Standard Lime & Stone Quarry
(Millville Quarry)
County Route 27
Millville
Jefferson County
West Virginia

HAER No. WV-49

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
MID-ATLANTIC REGION, NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
PHILADELPHIA, PENNSYLVANIA 19106

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HISTORIC AMERICAN ENGINEERING RECORD

STANDARD LIME & STONE QUARRY (Millville Quarry) HAER No. WV-49

Location: Beginning 0.6 mile south of intersection of State Route 340 and County Route 27 (Bloomery Road), approximately three miles southwest of Harpers Ferry, heading one mile in the southerly direction along the east side of Route 27 and terminating at the northeast edge of Millville, Jefferson County, West Virginia.

UTM: 18.4354560.260650 (NW)
18.4354530.260760 (NE)
18.4353060.260130 (SE)
18.4353130.260000 (SW)
18.4353560.259880 (W)
Quad: Charles Town, West Virginia

Builder: Standard Lime & Stone Company

Date of Construction: 1901-c. 1960

Present Owner: U.S. Fish and Wildlife Service

Present Use: Vacant/Abandoned

Significance: The Standard Lime & Stone Quarry is a surviving example of an early 20th-century dolomite quarrying and processing site in the limestone-rich eastern Panhandle of West Virginia. The extraction and heat processing of dolomite and limestone for manufacturing lime, cement, rock wool insulation, furnace lime, and lime flux was one of the most important industries in Jefferson County and the Panhandle region. Four principal stone processing operations--the production of furnace lime, rock wool, lime flux, and lime hydrate--were carried out at the Standard Lime & Stone Quarry plant area between 1901 and 1974. The products were purchased by Mid-Atlantic regional steel mills and local businesses. Due to changing technologies in the manufacturing of limestone-derived products, relatively few of these early industrial landscapes survive today with any integrity in Jefferson County.

Project Information:

This documentation was undertaken in June of 1991 by the U.S. Fish and Wildlife Service as a mitigative measure prior to the demolition of the Standard Lime & Stone Quarry site. The mitigation is in accordance with an anticipated Memorandum of Agreement to be signed by the U.S. Fish and Wildlife Service, the West Virginia State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The Agreement is in compliance with Section 106 of the National Historic Preservation Act of 1966. The existing quarry site and associated plant and residences are slated for demolition in 1991.

Prepared by: Jill A. Chappel
Historic Preservation Specialist
Affiliation: Greenhorne & O'Mara, Inc.
9001 Edmonston Road
Greenbelt, Maryland 20770
Date: September 24, 1991

The Standard Lime & Stone Quarry site is an early 20th-century industrial historic landscape located in eastern Jefferson County within the eastern Panhandle of West Virginia (Figure 1). Included in the boundaries of the site are a mile-long, water-filled, dolomite quarry; a stone-processing plant area; a group of workers' houses; and several associated landscape features. This industrial site is the youngest of three large quarries established in Jefferson County and owned by the Standard Lime & Stone Company of Baltimore, Maryland. Operations commenced at the quarry site in 1901 under the direction of Standard's co-founder and president, Daniel B. Baker. The buildings and structures remaining at the site in 1991 were erected between 1901 and 1960 and are comprised of an industrial plant area and a residential area.

The major components of the approximately 160-acre property include historic landscape features which were altered on a regular basis as quarrying activities expanded and technological changes occurred. The quarry itself is approximately 5,000 feet long, 250 feet wide, and 150 feet deep. Other prominent landscape features include 60- to 75-foot-tall spoil piles, road and railroad grades, industrial architectural ruins, and intact buildings. The site is divided into two main areas: the plant area, including the remains of kilns, settling basins, and other support buildings; and the residential area along Bloomery Road (County Route 27). The plant area is further subdivided according to and activity areas according to the types of stone processing and general support operations that took place at the site: Shops and Supply, the Excavating/Crushing Operation, the Refractory Operation, the Rock Wool Operation, the Magnesium Oxide (P32) Operation, and the Lime Hydrate Operation (Figure 2).

The Standard Lime & Stone Quarry site begins on a gradually sloping hill at Bloomery Road with a grouping of seven workers' houses and other minor outbuildings straddling the road. The site continues downslope to the spoil piles, to the general support buildings, then on to the plant area. The site ends with the quarry at the lowest elevational level. From the east rim of the quarry, the landscape ascends a slight ridge then drops steeply 200 to 150 feet to the Shenandoah River.

History of the Standard Lime & Stone Company

The Standard Lime & Stone Company was formed in 1888 by three prominent Frederick County, Maryland brothers--Daniel B. Baker, Joseph Dill Baker, and William Gideon Baker. The Baker family was widely respected in Maryland for their reputation in business, finance and investment banking, and community and liturgical affairs. Daniel, the initiator of the company, had been involved in his father's tannery business, Daniel Baker & Sons, in Buckeystown, Maryland, a business which depended on lime as one of

the ingredients used in the tanning process.[1] He organized the Standard Lime & Stone Company with his two brothers and began preparations to capitalize on neighboring West Virginia's untapped limestone resources. A year later, the three utilized their business acumen to form the Washington Building Lime Company, a subsidiary of the Standard Lime & Stone Company.[2]

Quarrying exploits began by the Bakers' Standard Lime & Stone Company during 1892 in Kearneysville, West Virginia, eight miles southeast of Martinsburg. The operation at the Kearneysville Quarry was limited to limestone-crushing for ballast used by the Baltimore & Ohio Railroad.[3]

Daniel Baker moved to Baltimore in 1893 and opened an office for the Standard Lime & Stone Company. By 1895, the Bakerton Quarry, a few miles east of Kearneysville and northwest of the Harpers Ferry area, commenced operations to manufacture lime under the auspices of the Bakers' Washington Building Lime Company. Because of the success of the brothers' investment, and since limestone products were in demand, their company opened two more quarries during 1901 in the vicinity of Millville. A central manufacturing plant was constructed on the north edge of the village between the two excavations.[4] It was at this Millville site that the Standard Lime & Stone Company established a quarry that came to bear its name--the Standard Lime & Stone Quarry. This quarry operation began producing refractory materials for distribution to steel mills in the Pittsburg district and became the company's primary producer of refractory materials. The West Virginia Geological Survey reported in 1916 that the Standard Lime & Stone Company was "the largest operating limestone company in the eastern Panhandle area [of West Virginia];" and that, "Mr. Daniel Baker was the pioneer in the limestone industry in this area, and his company at the present time ships the largest tonnage of any company in the field."[5]

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[1]Heather Moler, "'Company Town' Gone But Not Forgotten" (Unpublished manuscript, Bakerton, West Virginia, 1989), p. 2.

[2]The Baltimore Evening Sun, 8 August 1921, obituary of Daniel Baker; T.J.C. Williams and Folger McKinsey, History of Frederick County, Maryland, Vol. II (Frederick: L.R. Titsworth & Co., 1910), pp. 711-715; Anonymous, Tercentenary History of Maryland, Vol. III (Chicago and Baltimore: The S.J. Clarke Publishing Co., 1925), pp. 372-374, 430-434.

[3]G.P. Grimsley and I.C. White, West Virginia Geological Survey, Jefferson, Berkeley, and Morgan Counties (Wheeling: Wheeling News Litho. Co., 1916), p. 401.

[4]What is today known as the Millville Quarry is an active operation on the south side of the village of Millville and south of the study site. At one time it was owned and operated by the Baker family.

[5]Grimsley and White, West Virginia, pp. 396-402.

After Daniel and William Baker died in 1921 and 1922, respectively, their brother, Joseph, maintained the company with assistance from Daniel's two sons (Daniel, Jr. and Joseph, II), his brother William's son (William, Jr.), and his own son (Holmes). In 1927, the company obtained a Maryland charter and began developing quarry sites in that state.[6] The company continued expanding at a constant rate and soon had many quarry operations in several states.

The last of the original founders, Joseph Baker, died in 1938, leaving the limestone business to his son and nephews. Although the main office for the Standard company was in Baltimore, quarrying operations grew to eventually cover a seven-state region incorporating ten limestone extraction and processing plants in West Virginia, Virginia, Maryland, Pennsylvania, Ohio, Illinois, and Indiana. At the time the company was sold in the mid-1950s, plants were in operation in Michigan and Tennessee as well, bringing the total company employment number to 1,600 and total assets of $18 million.[7]

The Baker family, having operated the Standard Lime & Stone Quarry for 53 years, sold the Millville property in 1954 to the American-Marietta Corporation of Chicago.[8] Three former executives of the Standard Company took over as management officials for American-Marietta's newly-acquired quarry investment. Plans were underway soon after to expand operations at the Standard Lime & Stone Quarry and increase production. The sale of the quarry and plant site by the Baker family was a step in the dissolution of the Standard Lime & Stone Company. By 1957, the company was no longer in business, thus ending the familial legacy in the limestone quarrying industry.

American-Marietta merged with the Martin Corporation in 1961 and became the Martin-Marietta Corporation. Production at the old Standard Lime & Stone Quarry site continued at a steady pace until 1974 when operations completely ceased. The corporation then sold the property to Shenandoah Quarries, Incorporated, who also operated the old Blair Quarry a mile west of the Standard Quarry. Until the early 1980s, Martin-Marietta leased a

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[6] "Baker Family Sells Control of Old Maryland Firm," The Baltimore Evening Sun, 24 November 1954.

[7] "Local Lime Co. Is Acquired By Chicago Firm," The Baltimore Sun, 23 November 1954; and "Standard Lime & Stone Company History and Business" (unpublished manuscript in files of Martin-Marietta Corporation, Bethesda, Maryland, 5 November 1954), pp. 2-7.

[8] "Local Lime," The Baltimore Sun, 23 November 1954; and "Baker Family," The Baltimore Evening Sun, 24 November 1954.

portion of the Standard site and used the Rock Wool Plant building as a railroad terminal facility, storing refractory materials produced at other Martin-Marietta plants until they were transported by truck to consumers.[9]

History and Technology of the Standard Quarry Plant Processes

The technological and architectural evolution of limestone and dolomite-related industrial operations can partially be traced at the Standard Lime & Stone Quarry. The limestone products manufacturing processes that occurred during the production life of the Standard Quarry included the following: an Excavation/Crushing Operation, a Refractory Operation, a Rock Wool Operation, a Magnesium Oxide (P32) Operation, and a Lime Hydrate Operation. In 1901, the excavations and rock-crushing operations began at the southern end of the current quarry. By 1916, the Standard Quarry was well into producing refractory materials. A series of workers' houses were constructed as early as the 1920s along Bloomery Road above the quarry plant area. The Standard Lime & Stone Company began to produce rock wool insulation products and construct buildings to house that operation around 1930. By the late 1930s, the company added two more dolomite manufacturing operations--the production of furnace flux and lime hydrate.

The operations for extracting the raw dolomite from the ground, crushing it, and processing it into various products occurred in a fairly limited area at the site. Before the dolomite could be channeled to any of the operations areas, it had to be excavated, transported from the quarry to the plant area, and crushed to aggregate small enough to be easily handled. Because the dolomite at the Standard Quarry was buried beneath a layer of clayey residual soil, this layer first had to be excavated and dumped to the east of the quarry. Once the clay layer was removed, the dolomite rock was extracted using dynamite to blast it free. It then was loaded into gasoline-powered rail cars ("dinkies"), which were connected to a cable hoisting system lifting the cars out of the quarry to the northeastern edge of the plant area.[10]

At this point, the raw dolomite entered a large metal crushing mechanism built partially below ground at the west edge of the quarry. Crushing operations moved from one location to another as excavations at the quarry

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[9]Sellards & Grigg, Inc./GEI Consultants, Inc., "National Education and Training Center, Engineering Property Assessment for Old Standard Quarry Property (Martin Marietta Quarry Site), Site No. 2, Vol. 1," (report prepared for U.S. Fish and Wildlife Service, Denver, 1990), p. 19; and telephone conversation with Mr. Elliott Miller, Director of Public Affairs, Martin-Marietta Corporation, 2 July 1991, Bethesda, Maryland.

[10]Sellards & Grigg, "National Education," pp. 14-15.

moved south to north. The large crushing mechanisms and structures currently existing at the northeast edge of the plant area were probably moved to that particular location in the 1930s or 1940s. Processing through the Primary Crusher was the first step in reducing the size of the raw dolomite rock. The stone then exited the Primary Crusher and traveled through an underground tunnel on a 48-inch-wide conveyor belt 183 yards to a Secondary Crusher and Simon Mill, both of which further reduced the size of the dolomite aggregate. The Simon Mill was a grinding mechanism which crushed the aggregate to gravel size or to a powdery form. The amount of crushing and grinding that took place was dependent upon the particle size needed for each manufacturing operation. The crushed dolomite then was stored in bins adjacent to the Secondary Crusher.

The Refractory Operation, established in 1901 and discontinued in 1974, involved a relatively simple technological process of fine-grinding crushed dolomite then firing it in kilns. The end product was a heat-resistant material called "furnace lime" purchased by a number of northern steel mills for lining furnaces. Both open-hearth furnaces and the earlier Bessemer converters used dolomite and limestone refractory products, not only as insulating and heat-resistant materials, but also to create a basic pH lens at the bottom of the furnace. The basic environment inside the furnace aided in the burning process.[11]

Refractory materials production took place at the center of the Standard plant area. The operation utilized three Raymond tube mills for fine-grinding the dolomite, three rotary kilns for burning the stone, bins for storing the final refractory product, and an office for operations management (Figures 3 and 4).

The initial step in refractory materials manufacturing was running the previously crushed dolomite aggregate through the Raymond mills in order to grind it to the appropriate size. During the grinding process, iron was added to the stone. From the mills, the dolomite and iron mixture underwent a calcining step, whereby the pulverized stone entered one of three iron-clad, brick-lined, rotary kilns and was heated to a temperature of 2700 degrees Fahrenheit. These rotary kilns were nine feet in diameter, 175 feet long, and were fueled by coal passed through a Jeffrey Coal Crusher located at the south end of the kiln structures.[12]

Some of the dolomite was wasted during the process. A quarter of the ground stone burned in the kilns bonded to the kiln walls due to uneven temperatures during firing. This waste material was removed and deposited onto spoil piles.

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[11]Grimsley and White, West Virginia, pp. 375 and 382.

[12]Ibid, p. 382; and Sellards & Grigg, p. 15.

The firing process produced a black granular stone which, upon exiting the kiln, was placed in a cooling bin. At this point, the stone was sprayed with a heavy black oil called "COBLAX" or coal tar to prepare it for use in the steel mills. The finished refractory product was kept in adjacent storage bins until it was packaged for shipment by rail to steel mills. A spur connected the Standard Quarry to the main line of the Baltimore & Ohio Railroad (Figure 5).

During the first decades of the Standard Quarry's history, the refractory materials were sent almost exclusively to the Pittsburgh area to be used in steel mill furnaces. By the 1940s, an expanded market had developed, with refractory materials being shipped to steel companies in other areas of Pennsylvania, as well as to West Virginia, Maryland, Delaware, New York, Ohio, and Ontario, Canada.[13]

Rock wool production was a third operation at the Standard Lime & Stone Quarry. Rock wool, or mineral wool as it was often called, was used solely as insulation for buildings and pipes and was produced at the extreme south end of the plant area. The Rock Wool Operation at the Standard Lime & Stone Quarry commenced around 1930 but lasted only 15 years. Two buildings supported this manufacturing process; the larger of the two housed a cupola/blast furnace.

Rock wool manufacturing was not started on a large scale in the United States until 1897, however by 1928, there were still only approximately eight companies operating in the nation, including the Standard Lime & Stone Company's operation at the Millville quarry site. Nearly 10 years later, over 50 rock wool companies were in operation in the United States. It was a procedure which required calcining dolomite with other stone materials together to the melting point then shooting it through a pressurized jet to form loose wool. Pulverized dolomite, slate, and spar were combined in a small water-jacketed kiln, called a cupola, fueled by coal (Figures 6 and 7). The stone was then heated to a temperature ranging from 2200 to 3400 degrees Fahrenheit until it became molten. This aspect of the manufacturing process is described in the 1939 publication West Virginia Geological Survey, Volume XII, "Limestones of West Virginia:

> "The molten material runs from a spout from the bottom of the cupola. It is caught and blown by a jet of steam or compressed air at a pressure of 45 to 125 lbs. per square inch of steam or from 50 to 95 lbs. per square inch of air. The effect of the jet is to shear the stream of molten material into small droplets and to blow

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[13]Evidence supporting this is in the form of discarded Loading Receipts for refractory materials found on the floor of the Laboratory building at the plant area.

> them through the air in such a way that a long filament trails out behind and forms the wool fiber. A certain amount of so-called shot is produced in the blowing of wool in this fashion. The shot is in some cases separated and recovered. It is attempted to keep the amount of it at a minimum. The fibers made by this process are collected in a so-called blowing room and worked into [loose wool, granulated wool, bats, blankets, and pipe covering].[14]

Rock wool insulation had rapidly become an extremely profitable business, and between 1930 and 1950, the Standard Lime & Stone Company entered the market using their Millville quarry as the production center. Advertising to homeowners and the construction and plumbing trades, they sold their products under the name of "Capitol Rock Wool," selling pipe coverings, insulating cement, granulated rock wool, and rock wool rolled felt.[15]

A fourth primary dolomite processing method was the Magnesium Oxide (P32) Operation which was underway at the Standard Quarry by 1937 and ceased around 1958. The end product resulting from this manufacturing operation was furnace flux, a bonding mortar used to fuse metals together and to remove impurities in the stone. The lime flux was used by steel mills in the production of pig iron. Buildings and structures supporting this operation include: two 100-foot-long rotary kilns, a mixing plant, a storage silo, and several tanks and settling basins.

The Magnesium Oxide (P32) Operation pertained to the process of enriching dolomite with magnesium and used as much as three million gallons of water per day pumped from the Shenandoah River. To accommodate such volume, an 85-foot-square reservoir, an elaborate system of pipes, and a group of tanks and basins of various sizes were erected at the plant. The tanks and basins were primarily used during the P32 Operation to recycle and purify water as a necessary step at the beginning of the manufacturing process.[16]

The operation, which lasted from around 1938 until 1958, was described by former employees of the Standard Quarry and was published in a recent engineering assessment report of the quarry site:

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[14]John B. McCue, John B. Lucke, and Herbert P. Woodward, "Limestones of West Virginia," in West Virginia Geological Survey, Volume XII, (Parkersburg: The Scholl Printing Co., 1939), p. 362.

[15]Standard Lime & Stone Company, "Capitol Rock Wool Pipe Coverings" (Capitol Rock Wool Bulletin 1-1, Baltimore, c.1945); and "Shuts Winter Heat In, Shuts Summer Heat Out" (Capitol Rock Wool Bulletin D-2, Baltimore, c. 1945).

[16]Sellards & Grigg, "National Education," p. 16; and Grimsley and White, West Virginia, p. 368.

> The first step in the P32 process involved placing pulverized dolomite into a rotary kiln to produce "pebble lime," a white granular material. The P32 operation used two kilns, each of which was seven feet in diameter by 100 feet long. Extra pebble lime was stored in the "pebble lime silo." The pebble lime was dissolved in water to produce a "milk of lime." The next several steps in the P32 process involved settling out and extracting the magnesium and discarding the calcium portion of the stone. The extraction/ settling procedure did not involve the use of any solvents or chemicals. The calcium-rich, magnesium-poor liquid mixture produced from these settling processes was pumped back to the Shenandoah River. The final step in the process entailed adding iron and silica to the magnesium-enriched sludge and placing the mixture into a second rotary kiln. The product produced from the P32 operation was call Stayset. . . . A second product, Staycrete, was produced by adding chrome ore and silicated soda to the Stayset.[17]

The finished products were packaged at the plant area and transported north to the steel mills by way of the B&O Railroad.

In addition to the production of furnace flux, one other stone manufacturing process--that which produced lime hydrate--was in operation during the same time period as the Magnesium Oxide (P32) Operation. It was, however, a minor enterprise compared to the other three operations at the Standard Quarry. The Lime Hydrate Operation took place in the same area of the plant as the P32 Operation, and the steps of production were similar.

Lime hydrate, used as an agricultural fertilizer, was produced by hydrating the pebble lime that resulted from heating pulverized dolomite in a rotary kiln. The pebble lime was produced during the first stage of the P32 Operation, and while most of the material was used for the P32 Operation, some pebble lime was reserved for making lime hydrate. The lime hydrate product was packaged and transported by rail to Martinsburg, West Virginia. It was produced between 1937 and, at least, 1958 but may have been produced until plant operations ceased in 1974.[18]

In addition to the structures described in the above operations, other buildings were erected at the Standard Quarry. These housed the on-site plant managers, materials testing procedures, and general operations support and are grouped together on the western edge of the plant area.

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[17]Sellards & Grigg, "National Education," p. 17.

[18]Ibid.

Most are arranged linearly along the main service road. The structures include the following: an office, two experiment and testing laboratories, an electrical supply house, a machine shop, a main supply building, an oil and cleaning supply building, an instrument workshop, a carpenter shop, a blacksmith shop, and an 85-foot-square concrete reservoir with a control valve shed. In addition, at least 12 workers' residences were constructed along Bloomery Road.

Site Development and Alterations

A pattern of development is clearly illustrated in the site plan. Initial construction began to the south and spread north as the quarry excavations expanded. The last known large development to take place in the plant area was that of the Magnesium Oxide (P32) Operation, the northernmost building group.

A number of changes have taken place at the Standard Quarry from the time quarrying operations commenced in 1901. As the quarrying operation grew and expanded to include different manufacturing processes, the plant area developed over a greater expanse. Advances in dolomite processing technology gave way to the need for updated and more efficient crushers, kilns, other types of machinery, and the buildings which housed them. The West Virginia Geological Survey described the following after returning from a visit to the Standard Quarry in 1916:

> The working [Standard] quarry is one-half mile from the railroad track and is 50 to 60 feet deep. . . .The [Standard Lime and Stone] company controls nearly 450 acres of [high-grade dolomite]. The plant equipment includes a brick compressor house, crusher building with two Gates crushers, Nos. 6 and 5, with 16-foot revolving screen with perforations in the screen plates of 3, 2 1/2, 1 1/2, and 1/2 inches, large air-compressor, air-drills, hoist engines, etc., with electric power. There is a lime plant with two iron-clad 250-bushel kilns. The capacity of the quarry is about 1,200 tons daily.[19]

At least two of the earliest buildings at the Standard Quarry were brick, according to the West Virginia Geological Survey publication, but no other types of building materials are mentioned. However, little on-site evidence was found to indicate earlier buildings that may have been erected at the onset of quarrying operations. Since excavations began at the southern end of the quarry, it is likely that the earliest crushing operations were conducted at or near this locale. There is a brick ruin at the south end of the Rock Wool Plant along one of the B&O Railroad spurs,

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[19]Grimsley and White, West Virginia, p. 402.

near the site of the earliest quarrying activity. The north gable-end wall of this structure, which may have been the brick compressor house or crusher building addressed in the Geological Survey report, was incorporated into the construction of the Rock Wool Plant's south wall. Clear evidence of this is seen in the interior of the two-story portion of the Rock Wool Plant.

Most primary buildings and structures at the Standard Lime & Stone Quarry site were masonry, mainly hollow tile construction, finished either with brick facing or stucco. Hollow tile construction was an advantagious building system because of its stability, durability, and fire-resistance. Attributes, such as low expense, lightness of weight, regulation of temperature, and sound insulation, made hollow tile construction ideal for Standard's dolomite processing structures because of the nature of the industrial operations taking place at the plant.[20]

Concrete block and large-aggregate reinforced concrete were also widely used building materials, and reinforced concrete was the material utilized most often for foundations and floor slabs. Wood construction may have been the primary technology utilized during the earliest years of operations, but only a few ancillary structures existing at the quarry site in 1991 are of wood.

Exact dates of construction could not be established for any of the buildings at the plant. Although many of the buildings and structures present at the site in 1991 were demolished or partially demolished in the early 1980s, some walls and structural systems are intact enough to estimate construction dates. Approximate dates can be estimated based on their function and the technological chronology of site. For instance, in the case of the structures used for the Magnesium Oxide (P32) Operation, the reinforced concrete tanks and settling basins, pebble lime storage silo, and P32 kiln ruins were probably not constructed until the P32 Operation commenced around 1937. The same can be said for the Rock Wool Plant. Since manufacturing of this product did not start until around 1930, the main building, constructed of a reinforced concrete frame with concrete block infill, appears to date to that time period. The kiln and grinding mill ruins for the Refractory Operation probably date to the early 1920s.

As operations at the Standard Quarry progressed, other buildings were constructed in the plant area. During the late 1950s, the original cable hoist system for transporting the dolomite from the quarry bottom to the plant area was replaced by diesel fuel-powered Euclid vehicles.[21] A

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[20]Charles E. White, Jr., Hollow Tile Construction (Philadelphia: David McKay Co., 1919, reprint 1924), pp. 1-3.

[21]Sellards & Grigg, "National Education," p. 15.

maintenance shop for the Euclids and underground diesel fuel tanks once were located north of the tanks and settling basins, on the west side of the main service road. Also in this part of the plant area were an employee parking garage and an employee shower house. Other buildings no longer standing at the quarry site are an electrical control house for the Primary Crusher, a carpenter shop, two small square basins for the P32 Operation, a pumphouse for draining water from the quarry, an unidentified refractory building, a COBLAX oil tank for the Refractory Operation, and a dynamite storehouse.

Although no records of the original machinery for the Standard Lime & Stone Quarry have been located, the kinds of limestone and dolomite processing equipment used at other quarries in the area--quarries owned by the Standard Company as well as other companies--were similar at each quarrying operation. The following is a list of known machinery used at limestone quarries in the vicinity (an asterisk indicates machinery used at one of the three Standard Company quarry operations in Jefferson County):[22]

Crushers

Gates gyratory crushers, Nos. 8 to 4*
Champion jaw crusher
McLanahan single-roll crusher

Pulverizers/Mills

Jeffrey*
Williams*
Allis (Chalmers) tube mill*
Stedman cage disintegrator
swing-hammer mill type

Kilns

iron-clad draw kiln type* (Decker)
stone-pot kiln type*
Shoop steel-clad lime-kiln

Bag-Packing Machines

Jeffrey*
Urschel-Bates

Driers

Allis (Chalmers)*

Hydrators

Clyde system*
Kritzer

In addition to the industrial structures at the quarry site, the Standard Lime & Stone Quarry constructed single-family residences for some of its employees close to their job site. These structures are completely intact and in good condition in comparison to the industrial building group in the quarry plant area.

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[22]Grimsley and White, West Virginia, pp. 398-407.

The residential area above and to the west of the plant area once consisted of at least 12 wood-framed workers' houses along both sides of Bloomery Road. Of the remaining seven, three are vacant and four are included on this property.[23] Foundations, overgrown with vegetation, are still evident from those houses that are no longer extant.

The houses are nearly identical; the only variations are later additions constructed by individual occupants. Judging from the construction materials, the houses probably date from 1901 to 1920. The exact design for these houses is duplicated at the village of Bakerton where the Standard Company owned another limestone quarry and plant. The Bakerton houses were constructed by Preston S. Millard and C.D. Carter, and, since these houses are identical to those at the Standard Lime & Stone Quarry, it is reasonable to believe that the Millville quarters were constructed by these men as well.[24] The houses at Bakerton, however, are less altered than those associated with the Standard Quarry.

The design for both the Bakerton and Standard Quarry housing developments is a simple two-story, three-bay, side-gable form with a central stair, single-pile plan and a one-story, rear shed-roofed ell. The houses were originally sided with cove shiplap (German) wood siding, but the Standard Quarry houses were covered at a later date with metal lath and pebble-dash stucco. Foundations are a combination of fieldstone and concrete, and each shed-roofed front porch is adorned with turned columns. The window type ranges from six-over-six to two-over-two double-hung sash. Door types vary considerably from panel-and-light, four-panel, and five cross-panel styles.

The Standard Quarry houses on the east side of Bloomery Road were constructed on a slight rise and have full basements facing the spoil piles. Those houses on the west side of the road were built on more level ground with only crawl spaces beneath them. Most houses have kitchens in the rear, shed-roofed ell on the first floor. The ell is also accessible from the back of the house through a small, shed-roofed porch. In one house, the kitchen is located in the basement, which proves to be an exception to the original designation of rooms.

The interior of these houses on both floors is unpretentiously adorned with simple window, door, and baseboard moldings and a single stair rail with a modest staircase. The wood floors are standard tongue-and-groove, either varnished or painted, with a squared and centered "carpet" of patterned linoleum reaching within one or two feet of the walls. The walls are plastered and either painted or wallpapered. Light switches are both

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[23]The other three are across Bloomery Road and belong to another owner.

[24]Moler, "'Company Town,'" p. 4.

standard dial switch and rotary flush switch types, and wiring is knob and tube. The houses have two interior, end wall, brick chimneys, with roofs originally clad in wooden shingles. Heating was provided by wood- or coal-burning stoves.

Alterations to the workers' houses generally consist of shed additions in various directions at the rear of the building for dry goods or tool storage. Often the back porch was enlarged to span the entire length of the house. In one instance, a rear porch was completely enclosed and transformed into additional living space for the occupants. Originally the houses were not equipped with bathrooms, and the privy for one of the houses still stands a distance behind the building. Bathrooms, some extremely jerry-built, were sometimes added to both floors. Other alterations include front porch enclosures, reconstructed chimneys, and replaced roofs of asphalt or standing-seam metal.

Most of the Standard Quarry workers' houses have wood-framed outbuildings and sheds, primarily for keeping chickens and hogs and for general storage, garage, or workshop use. One house had an extensive garden, complete with fruit trees and grape arbors. Other types of landscaping, however, is minimal.

Statement of Significance

Research into newspapers has verified the critical role that the Standard Lime & Stone Quarry played within the local economy. Numerous articles from the 1910s and 1920s report on the quarry site, covering employment announcements, production statistics, even industrial accidents that occurred at the plant from time to time. The Standard Lime & Stone Company's dominance in the limestone and dolomite quarrying business in West Virginia, including the Standard Quarry operation on the north side of Millville, is recognized in two West Virginia Geological Survey reports from 1916 and 1939. These reports describe the success of the Standard Quarry and its reputation for providing products manufactured from some of the highest quality dolomite ever to be excavated in the area. Evidence from Loading Order receipts for refractory materials produced at the Standard Quarry from 1941 to the 1960s show that Standard refractory products were being widely distributed to a sizable number of steel mills in Canada, New York, Pennsylvania, Delaware, Ohio, Maryland, and West Virginia. Obituary notices and published biographies of the company's originators attest to the significance of the Standard Stone & Lime Company and the family that founded the site and operated it for over half a century.

The abundance of raw limestone and dolomite played a central role in developing Jefferson County's early 20th-century industrial past. Although as many as five other companies operated several limestone quarries and

plants within the three-county territory of West Virginia's eastern Panhandle during the 1910s and 1920s, the Standard Lime & Stone Company's operations within Jefferson County alone surpassed any of these companies' output and quality of product at that time. The Standard Quarry was also the only operation in the state that was manufacturing rock wool in the late 1930s, giving the Standard Lime and Stone Company and its Millville quarry a state monopoly on the insulation market as well.[25]

The Standard Lime & Stone Quarry is an industrial historic landscape which contributes to the broad historic context of Industry on the local level. Most of the buildings and structures associated with dolomite quarrying and processing activities at the Standard Quarry site possess little or no structural integrity. They do, however, significantly contribute to the historical significance of the quarry site as a whole and, as ruins, are critical cultural elements in the industrial historic landscape. The individual landscape features, including the quarry, spoil piles, transportation ways (roads and railroad tracks), workers' houses, the industrial/residential architectural ruins and archeological sites, and the site plan as a whole are significant in their representation of the history of limestone and dolomite extraction and processing in Jefferson County.

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[25]Works Progress Administration, West Virginia: A Guide to the Mountain State (Conservation Communion of West Virginia, 1941), pp. 22-23.

SOURCES OF INFORMATION

Original engineering drawings:

No original architectural/engineering drawings, plot plans, or residential architectural drawings were found during the course of the investigative research at local archives repositories.

Historic views:

No historical photographs or other historic views depicting quarry activities in Millville were found at local archives repositories. There are, however, historic views of other quarries and limestone processing plants in the immediate area in Grimsley and White, West Virginia Geological Survey, Jefferson, Berkeley, and Morgan Counties, 1916.

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Zembala, Dennis. Telephone conversation. Director, Baltimore Museum of Industry, Baltimore, Maryland. 1 July 1991.

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Likely sources not yet investigated:

The Directories of Manufacturers, specifically Thomas' Register of Manufacturers and Sweet's Architectural Catalog, as well as trade catalogs for extractive industries, may yield further information on the manufacturers of crushers, mills, and kilns used for limestone processing. Relatives of the Baker family who may still live in Frederick and Baltimore could offer a personal insight into the Bakers' limestone business. Since the Bakers resided in Frederick County, Maryland when they first began the quarrying businesses in West Virginia, and since the Bakers were prominent in the county, records available through the county historical society and library might yield information as well.

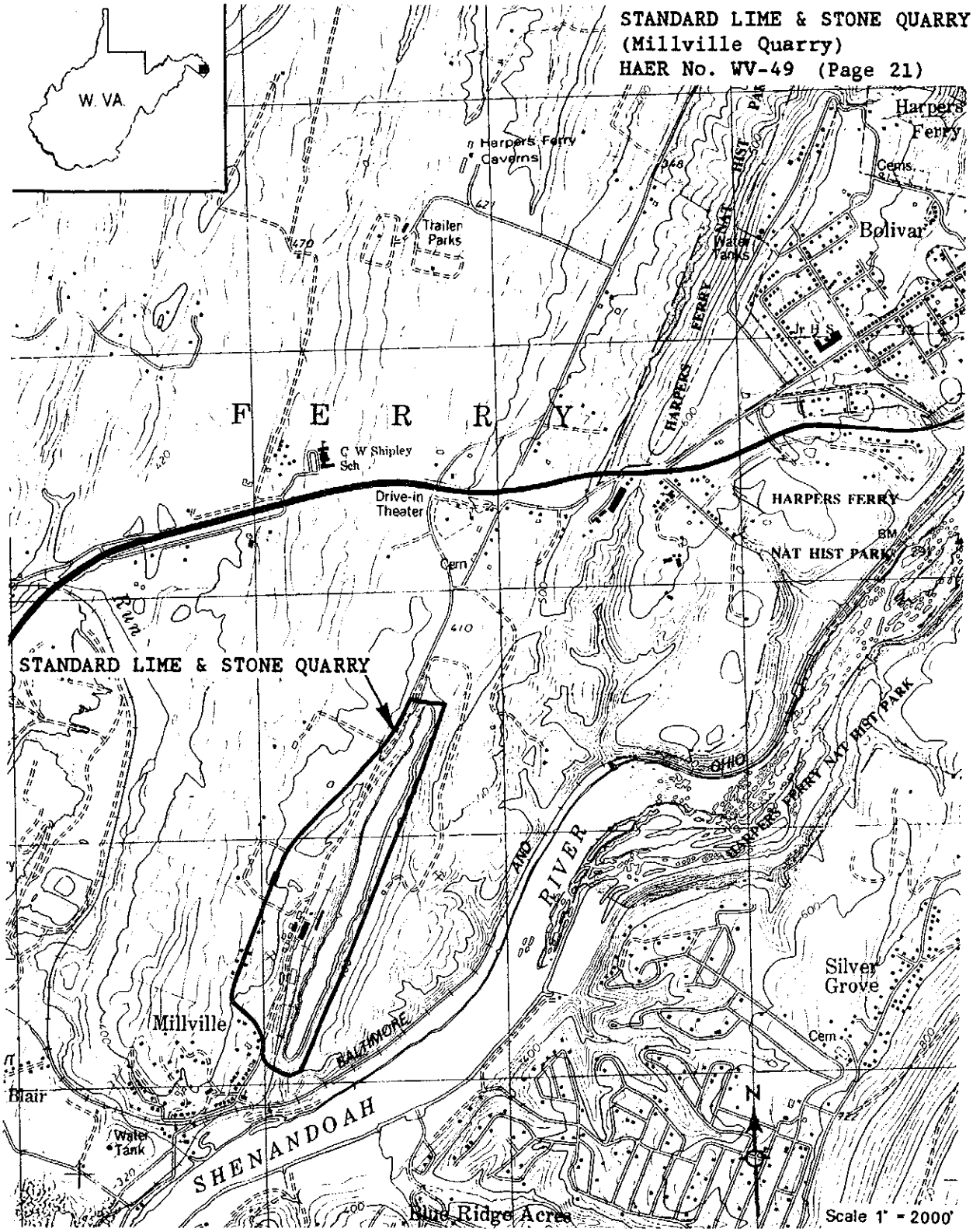

FIGURE 1. Location of the Standard Lime & Stone Quarry in Jefferson County, West Virginia. U.S.G.S. 7-1/2 minute Charles Town quadrangle.

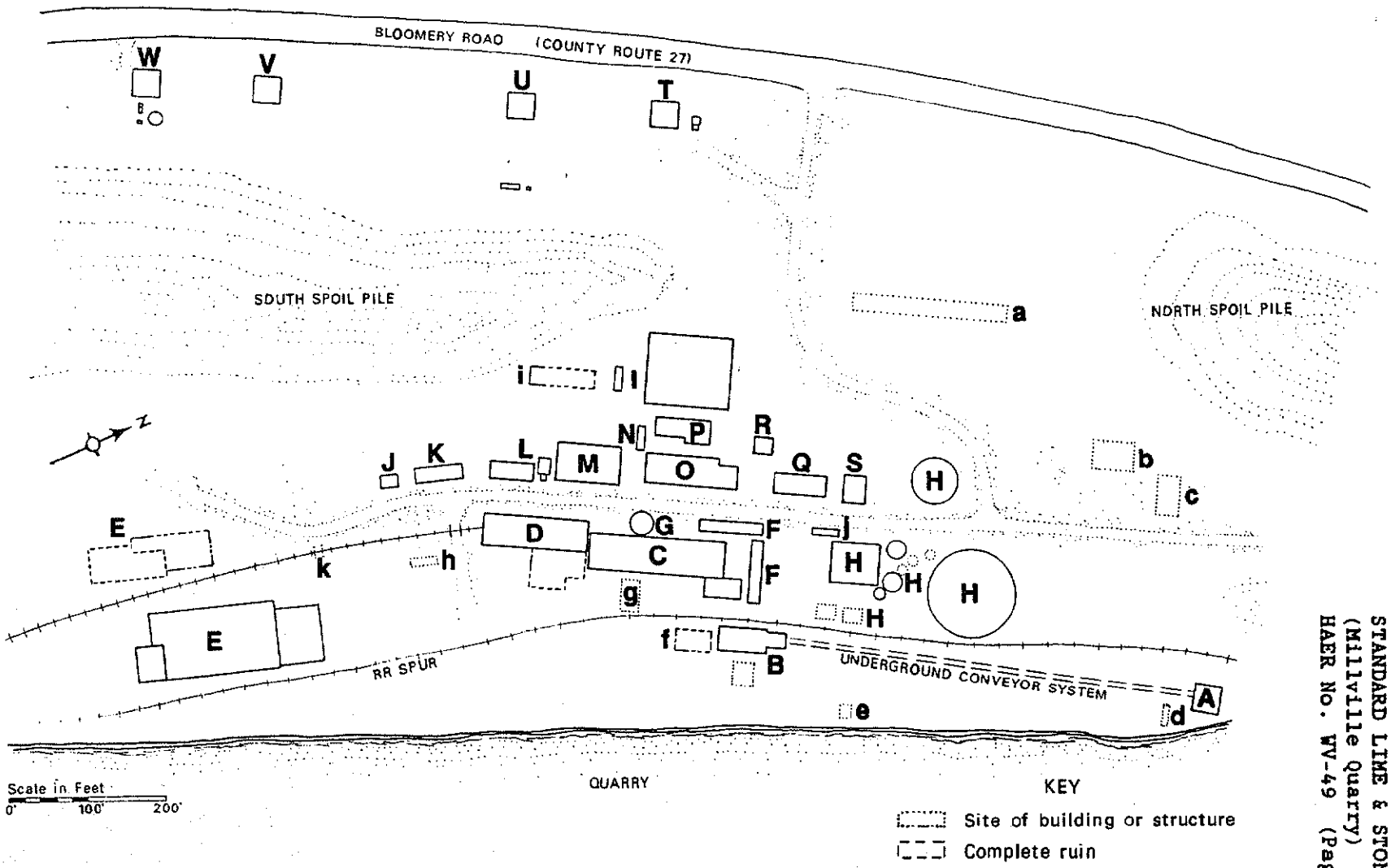

FIGURE 2(a). Sketch site plan of Standard Lime & Stone Quarry identifying buildings no longer standing [Figure 2(a)] and dolomite processing areas [Figure 2(b)]. Redrawn from Sellards & Grigg, "National Education," Figure 13.

Figure 2(a) Building Identification Key:

A Primary Crusher
B Secondary Crusher (Simon Mill site is to the east)
C Kilns No. 1, 2, 3 (storage bins off northeast corner)
D Raymond Mill Ruins
E Rock Wool Plant (main building is on the east side)
F Kiln No. 4 (running east-west); Kiln No. 5 (running north-south)
G Pebble Lime Silo
H Tanks and Settling Basins
I Reservoir (valve shed is to the south)
J Instrument Workshop
K Storage/Supply Building
L Oil/Cleaning Supply Building (gasoline pump to the north)
M Main Supply Building
N Blacksmith Shop
O Machine Shop
P Experiment Laboratory
Q Laboratory
R Electricity Supply Building
S Office
T Worker's House No. 1
U Worker's House No. 2
V Worker's House No. 3
W Worker's House No. 4
a employees' parking garage
b Euclid maintenance shop
c employees' shower house
d electrical control house for Primary Crusher
e pump house
f P32 mixing plant
g unidentified refractory building
h COBLAX storage tank
i carpenter shop
j P32 maintenance shed
k coal tipple

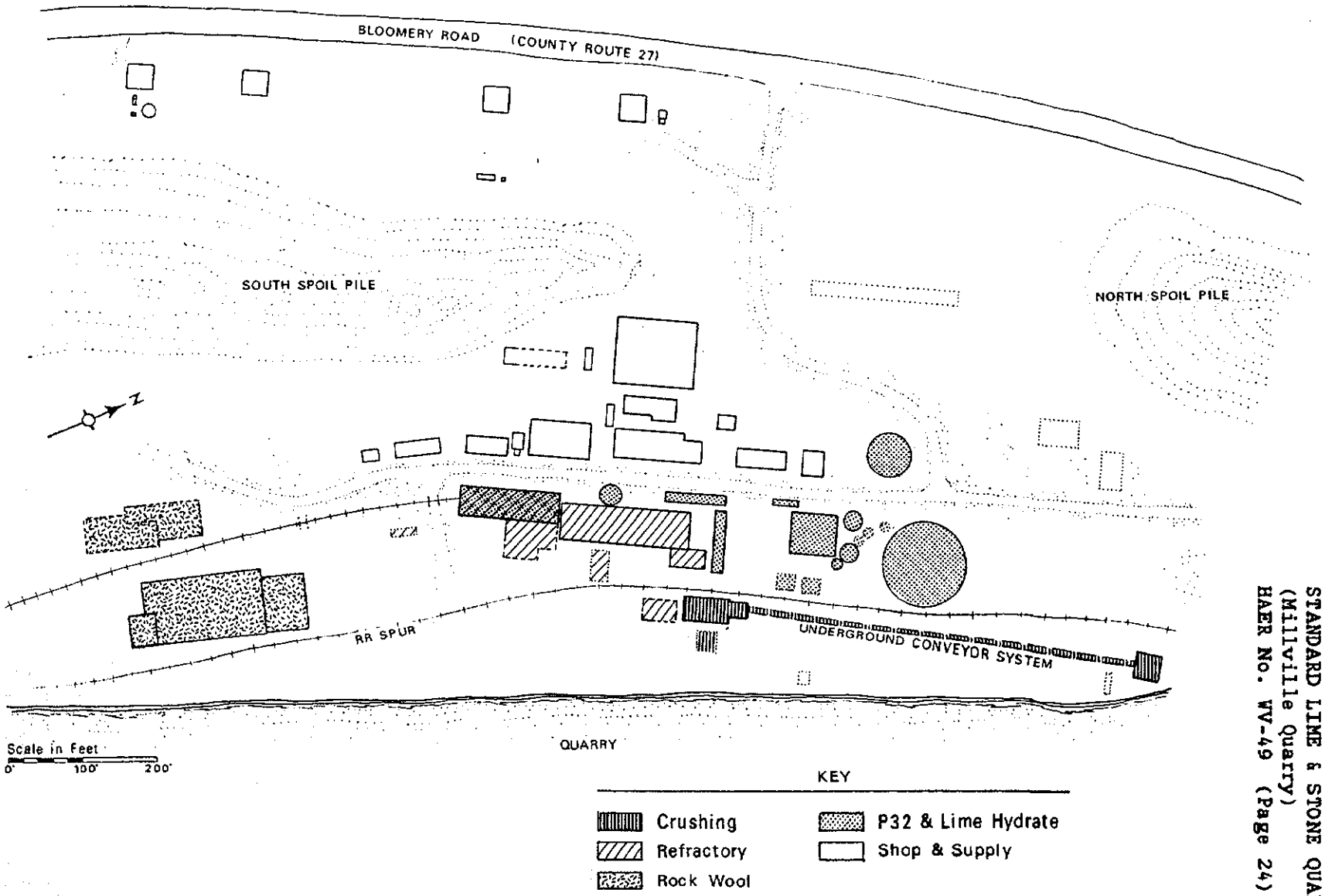

FIGURE 2(b). Dolomite processing areas.

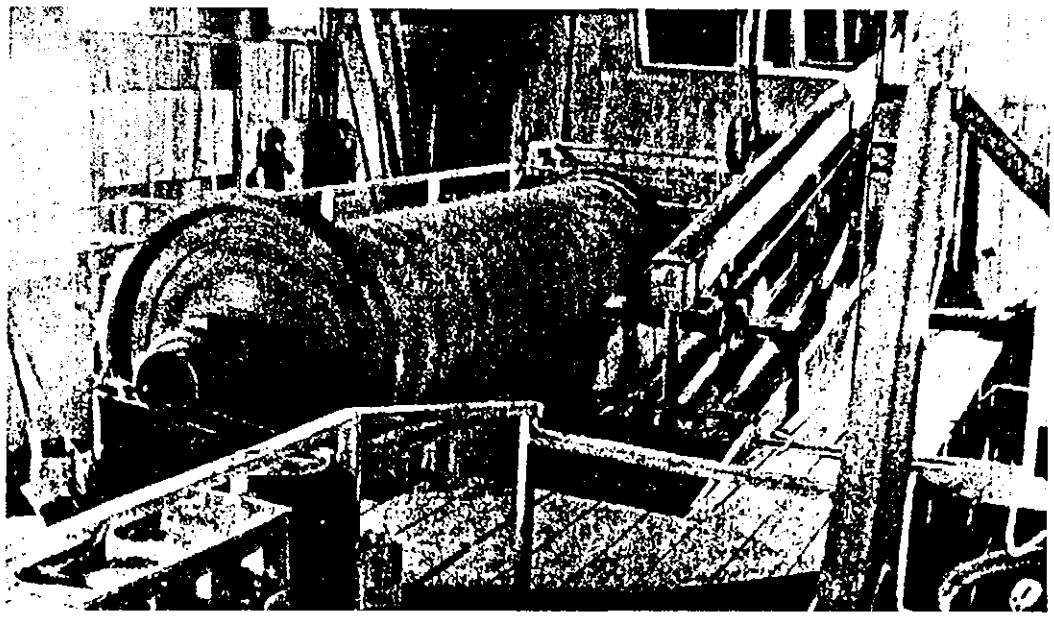

FIGURE 3. One type of tube mill used for fine-grinding stone. This 1920s' mill was manufactured by Allis-Chalmers and was probably similar to the Raymond tube mills used at the Standard Lime & Stone Quarry. From Hardesty, Archaeology, p. 42.

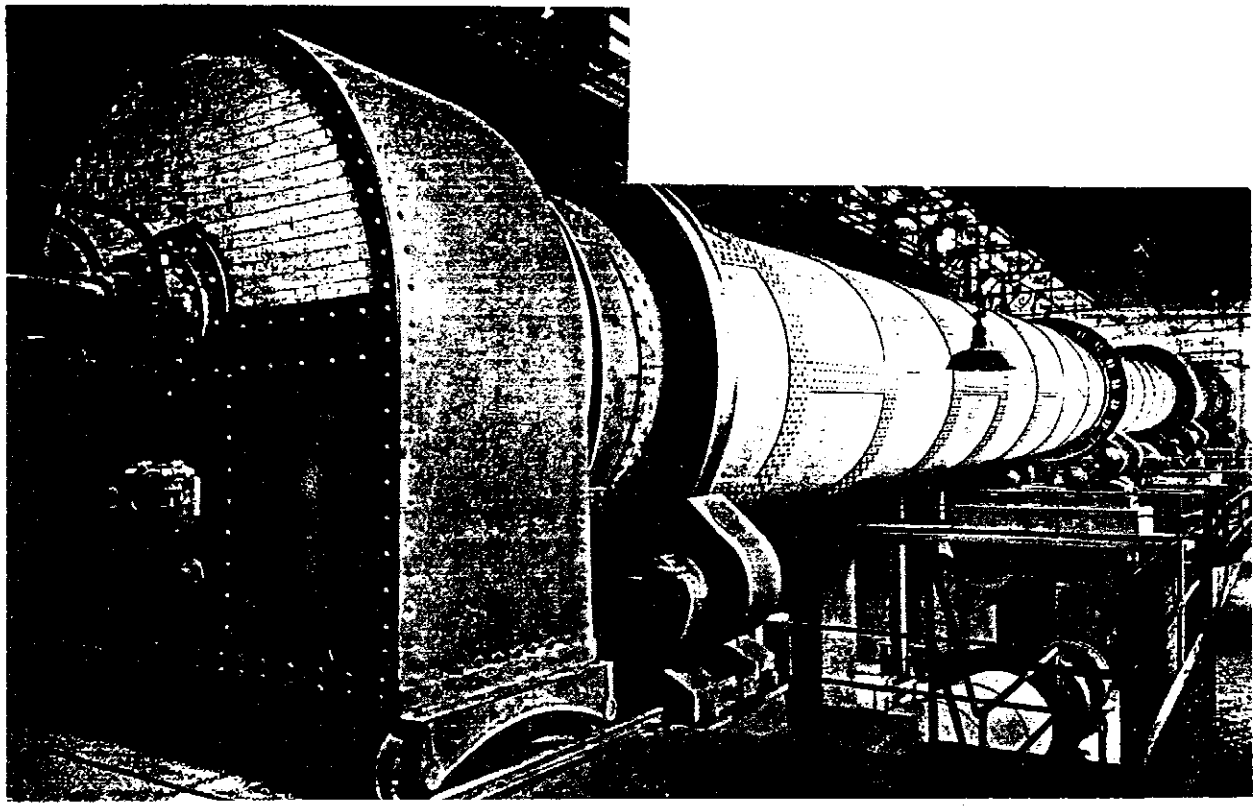

FIGURE 4. A typical rotary kiln used in dolomite and limestone burning. The rotary kilns at the Standard Lime & Stone Quarry may have been similar. From General Refractories Company, Refractories, p. 78.

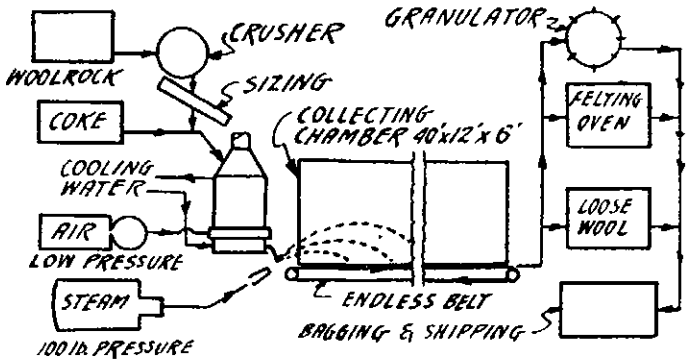

FIGURE 5. "Typical Flow Sheet of a Rock-Wool Manufacturing Operation." From McCue, et al., "Limestones," p. 363.

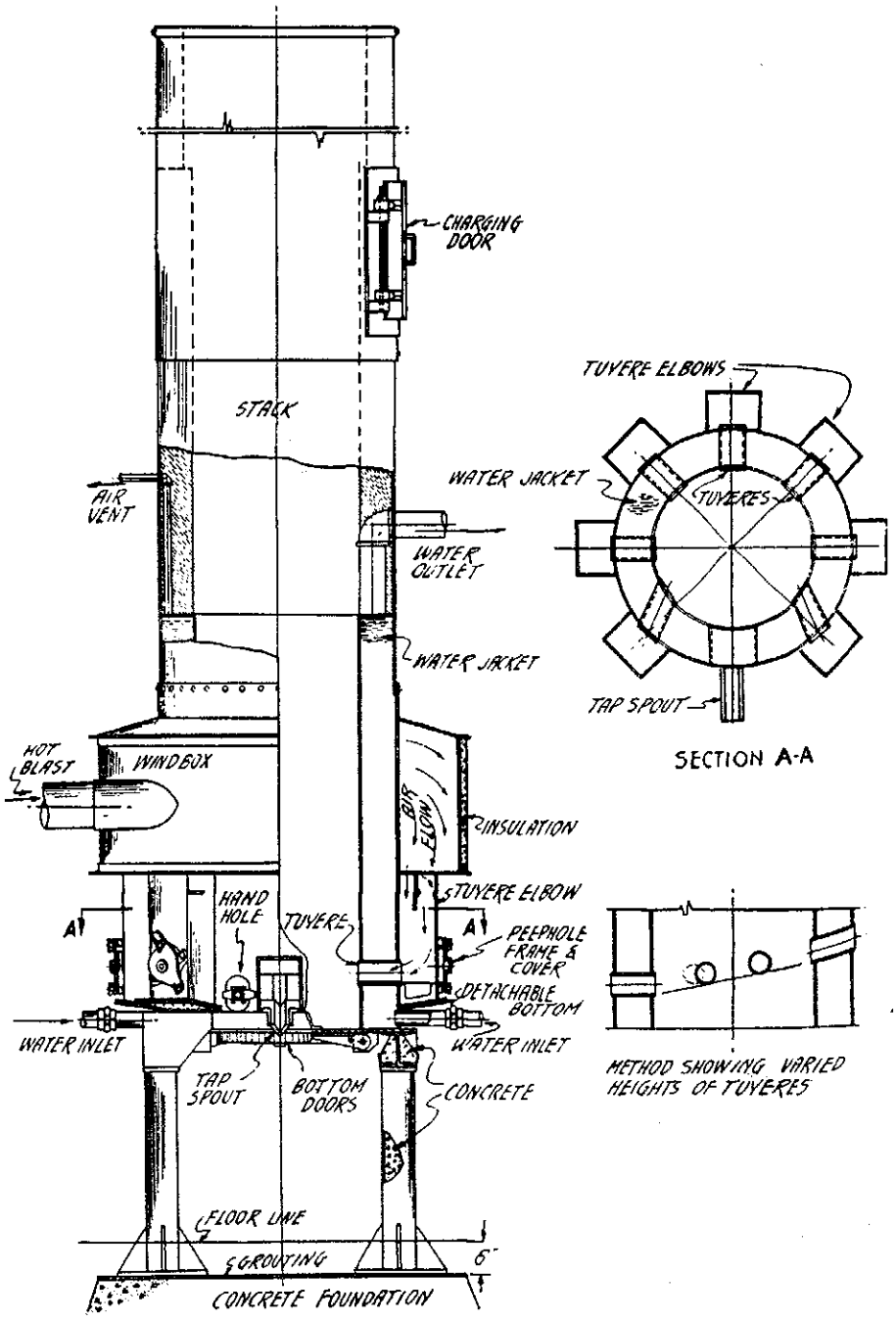

FIGURE 6. "Type of Water-Cooled Blast-Furnace Used to Melt the Rock Mixture, Slag, or Natural Wool Rock." This type of furnace may have been used in the Rock Wool Plant at the Standard Lime & Stone Company. From McCue, et al., "Limestones," p. 364.

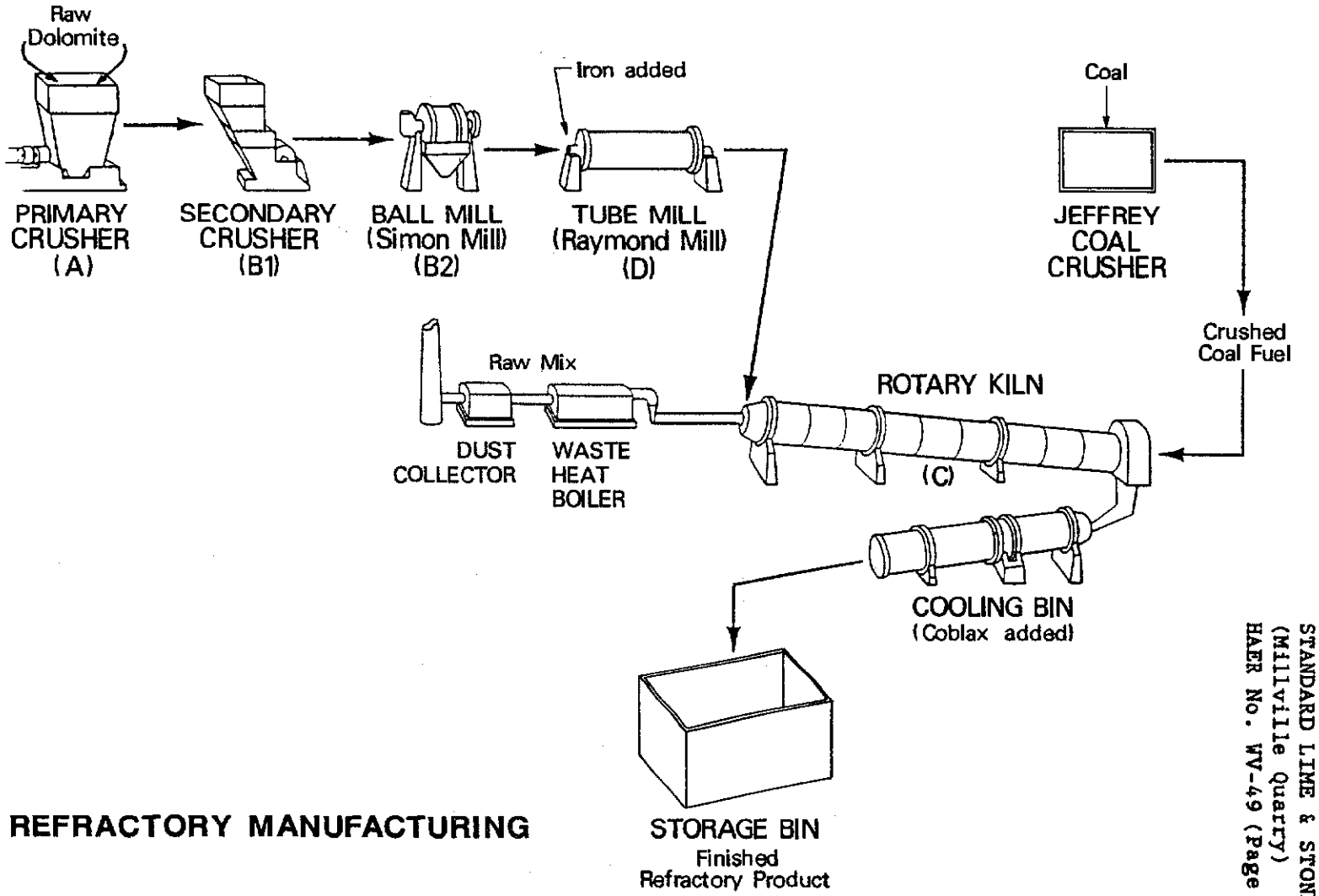

FIGURE 7. Generic refractory manufacturing process flow chart. The operation and machinery used to produce refractory materials illustrated in this diagram were probably similar to that of the Standard Lime & Stone Quarry plant. From General Refractories Company, Refractories, p. 76.

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