In order to appreciate the work of Mr. Saylor in the development of Portland cement, it is well for us to go back some years and trace the history of cement generally so that one may properly appreciate his contribution.

EARLY USE OF CEMENT

No one knows when the use of lime for mortar started, but certainly the ancient Egyptians had learned that the burning of limestone to drive off the carbon dioxide yielded a product that possessed binding properties and was accordingly valuable in the construction of walls and buildings. The ancient civilizations of the Andes were not familiar with lime, hence they were required to dress the stones for their walls much more exactly.

Centuries later came another great advance, when some of the Romans living in the vicinity of Vesuvius discovered that lime and finely divided volcanic debris produced a cement that possessed superior properties as a mortar and this product was largely substituted for lime alone. Much cement of this kind can be seen in many ancient structures throughout Italy, especially in Pompeii, where the writer recently had opportunity to examine some of the Roman cement baths discovered in the process of uncovering that ancient city. [A sample of Pozzuolan cement mortar from Pompeii is on exhibit in the CHHS Museum.] The cement shows no signs of deterioration although more than 2,000 years old, and is actually harder than most of the natural stones of that region. This cement has been called Roman or Pozzuolan cement and was not only made and used throughout Italy, but was produced in other parts of the world where volcanic ashes occur in the centuries that followed.

The next decided advance in cement manufacture was made in England, where about 1756 an engineer, John Smea-

ton, through experimentation succeeded in producing a cement, made by burning impure limestone or mixtures of limestone and clay that would harden under water as mortar made from lime will not do. This was used in the building of the Ed-dystone light house off the coast of Cornwall, where previous attempts to build a light house has met with disaster. Following Smeaton's success, many kinds of Hydraulic cements were made by engineers in France and England during the next 60 years and various patents were issued. All of these cements were similar in that the various ingredients were burned at temperatures only sufficient to drive off the carbon dioxide from the calcareous material used—limestone, chalk, or marl.

It was not until 1824 that the next important discovery was made. In that year an English bricklayer, Joseph Aspdin, produced a cement which, on hardening, suggested to him the famous Portland oolitic limestone of the Isle of Portland in the English Channel, long used for building purposes. He obtained a patent on his process and called the product Portland cement. His essential improvement was in the burning of the chalk and clay at much higher temperatures than those formerly employed in the manufacture of the various kinds of hydraulic cement. Aspdin is generally credited as the "father of the Portland cement industry," although there is some dispute as to whether he employed the methods that are now regarded as essential for the production of Portland cement as we know the product today, viz., the burning of the raw material to incipient vitrification. Compared with present standards it was probably a rather poor Portland cement though a distinct advance.

During the next 30 to 40 years, Portland cement manufacture extended to other European countries: first to Belgium, where a son-in-law of Aspdin carried the process, and then to France, Germany and Austria. Improvements were being made from time to time until finally the product became recognized as superior to the natural hydraulic cements formerly used. Meanwhile, Portland cement in small shipments began to filter into America, where by good salesmanship it finally gained a foothold in competition with hydraulic natural cements made in quantity in New York, Pennsylvania and other states in the East and Middle West in spite of its greater expense. Immediately after the Civil War, the shipments increased steadily until soon foreign Portland cement became one of the widely used structural materials.

During this expansion of the European Portland cement industry, the United States did not participate except as purchasers and users of the imported product. The reason for

this apparent inertia was mainly the general belief that chalk or soft limestone such as exist in England, France, Belgium and Germany was essential for the manufacture of this new cement and the absence of these along the Atlantic border and throughout the limestone regions of the Mississippi Valley.

MANUFACTURE OF NATURAL CEMENT IN AMERICA

However, natural hydraulic cements had been produced in several places, especially in the Hudson River Valley. These were used in the construction of locks along canals that were so extensively built during the first half of the last century.

In New York the construction of the Erie Canal in 1818-19 led to the discovery of natural hydraulic cement; in Pennsylvania the digging of the canal of the Lehigh Coal & Navigation Company accomplished the same object. Rock suit-

able for hydraulic cement was found just above Lehigh Gap, where Palmerton is now located, and also at Siegfried's Bridge, (now a part of Northampton). The rock at the former locality seemed to be preferable and a cement mill was built at Lehigh Gap under the direction of the company's engineers. This was operated by Samuel Glace from 1826 to 1830 and furnished material for many of the canal locks. When the best cement rock near Lehigh Gap was exhausted, for a time material was quarried about six miles east of the Gap and hauled to the plant. However, in 1830 it was decided

to abandon the mill and erect a new one at Siegfried's Bridge. In a small pamphlet by William H. Glace entitled "A Narrative of Hydraulic Cement Mined in the Lehigh Valley" the following description is given:

"Capt. Theodore H. Howell, residing at Siegfrieds, informed me that when he came there in 1837 there were four kilns erected and in operation. They were known as draw kilns, drawn at the bottom and hoisted up an incline plane or tramway and emptied into a hopper, where the stone was crushed by machinery shaped like a corn crusher, then placed in boxes or trays with handles, then dropped down and ground by buhr millstones, then transported in scows to points on the canal where needed. At that time the capacity of the plant was ten barrels per day."

Natural hydraulic cement continued to be manufactured in the region as shown by the following quotation from "History of the Lehigh Valley" by M. S. Henry, published in 1860.

"on the eastern side of the river, directly opposite the



**Medal of Merit awarded to Copley Cement Company's
For Saylor's Brand Portland Cement at the Centennial 1876
Drawing: Illustrated History of the Centennial Exhibition. 1876.**

**At the 1893 World's Columbian Exposition Copley cement had to share
the honor of a cement award with the Lawrence Cement Company's
Hoffman, Shield and Improved Shield brands of Rosendale
natural cement.
New York at the World's Columbian Exposition. 1893**

village (Whitehall, now Cementon), are the extensive Hydraulic Cement Works of E. Eckert and Co. These works have been in successful operation for a number of years, and the cement (which is mined in the neighborhood) is said to be equal in every respect to the celebrated Rosendale cement."

WORK OF DAVID O. SAYLOR

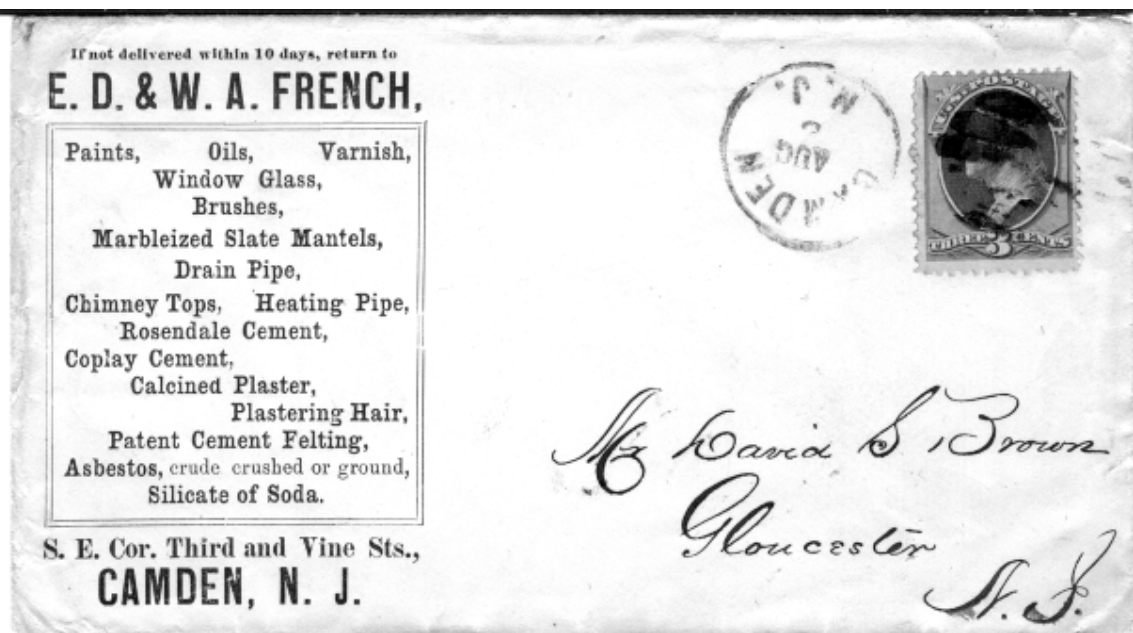
At this stage David O. Saylor enters into our narrative. The writer has been able to collect considerable information concerning the work of Mr. Saylor and his personal characteristics from published sources and from people still living who knew and worked with him. The two paragraphs following are largely taken from an obituary notice in an Allentown paper following his death on July 21, 1884:

David Oliver Saylor, of Pennsylvania German ancestry, was the son of Samuel Saylor and his wife Margaret, whose maiden name was Paules. He was born in Hanover Township, Lehigh County, October 20, 1827. The record in the family Bible says he was christened by Rev. C. L. Becker and confirmed at Christ Church, Hanover, by Rev. Joshua Yeager. As a youth he enjoyed the educational advantages afforded in those days and he gained the rudiments of a common school education. His father conducted a general country store in Butztown for some years and David, showing business capacity, assisted in its management. Later on the family removed to Schoenersville, where the father for many years kept a store. Here David also assisted and eventually relieved his father of the management. While yet a young man and in the service of his father, the burden of the business fell on him and he discharged his duties with great credit. Tiring of the store business, he disposed of it in 1865 and moved to Allentown. Here he engaged in truck farming for about a year. Up to this point he had not demonstrated any special ability other than faithful performance of duties.

Krouse of Coplay and induced him to look at it. Mr. Lewis Knauss is also given credit for interesting Mr. Saylor in the Krouse farm by telling him that he had proved that good hydraulic cement could be made from the stone exposed along the Lehigh Valley Railroad and almost forced Mr. Saylor to go with him to examine it. The result was the purchase of the property and in the spring of 1866 the Coplay Cement Company was chartered for the manufacture of natural hydraulic cement, the stockholders being Mr. Saylor, Mr. Rehrig and Adam Woolever. Mr. Saylor was president and superintendent of the company from its organization, and its success was in no small measure due to his enterprise and determination. The concern was started on a small scale, but it grew and prospered until it was recognized as one of the leading industrial establishments in the Lehigh Valley.

It appears that Mr. Saylor displayed considerable originality as soon as he entered the cement business and carried on experiments for the purpose of improving his product. He soon took out a patent on a cement to which he gave the trade name of "Anchor" but this was still a natural cement burned at low temperatures.

Just before and during the Civil War the European cement manufacturers made many improvements in their Portland cement which they now burned to incipient vitrification. This superior cement appeared and attracted attention in this country immediately after the Civil War and came to the notice of Mr. Saylor. He and Mr. Rehrig are reported to have started experiments to make a similar product at their plant at Coplay soon after they entered the business. Mixing high grade limestone from the lower beds exposed in their quarry with more argillaceous strata above, grinding the stone in a coffee mill and burning the mixture in the cook stove or in a blacksmith's

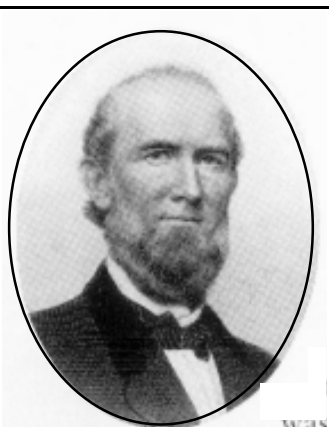


Building Supply cover advertising Rosendale Cement and Coplay Cement.

In the winter of 1866 he contemplated engaging in the slate business with a Mr. Morgan, of Slatington, when he met Mr. Esaias Rehrig, later president of the Allentown National Bank, who spoke of the cement rock on the farm of Christian

forge, they finally succeeded in approximately duplicating the foreign Portland cement. We do not know how many failures and disappointments resulted but we learn that success was

attained only after experimentation carried on for a number of years. Explanations for the failures were not always forthcoming and the rule-of-thumb method prevailed to a large extent. Ingredients were varied as well as conditions of burning and grinding. Good fortune was with Mr. Saylor in that the Coplay quarry contained stone that possessed all the elements now known to be essential to the manufacture of Portland cement and containing no injurious materials. Had the quarry yielded high magnesian stone or other undesirable material all of his efforts might have been in vain. In the latter stage of his work, after promising results had been attained, a small upright kiln for still further experiments was erected at the Coplay plant. Feeling that he had perfected a practicable process, he applied for a patent in 1871. The application reads as follows:



James B. Eads

Used Saylor's Portland Cement in construction of the Eads Jetties in 1878-1879.

Photo:
American Heritage.
August 1969.



Coplay Cement Company's Schoefer kilns at Coplay, Pa. Erected in 1893.
Photo: Radford's Cyclopedia of Construction. 1921.

It may of interest to note that the Coplay Cement Company continued to manufacture two types of natural cement under the brand names; Anchor Brand Rosendale Natural Hydraulic Cement and Commercial Brand Natural Hydraulic Cement. Also that in the production of Saylor's Portland cement a small amount of Natural Cement is added to the mixture used in making the bricks which are then fired in the kilns.

[Frederick H. Lewis. The Cement Industry. Engineering News. 1900]

UNITED STATES PATENT OFFICE

David O. Saylor, of Allentown, Pennsylvania.

Improvement in the Manufacture of Cement.

Specification forming part of Letters Patent No. 119,413, dated September 26, 1871.

To All Whom it May Concern:

Be it known that I, David O. Saylor, of Allentown, in the County of Lehigh, State of Pennsylvania, have invented a new and improved cement; and I do hereby declare that the

following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same.

I have discovered that some kinds of the argillo-magnesian and also argillo-calcareous limestone found along the Appalachian range, containing more or less carbonate of lime, magnesia, silica, alumina, iron, salts, and alkalies adapted to the purpose, and which are now extensively used in the manufacturing of hydraulic cement, will make, when burned to a state of incipient vitrification, so as to be agglutinated, warped, or cracked, by contraction, and some burned to cinders, a very superior and heavy hydraulic cement, weighing from one hundred and ten pounds to one hundred and twenty pounds per bushel, and in every respect equal to the Portland cement made in England and imported into this

country.

The ordinary cement now in our market such as Rosendale, Coplay, and other American brands, are burned with the least possible degree of heat. The stage of calcination is arrested before it fuses or is contracted; should any of it do so it is thrown away as worthless. I propose to burn this stone to the condition above indicated. After this calcination a selection is made and the pulverulent and scarified portions of the mass is picked out and thrown away. The remainder is then passed through a crusher; then through a mill consisting of ordinary sand, or buhr-stone. The manufactured material is then placed in a layer of from two to three feet thick over the floor to a cool shed and left exposed to the air for about four weeks before it is fit to use.

The stone which I use for the purpose contains the same ingredients as the composition used for making Portland cement, and the products cannot be distinguished from each other except by treatment.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process of making hydraulic cement from argillo-magnesian and argillo-calcareous limestone, substantially as herein specified and described.

2. As an improved article of manufacture, hydraulic cement produced from argillo-magnesian and argillo-calcareous limestone, substantially as herein specified and described.

DAVID O. SAYLOR.

Witnesses:

Edwin Albright

Augustus Weber.

His difficulties, however were not at an end as he had not yet mastered the process. Some of the cement was the equal of the foreign product, but some was decidedly inferior and after a time crumbled. This was mainly due to the fact that the eye determination of the proper mixture of the stone was not sufficiently accurate, the burning was not uniform, and the grinding was not always done with sufficient care.

Notwithstanding the fact that Saylor's Portland Cement was not always uniform and satisfactory, he exhibited it at the Centennial Exposition in 1876 and received an award of merit. Saylor's first great triumph in winning recognition for

four feet at the top. At the bottom of the kiln a layer of wood was placed and then alternate layers of coke and dried bricks of the cement ingredients. These had to be carefully placed in the kilns by hand. Openings in the kilns at different levels facilitated their filling and later these were closed by brick. When the kiln was filled, the wood at the base was ignited and the burning took place.

After the burning process was ended the resulting product was taken out at the base of the kiln. Portions that had been burned to partial fusion formed large or small masses of clinker which were broken into sizes easily handled and sent to the mill for grinding. Those portions insufficiently burned were again moulded into bricks for re-burning. At times as much as 40 per cent. required further burning. For some time, the clinker was ground in a mill that was set up in an old distillery about half a mile away but later a new mill was built near the quarry and kilns.

These intermittent kilns of small capacity and requiring a large amount of hand labor were used at the Coplay plant until about 1892 or 1893, when they were replaced by the con-



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CANADIAN LIFE INS. BLDG.
MONTREAL, P. Q.



Advertisement in The Brickbuilder. September, 1899 issue placed by Commerical Wood & Cement Co., agent for Coplay's Portland and Natural cements, as well as other brands of cement made by the Glens Falls Portland Cement Co. and the Beaver Portland Cement Co. Coplay's use of the name 'Rosendale Cement' shows the cachet that 'Rosendale Cement' had. Other manufacturers of American natural cement followed the practice of calling their natural cement 'Rosendale'.

his product came with the selection of Saylor's Portland Cement in the construction of the Eads Jetties at the mouth of the Mississippi River in 1878-79. Its merits were there firmly established, and thereafter success was certain.

In his further regard he was ably assisted by Mr. John W. Eckert, whom he engaged as chemist to assist in the making of chemical analyses while Eckert was still a student at Lehigh University, and in 1878 as a full time employee. Mr. Eckert became the first cement chemist in this country. Correct chemical composition soon became recognized as one of the most important attributes in the manufacture of high grade Portland cement and since that time chemists have been attached to the manufacturing staffs of all cement plants. In addition to his duties as cement chemist, Mr. Eckert was given charge of the manufacturing operations in 1879, a position which he held for several years. Some of his analyses as well as tests of Saylor's Portland Cement are published in Report DD of the Second Geological Survey of Pennsylvania, issued in 1878.

The process of manufacture used by Saylor was simple and primitive when compared with modern practice. The ingredients were ground, mixed with water, and moulded into bricks first by hand and later by brick-making machines. These were dried naturally or by steam pipes and then placed in upright bottle-shaped kilns from 30 to 40 feet in height and from 12 feet in diameter, where the greatest bulge occurred, to about

tinuous upright German Schoefer kilns. A little earlier the rotary kilns developed in England were introduced by a neighboring company that later became the Atlas Portland Cement Company. The rotary kilns are now used by all the cement companies. They have undergone marked changes, especially in increased size. From a length of 24 feet they have been increased to 343 feet. The diameter has also increased from less than six feet to 10 or 12 feet in some mills.

Up to the time of Mr. Saylor's death the bottle shaped intermittent kiln was the only type used in this country and the process of manufacture was expensive, notwithstanding the cheap labor, because of the large number of men required. The best these kilns could do was to produce 150 to 200 barrels of cement every ten days, as against 15 to 20 barrels per kiln per day at present with fewer men. It was, therefore, necessary for the Coplay Company to build additional kilns and in 1882 it had 13 kilns for the manufacture of Portland cement and four for the production of Natural Anchor cement. A total production of 600 barrels per day of both kinds of cement required the services of 150 men.

Although Saylor had proved that good quality Portland cement could be made from the cement rock of Lehigh and Northampton Counties and other mills shortly started in the same vicinity, still the business was not highly profitable. It was hard to convince the users of cement that the American

manufacturers had succeeded in producing Portland cement of the same quality as that imported from Europe. Naturally the importers did all they could to discredit the home product and the American Portland cement gained recognition slowly.

That Mr. Saylor lived to see only the beginnings of the American cement industry is evidenced by the fact that this country produced only 82,000 barrels of Portland cement up to 1879, while in that year alone 106,000 barrels of foreign Portland cement were imported. In 1884, the year of Saylor's death, 585,768 barrels of foreign cement were imported and only about 100,000 barrels produced in the United States. This should be compared with a production of 170,000,000 barrels produced in this country in 1927.

Mr. Saylor was married June 11, 1867, to Miss Emma M. Saeger, daughter of Eli J. Saeger, Esq., of Allentown. His domestic life was very happy, and five children blessed the union, four of whom—three daughters and one son—with the mother, survived him. He died on July 21, 1884, at the age of 56 years, 9 months. He was in poor health and inactive sometime before his death. His only sister was the wife of Adam Woolever, one of his partners. Mr. Saylor was a man of pleasing personal appearance, large in size, weighing over 200 pounds, agreeable in manner, candid and outspoken, generous and open-handed, qualities which greatly endeared him to a large circle of friends. He was an enterprising business man, took an interest in the welfare and prosperity of Allentown, his home town, and the entire Lehigh Valley, and contributed materially to the growth and development of both.

Mr. Saylor owned a half interest in the fire-brick works of Ritter & Saylor, and was one of the leading stockholders of the Blue Vein Slate Company, of Slatington, of which he was for a time president. As a member of the Allentown Board of Trade, Mr. Saylor was distinguished for the zeal he displayed in securing to the city new enterprises. He was for many years the treasurer of the board, and he was one of the committee who visited Paterson and induced the Phoenix Manufacturing Company to establish the Adelaide Silk Mill in Allentown. He was active in securing this institution, in which he took great pride. He was a member of the Masonic order. He never sought political favors and never held office.

Mr. Saylor's contributions to the Portland cement industry of this country are difficult to evaluate. Undoubtedly he was the moving spirit in the experiment carried on by himself and his assistants and associates and is therefore worthy of the title of "Father of the American Portland Cement Industry" even though we recognize that success was attained only through the efforts of many workers. Although he laid the foundations of an industry that has since his death made fortunes for many persons, he profited little financially and at his death is said to have been a comparatively poor man. It was not long after his death that his company and others located nearby began to realize on their investments as the merits of the American product gained recognition and many of the manufacturing difficulties were overcome. It is to be regretted that Mr. Saylor died before he could see the full fruition of his endeavors and the public approval of the product in which he had so much faith. These he might have seen and in addition profited financially had he lived the so-called allotted years of Man. It is interesting to know that his partners, Rehrig and Woolever, died about the same, all within two years.

Since Lorado Taft, the well-known sculptor, has dem-

onstrated the effectiveness of Portland cement in decorative monuments, what would be more appropriate than a suitable structure somewhere within the Lehigh Valley to commemorate the achievements of David O. Saylor, the founder of the Portland Cement Industry in America?

Taft sculpted this 40-foot statue of Black Hawk on a bluff near Oregon, Il. Completed in 1911 the sculpture can be seen for miles around. It represents the American Indian saying good-bye to his homeland. Taft gambled successfully on the use of cement as his medium. Photo and more info:
<http://www.oregonil.com/sculpture-trail.html>



Saylor Park in Coplay, PA, opened in October, 1976. The kilns and museum honor Saylor's contributions to the cement industry.

Saylor was also honored by having a ship made of cement named after him during WWII.



Arthur Newell Talbot sister ship to the S.S. David O. Saylor

S.S. David O. Saylor

Just as steel had become scarce during the First World War, the Second World War was again consuming the country's steel resources. In 1942, the United States Maritime Commission contracted McCloskey and Company of Philadelphia, Pennsylvania to build a new fleet of 24 concrete ships.

The S.S. David O. Saylor was the first concrete ship built by McCloskey and Company in Tampa, Florida. She was launched in November of 1943 but was initially unable to sail due to improper pouring of the concrete, which was eventually fixed. In March of 1944, the David O. Saylor and the S.S. Vitruvius set sail for Liverpool, England to join a fleet of ships to participate in the D-Day invasion of Normandy. On July 16, 1944, the S.S. Vitruvius and Saylor were partially sunk to form the "Gooseberry" breakwater off the coast of Normandy, France. At the time of her sinking, she was still visible above the water. How much is left of her now is unknown. Gross Weight: 4,690 Tons Net Weight: 2,738 Tons Dimensions: 102.53 meters x 16.45 m x 10.66 m.



Sammon's Hotel. Destroyed by fire in the great Fire of 1895
Photo: Rosendale News

The Rosendale News

No. 2 Vol. 4

Friday, March 7, 1941

ROSENDALE, N. Y.

PRICE TWO CENTS

Stormy Scene Marks Board Session

**Board Members Engage
In Acrimonious Dispute**

COMING EVENTS TO-DAY

Meeting—Rebekah Lodge in the
Grange Building
Meeting—Rosendale Sportsmen at
Herman Oamers' in Tillson

Monday

Meeting—The Rosendale Grange at
Grange Hall, Rosendale.

ROSENDALE QUARANTINED

Dr. Rymph, health officer of the
Town of Rosendale notified us to-
day that the Town will be under
quarantine until further notice. This
is being done to protect the people.

From now on, all dogs must be
muzzled and those owners of
dogs who disregard the law will

R. T. A. Holda rubicity Meeting

At the last meeting of the Rosen-
dale Township Association, which
was held at Whiteport Tavern, in
Whiteport, Thursday, Feb. 21, plans
were laid for the coming reunion
which will be held in New York City
on Friday, April 18, 1941.

A large committee was appointed
to make sure this reunion will be as

The Century House Historical Society and the Rosendale Library Local History Group joined in an effort to make available many of the issues of the first five years publication of Rosendale's home town newspaper—The Rosendale News. Linda Tantillo, Rosendale Library staff and Society volunteers have made copies of all the issues of the newspaper that were placed on loan by the owner of the newspaper. Linda first made a hard copy of each page reduced to 8 1/2" x 11". These copies in turn were scanned by Society volunteers and saved on 4 CDs.

The issues in this collection start with volume one, number 38, published on Friday, November 18, 1938 and then a majority of issues to the January 1943 issue. Henry Dittmar, of LeFever Falls was editor and publisher. The paper soon added Joseph Fleming as associate editor. Melvin Fein was the sports editor and R.C. O'Brien was the Radio editor. Mr. Fleming was the author of a special feature, started in the November 1938 issue, called *Do You Remember*. It was a local history column which often was accompanied by an old time photo. The photo of the Sammons Hotel shown above is an example. Mr. Fleming's focus was Rosendale during its cement manufacturing heyday. Fleming wrote at least 194 *Do You Remember* articles. Number 1 (November 18, 1938) is a story about the James B. James cement company and number 194 (January 29, 1943) is a story about the Delaware and Hudson canal and the wild days of the "Roaring Valley." Fleming had intentions of publishing a history of Rosendale, but never did.

The Rosendale News ceased publication in the early 1960s. In August, 1963 The Rondout Valley Times began publication. Bernard V. Wainer, of Ellenville was the editor and publisher. We continue to search for issues of local newspapers so that we may add to our archive of this important local history tool. If you find any, contact us to check if you have a missing issue.



The Royal Gazette

Reinventing Rosendale, the natural cement

Article published November 4, 2005

HERITAGE MATTERS by DR. EDWARD HARRIS MBE [Reprinted with permission of the author]

HERITAGE is the unconscious cement that holds societies together and built – heritage would not exist without the cements, mortars and concretes that keep it whole. For thousands of years, monuments and buildings have been erected which express in stone the ideals of a community.

For most of that time limestone, one of the most plentiful rocks on earth, has been an essential building stone. It is also burnt to produce quicklime that is the major binding ingredient of the mortars that glue stone blocks into buildings.

Stronger cements are often required and the ancient Romans found the ingredients for natural cements, the cousins of lime mortars, in the ancient ashes of the great volcanoes near Pompeii. Without mortars and cements, we would have very little in the way of permanent heritage, even in Bermuda. The country was lucky to have supplies of soft limestone for cutting into building blocks and a harder variety to burn in limekilns, of which many survive if unused.

The town of St. George's is a World Heritage Site, not because its people may be outstanding Bermudians, but because it has been built of stone in a special style for several hundred years. Heritage and cement outlast people and we should be reminded often that we are but short-lived trustees of the built treasures of the past.

In the early 1800s, the building of canals in Europe and North America was an industrial craze, as companies sought cheap freighting by barge for their manufactured goods from the interior to the coast for oceanic shipping. An unintended achievement of canal building was the tremendous advances in geology, as the cuttings revealed details of the earth not previously viewable. The cuttings also exposed rocks of economic value. When excavating for the Delaware & Hudson Canal at Rosendale, New York, dolomites capable of making cements rather than mortars were found. For 75 years from 1825 onwards, Rosendale supplied 50 per cent of the natural cement for the rapidly expanding United States, including such structures, now major heritage monuments as the Brooklyn Bridge and Fort Jefferson in the Dry Tortugas off Key West. The name of Rosendale became synonymous with high-quality, natural cement and the town today is a unique industrial site worthy of World Heritage status.

Rosendale produced an average of five million pounds of cement each year, but after the First World War its industry fell victim to the manufacture of artificial Portland cement. Portland cement did not rely on specialised rocks for its creation and so could be made anywhere. One cement company survived at Rosendale until 1970 and for the next three decades Rosendale natural cement was all but forgotten.

Then a few years ago an architect, Mary Catherine Martin, working on the restoration of Fort Jefferson found that it was built with Rosendale cement, no longer obtainable. The discovery led her to Ken Uracius, a "gruff, barrel-chested mason with a Boston accent", who almost single-handedly is leading the charge to reinvent Rosendale cements.

Uracius believes that buildings should be restored using the same materials of their construction, but was unable to get natural cement for preservation projects.

Like lime mortars, natural cements breathe due to their porosity, without giving up any of their strength or flexibility. Portland cements breathe very little and are too inflexible to use in many

contexts, including restoration of Bermuda limestone architecture.

Ken cites an example of a university building where the mortar pointing, originally natural cement, was redone in a Portland cement. Instead of moisture evaporating through the pointing, it was trapped behind it and migrated into the stonework, turning the façade of the building into a slime of mildew and mould.

His research led him to Dietrich Werner at the Century House Historical Society in Rosendale, which preserves artifacts of the natural cement industry and to experiments in the making of natural cement, during which laboratory work he almost burnt down his garage. "It took me about six months to figure out how to get the rock to burn. I tried coal, but eventually bought a kiln and used electricity."

He then found Edison Coatings of Connecticut, a chemical engineering firm specializing in the development and production of customized mortars and coatings for restoration work. Ken Uracius and Michael Edison have now started to produce Rosendale cement on a limited scale for restoration purposes.

It was a privilege to visit some of the old mines at Rosendale with Uracius. The workings follow the strata of cement-making limestone deep into the hills.

After the first hundred yards into the mine, it was pitch-black, with a steady, cool temperature of 68 degrees. The mineshafts criss-cross one another, so it is possible to fall through from one level to another, never to be heard of again.

Fortunately, our flashlights held up and we reached the area where Ken is taking out stone. Water was dripping from the overlying strata that are held up only by columns of stone not quarried away and lakes have formed in what were once the floors of the mine.

Before claustrophobia and sheer terror of the dark set in, we completed the tour and debouched into the pale sunlight of woods that have colonized the once open ground outside the mines.

The built heritage of the Rosendale works surrounds one in the place. Great banks of kilns that were fed by railways overhead rise in immense man-made cliffs and everywhere are the gaping mouths of mineshafts.

It is an industrial wonderland and heritage site perhaps without parallel in the United States, but like so many worthy monuments, it is being subsumed and destroyed by vegetation. Yet it was from here that most of the great buildings and fortifications of Victorian America took their sustenance in the form of natural cement, a major contribution to the wealth and progress of the United States in the nineteenth century.

Hope emerges from the Rosendale mines and last year the first Natural Cement Conference was held there to promote the revival of the use of its extraordinary cement. Perhaps we might take a cue from Ken Uracius and revive some Bermuda limekilns.

Lime mortars are the appropriate and natural materials with which our historic architecture should be restored. The harder, but popular Portland mortars will but cement the destruction of the very heritage we wish to save.

*Dr. Edward Harris, MBE, JP, FSA, Bermudian, is the Executive Director of the **Bermuda Maritime Museum**. The views expressed here are his opinion and not necessarily those of the Trustees or Staff of the Museum. Comments can be sent to drharris@logic.bm or to P.O. Box MA 133, Sandys MABX, or telephone 734-1298. [Reprinted with permission of the author. I apologize for the replacement of z for s. My spell check program does American English not the Queen's English.]*

About the Royal Gazette

Founded in 1828, The Royal Gazette is Bermuda's only daily newspaper, publishing every day except Sunday and public holidays. With daily circulation of more than 16,000 copies, the newspaper reaches more than 90 percent of the adult market. www.theroyalgazette.com

The Second American Natural Cement Conference
March 30—April 1, 2006
Washington, DC

For information & Registration: www.naturalcement.org

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Thursday, March 30, 2006

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John Walsh, Petrographer: *Identification of Natural Cement in Existing Buildings*

Laura Powers, Consultant Petrographer *Advanced Techniques for Identification of Natural Cement in Historic Mortars*

John Lambert, Mason, Consultant: *A Clearer Perspective on the Evolution of Early American Mortars*

Linda Willett, Executive Director & Frederick O'Connor, Project Manager *Traditional Mortars at Historic Harrisville*

Michael Edison, Chemical Engineer: *Natural Cement Formulation, Performance and Standardization*

Tour of Natural Cement Buildings, Bridges & Monuments in Washington, DC

Sponsored Dinner: *The Future of Public Funding for Historic Restoration*

Friday, March 31, 2006

Ken Uracius, Mason: *The Natural Cement Revival, Mortar and Stucco Demonstrations*

INTERNATIONAL SESSION: *Roman Cement – Europe's Pre-Portland Technology*

Tour – Harpers Ferry, Shepherdstown, Potomac River cement works and C&O Canal – with NPS interpreters: Christopher Robinson, Peter Dessauer, and Michael Siebert

Saturday, April 1, 2006

In-depth geology tour of Potomac River Cement mines or

Hands-on Natural Cement training workshop @ NPS Historic Preservation Training Center, Frederick, MD.

ABSTRACTS & BIO'S

Dr. Emory L. Kemp, Professor, Author, Engineer, Industrial Archaeologist:
Natural Cement Industry and Use in the Potomac Valley

ABSTRACT: Long before the current revival in use of original masonry materials in general and of

natural cement in particular, Dr. Kemp was one of a small group of visionaries studying natural cement history and technology and making use of natural cement in the restoration of historic canal structures. Dr. Kemp will share some of his thoughts and experiences while recreating the era when the Potomac Valley was the 3rd largest production center for natural cement, and when the rapidly-growing city of Washington, DC was one of its largest consumers.

BIO: Emory L. Kemp worked for the leading engineering consulting firms in England before receiving his Ph.D. in Theoretical and Applied Mechanics from the University of Illinois. He joined West Virginia University in 1962 to establish a graduate program in structural engineering. He founded WVU's program in the history of science and technology. Fostering the use of a material culture approach for the study of the industrial past, he has researched and preserved historic industrial sites around the country and overseas and has advocated their public interpretation. Kemp was a founding member and past president of the Society for Industrial Archaeology, and past president of the Public Works Historical Society. He celebrated the American bicentennial as a fellow of the American Council of Learned Societies at Imperial College in London. As a Regents Fellow at the Smithsonian Institution, 1983-84, he was involved in research on the history of suspension bridges. Since 1989 he has served as director of the Institute of the History of Technology and Industrial Archaeology at West Virginia University.

John Walsh, Petrography:

Identification of Natural Cement in Existing Buildings

ABSTRACT: Petrographic analysis is a microscopy method that provides a unique and revealing view of inorganic materials. Hydraulic cements rarely react completely and telltale residuals are detected when the forensic petrographer is properly trained in their identification. Combined with accurate chemical analysis, the petrographic examination not only identifies the original components but often allows for a quantitative assessment of material proportions and original binder chemistry. Such data is crucial for the proper conservation and rehabilitation of historic structures. Portland cement, hydraulic lime, and natural cement in any combination may be present in 19th century and early twentieth century masonry construction. A comprehensive petrographic examination serves as the basis for the successful creation and implementation of an historically accurate project specification. This presentation provides insight into how various contemporary and historic binders are properly distinguished and their mortars reverse-engineered. While technical data will be offered, the goal of the presentation is to provide the architect or specifier with a general understanding of the methods employed by the petrographer and to demystify the often complicated petrographic report. Case studies will be discussed with an emphasis on the pitfalls of an inaccurate petrographic analysis. Finally, the petrographic identification of the often misidentified Rosendale cement will be addressed with some discussion of current research into its various incarnations in historic structures.

BIO: John Walsh is a former NSF Graduate Research Fellow with a Masters Degree in Structural Geology from Columbia University. His early research focused on carbonate microstructure in natural fault zones; an experience ultimately leading to a career studying the microstructure of cementitious materials. He is now a Geologist and Senior Petrographer at Testwell Laboratories in Ossining, NY where he specializes in the reverse engineering of existing materials and investigating failures related to material deficiencies and environmental exposure. He is currently serving as Secretary of the Society of Concrete Petrographers and is active in various ASTM subcommittees. As a native fifth generation New Yorker, the investigation of construction materials and practices in historic NYC structures was a natural progression in John's career. He is currently researching the petrography and chemistry of the Rosendale cement that has played an important role in many of New York's landmarks and early infrastructure.

Laura Powers, Consultant Petrographer:

Advanced Techniques for Identification of Natural Cement in Historic Mortars

ABSTRACT: Building upon the foundation of Mr. Walsh's presentation, Ms. Powers will discuss scanning electron microscopy and other advanced techniques for characterizing and identifying natural cement in historic mortars.

BIO: Laura Powers is a Consultant Petrographer with the firm of Wiss Janney Elstner in Northbrook, IL. Ms. Powers is an expert in materials analysis with more than 25 years of experience in microscopical, chemical, physical, and field investigations of construction and geological materials. Her experience also includes product evaluation, project management, and research. Prior to joining WJE in 2003, Ms. Powers was Principal Microscopist at Construction Technology Laboratories, Inc. where she investigated causes of distress and failure in portland cement-based materials. She has lectured on petrographic and chemical analyses, concrete and masonry performance, aggregate evaluation, fire damage, and analysis of histori-

cal construction materials for universities, professional societies, and the Portland Cement Association (PCA). Ms. Powers created and was the principal instructor for a PCA workshop on concrete petrography.

John Lambert, Mason:

A Clearer Perspective on the Evolution of Early American Mortars

ABSTRACT: This paper presents a wealth of *new* research and information regarding the evolution of American unit masonry mortars during the late 1800's and early 1900's. In recent years, a significant amount of attention has been paid to the history of Portland Cement and lime putty binders, and their effects on our early American unit masonry mortars. This has been done at the expense of overlooking the use of hydraulic limes, natural cements, and dry hydrate binders and how their advent significantly changed early American mortars in the late 1800's and early 1900's. This paper more fully exposes the development, distribution and extensive use of these unique mortar binders, and explains why this new knowledge is important for architects, contractors, specifiers, building owners, engineers and craft persons today. The paper is based on excerpts from numerous writings obtained from period books and manuscripts of the time. The appropriate information has been carefully selected, organized and chronologically arranged for easy understanding and assimilation by the participant. The significance of this paper's content to the conference and the intended audience is that it is important that today's preservation professionals combine both modern day investigative technologies as well as historic factual information in order to determine the most appropriate repair mortar for our historic masonry buildings and monuments. This marriage will ensure the most enduring solution for these structures, and will assist in perpetuating their survival into the future.

BIO: John Lambert is President and CEO of Abstract Masonry Restoration, a 19 year old historic masonry restoration contracting and consulting company located in both Boston, Massachusetts and Salt Lake City, Utah. He has provided the historic masonry consulting and/or contracting services for several of America's most notable masonry buildings. John is actively involved in providing hands-on training to those interested in learning how to properly care for historic masonry structures. He is the instructor for the 3 to 4 day, hands-on workshops held at both The Campbell Center for Historic Preservation Studies in Mount Carroll, Illinois, as well as The Traditional Building Skills Institute at Snow College in Utah. Several of John's students join him each year in traveling to England and Wales to further study historic masonry and work on historic masonry buildings abroad. In addition to serving on several historic preservation related boards, his preservation leadership includes serving as the past Chairman of the Board of The Traditional Building Skills Institute. He has traveled and trained in England, Scotland, Ireland, Wales and France. He also serves on ASTM Subcommittee C12.03.03, the task group charged with developing new standards for restoration mortars. John is a passionate collector of rare and historic books, art and documents written on masonry during the 1700's to early 1900's. As an avid student of these valuable resources, he has gained unique insight into the minds of the architects, engineers and craftsmen of the time.

Linda Willett, Executive Director &

Frederick O'Connor, Project Manager

Traditional Mortars at Historic Harrisville

ABSTRACT: Cheshire Mill #1, Harrisville, New Hampshire, stands at the core of the Cheshire Mills and is the complex's most significant structure historically, architecturally and aesthetically. The continuous use of the building for woolen manufacturing has protected it from major alterations and preserved a unique architectural record as well as an archaeological record of manufacturing practices. Cheshire Mill #1 is of primary significance both to the Cheshire Mill complex and to the surrounding Harrisville National Historic Landmark. Completed in August, 2001, in preparation for major repairs, the Cheshire Mills Complex Historic Structures Report included masonry and mortar analysis for Mill #1. The mortars selected and the steps taken are described as exemplified through the treatment of the single granite block walls, including the preparation of lime mortars, the packing out of joints and the preparation and use of Rosendale cement for selective repointing.

BIO: Linda Willett graduated from the University of New Hampshire with a B.A. in Philosophy. She worked on the repair of historic buildings throughout New England for the Society for the Preservation of New England Antiquities (SPNEA) from 1989 to 1999, first as Property Care Manager and later as Curator of Buildings. Willett is a 2003 Quinque Fellow, and has been Executive Director of Historic Harrisville since 1999. Frederick O'Connor has had 35 years of experience in interior and exterior painting, wall treatments and trim work. Over the past 15 years, O'Connor has developed a specialty with historic structures, completed numerous training courses in the use of building limes for the repair of historic

buildings, and worked on a number of masonry projects both in the United States and in Scotland. He was the first Quinque Fellow, completing his fellowship with Historic Scotland in 2001 during his ten years of employment at SPNEA. O'Connor has worked as Historic Harrisville's project manager since 2002.

Michael Edison, Chemical Engineer:

Natural Cement Formulation, Performance and Standardization

ABSTRACT: This paper reviews the well-documented formulation practices from the 19th and 20th centuries, utilizing natural cement as the sole binder, primary binder, or as an additive in a wide variety of cement-based materials. These include masonry mortars, renders and stucco's, limewashes and early concretes. In most cases, restoration of these traditional materials will best be performed by duplicating the original formulations. Behind the formulation, there must be a clear understanding of natural cement performance and chemistry. What is natural cement, how does it perform and how does it differ from other traditional masonry materials? Edison will discuss these issues as well as the current effort to reinstate ASTM C10 Standard Specification for Natural Cement, withdrawn more than 25 years ago, when the last of the original natural cement producers closed its doors. **BIO:** Michael Edison, chemical engineer, is President and Founder of Edison Coatings, Inc. in Plainville, CT. His engineering career spans more than 30 years, during which he has worked extensively in the development and formulation of custom mortars and coatings for masonry and concrete. Edison is currently processing Rosendale natural cement rock into natural cements, and is compounding these materials into a variety of traditional masonry mortars, renders and concrete materials. He has authored a number of articles on repair and coatings technology and has been a frequent lecturer at restoration industry events. He has authored technical and historical articles published by *APT Journal of Preservation Technology*, *ICRI Concrete Repair Bulletin*, *ASTM Standardization News* and *SWRI Applicator*, among others. He is a past chairman of the Central New York Section of the American Institute of Chemical Engineers, a Past President of the Connecticut Chapter of the International Concrete Repair Institute and a current Director on the Board of the Association for Preservation Technology Northeast Chapter. He is Chairman of ASTM C1.10.04 Task Group on Natural Cement, working to reinstate ASTM C10 Standard Specification for Natural Cement.

Ken Uracius, Mason:

The Natural Cement Revival, Mortar and Stucco Demonstrations

ABSTRACT: Five years ago, Ken Uracius was a masonry restoration specialist working as Director of Restoration for a masonry restoration contractor in New England. As the European Lime Revival reached the United States, he became a student of traditional lime, lime putty and hydraulic lime technology and an active advocate of the use of historically accurate materials in restoration work. But the more he learned, the more he came to realize that 19th Century American buildings were very different in their construction, thus beginning his quest for the forgotten truth. The history and technology of natural cement use in the United States that he rediscovered led to the reintroduction of authentic Rosendale natural cement products for use in restoration.. In recounting his quest, Ken utilizes material demonstrations to illustrate key concepts. **BIO:** Ken Uracius has been working around masonry for all of his life, and has 20 years of experience in directing major masonry construction and restoration projects. He is currently with Stone and Lime Imports, a firm dedicated to technical support and training for traditional masonry materials.

INTERNATIONAL SESSION:

Roman Cement – Europe's Pre-Portland Technology

1. Roman Cement Mortars in Europe's Architectural Heritage of the 19th Century

Dr. Johannes Weber, Institute of Art & Technology, Dept. of Conservation Sciences, University of Applied Arts, Vienna, Austria

ABSTRACT: Roman cements calcined at low temperatures formed an important binder material in 19th Century building construction and facade decoration of many European cities and towns. As a rule, Roman cement mortars appear well-preserved. In order to understand the range of composition and properties of such cements and the mortars produced for casting and plastering, a number of samples from historic buildings were collected and analyzed. Microscopic techniques including scanning electron microscopy were employed along with the assessment of physico-mechanical properties. The study shows that the most significant feature of Roman cement mortars is a wide range of differently calcined clinker

relicts within each mortar. They were recognized as either underfired or overfired resp. poorly dispersed, and due to their amount and size these relicts play an important role for the mortar properties. The binder relicts are composed of a number of phases in the system Ca-Si-Al-Fe. C₂S and C₂AS (gehlenite) are amongst the most frequent compounds, their grain size and microstructure depending on the calcination temperatures. Especially the clinkers produced at lower temperatures show nonequilibrium features such as solid solution systems and zoning by partial diffusion namely of Ca and K into silica. The inert aggregates found in the mortars cover a wide range of mineralogical compositions, however with some distinct differences which reflect local geological situations. Cast and in-situ applied mortars differ in the amount of aggregate, which is generally lower for cast elements. There is no correlation between the amount of inert material and the state of preservation indicated e.g. by the occurrence of shrinkage cracks. Historic cast mortars show high compressive strengths at comparatively low modulus of elasticity. The total porosity is frequently high but depends on the conditions within the first months of curing. The paper will present the above-mentioned properties and discuss them in terms of the excellent ageing performance of the historic Roman cement mortars.

2. Calcination of Marls to Produce Roman Cement

Dr David Hughes, School of Engineering, Design and Technology, University of Bradford, Bradford, West Yorkshire, UK

ABSTRACT: Marls were identified from a range of European sources and assessed for their Cementation Index, as would have been the case in the 19th century. Three were selected for calcination in a laboratory kiln; two from Folwark in Poland (CI 1.75 and 2.00) and one from Lillienfeld in Austria (CI 2.03). Analysis of historical documents, whilst not revealing precise kiln conditions, does suggest that they were such as not to yield complete de-carbonation of the calcite. Consequently, a series of calcinations was undertaken in which the peak temperature control of the kiln was set in the range 730°C to 1100°C, with residence times in the range 150 minutes to 1250 minutes. The airflow through the kiln was sufficient to maintain a minimum oxygen content of at least 12%. The resulting clinker was ground to comply with the 19th century Austrian Norme. Pastes were produced at w/c = 0.65 and assessed for setting time and strength development (6 hours to 1 year). Both parameters were highly dependent upon calcination conditions with both "low" and "high" calcinations producing slower setting and slower strength development than intermediate conditions. Two strength development profiles were identified; one being the expected continuous increase of strength, albeit with a declining rate of increase with time, whilst the other showed a 3 step sequence of high initial strength, a dormant period which could last for many weeks and a final increase in strength to an age of 1 year. The cements were compared using X-Ray Diffraction (XRD). Considerable variation in the composition was noted and related to the calcination conditions. Of particular interest is the formation of both a/-belite and b-belite under differing calcination conditions. Clinker particles were also compared using the SEM in both secondary electron and back-scattered electron imaging modes and the development of morphology observed. Optimum calcination conditions for two marls were identified and an electric kiln designed to produce larger quantities of cement for both laboratory and workshop assessment by practicing conservators.

3. Hydration Processes in Pastes of Several Roman and Natural Cements **Renata Vyskocilova, Faculty of Restoration, University of Pardubice, The Czech Republic**

ABSTRACT: Hydration of five Roman and natural cements was compared using X-Ray Diffraction (XRD). Three cements were prepared on a laboratory scale by burning batches of marls from geological sources in Poland (Folwark) and Austria (Lillienfeld). They possessed the characteristics and advantages of the historic Roman cements widely used in the nineteenth and the beginning of the twentieth centuries in Europe to decorate buildings. Two other cements tested are produced commercially: quick setting natural cement (Prompt cement) from Vicat, France and Rosendale natural cement from Edison Coatings, USA. The XRD measurements were done in situ for cement pastes; the progress of hydration was evaluated from variation of the intensities of diffraction maxima characteristic of both crystalline hydrates formed and components of the original cements consumed in the hydration process. The XRD diagrams were recorded from 15 minutes to 6 months so that the entire hydration process was investigated. The results showed that the hydration of natural cements comprises two distinct stages. The immediate setting and early strength is due to the formation of calcium aluminate hydrates. Further slow hydration and strength development is brought about by the formation of the C-S-H gel. Similarities and differences between the individual natural cements are discussed. The proposed mechanism of hydration is further confirmed by evaluation of the development of strength and porosity structure in the pastes.



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