

2004-12-0

Buzzi Unicem USA, Inc.

100 Broadway, Suite 30, St. Louis, MO 63102

Riverside Cement Company, d/b/a Buzzi Unicem USA, Selma Plant

10000 River Road, Box 100, Festus, MO 63028

Personnel T23

Replacement of two (2) existing rotary clinker production systems and their attending raw mill system with a single new clinker production line that will operate with an existing raw mill and preheater/precalciner kiln system, in addition to adding finish grinding capacity. This review was conducted in accordance with Section (8), Missouri Rule 10 CSR 10-6.060, *Construction Permits Required*.

Page No.	2
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

River Cement Company, dba Buzzi Unicem USA – Selma Plant
Jefferson County, S40N, T23, R6E

1. Shut Down of Existing Emission Units and Operations at Installation
 - A. River Cement Company, dba Buzzi Unicem USA – Selma Plant (Buzzi Unicem) shall render inoperable the equipment listed below before the date all shake down related activities for the new preheater/precalciner (PH/PC) kiln system (4-K-09) have been completed and the new kiln system becomes fully operational. However, in no instance, may this shake down period for the new kiln system exceed 180 days from the initial start-up date of the new kiln system. The emission units and operations listed below may not be operated after the new kiln system becomes fully operational without first obtaining a New Source Review permit or a No Permit Required determination from the Air Pollution Control Program.

<u>No.</u>	<u>Unit ID</u>	<u>Emission Unit Description</u>
1.	2-R-04A	Screen (1607)
2.	2-R-04C	Screen (1607) Discharge onto Belts (1703/1744)
3.	2-R-06	TP: Belt Conveyor (1707) to Belt Conveyor (1701)
4.	2-R-11	TP: Belt 1703 to Belt Conv & Trip (1710/1732)
5.	2-R-12	TP: Trippers Discharge into Raw Feed Bins
6.	3-G-01	Raw Mill Bin Feeders to Belts (1711/1712) (3 pts.)
7.	3-G-02A	Raw Mill #1 Air Separators (2901/2902)
8.	3-G-02B	Air Slide (3204) & Belt Discharge onto Elev. (2803/2804)
9.	3-G-03	Scale Belt (1713)
10.	3-G-04	Raw Mill #1 (3101)
11.	3-G-05	Air Slide (3204) Discharge onto Elevators (2803/2804)
12.	3-G-06	TP: Raw Mill Bin Feeders onto Belt 1742 (2 pts.)
13.	3-G-07	Raw Mill #2 Air Separator (2907)
14.	3-G-08	Raw Mill #2 (3104)
15.	3-G-09	Separator Air Slide Discharge to F-K Pumps
16.	4-K-01	Kiln Feed Alleviators (2512/2544)
17.	4-K-02	Cement Kilns (4001/4002)
18.	4-K-03	East CKD Tank

Page No.	3
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

19. 4-K-04 Waste Dust Truck Load Spout
20. 4-K-05 Waste Dust Storage Tank
21. 4-K-06 Waste Dust Pelletizer
22. 4-K-07 Waste Dust Pile
23. 4-K-07A Waste Dust Pile Unpaved Haul Road
24. 4-K-07B Waste Dust Transfer Point
25. 4-K-08 R.C.G.A. Tank
26. 5-L-01 Clinker Coolers (4101/4104)
27. 5-L-02 Clinker Conveyors (3 transfer points)
28. 5-L-03A TP: Clinker from Conveyor to Elevators (2807/2808)
29. 5-L-04 TP: Clinker from Elev. (2807/2808) to Elev. (2810/2811)
30. 5-L-07A TP: Clinker from Belt (1716) to Belt (1714)
31. 8-B-01 Coke Barge Unloading/Truck Loading
32. 8-B-02 Haul Road: Coke from Barge Unloading to Stockpile
33. 8-B-06B TP: Coke/Coal Belt (1730) - Furnace Storage Tank
34. 8-B-07 TP: Coke/Coal Bins (2542/2550) to Belts (2623/2634)
35. 8-B-08 Coke/Coal Crusher (1414 Inactive)
36. 8-B-09 Raw Mill Fluid Bed Furnaces 1 & 2
37. 9-M-07 Gasoline Storage Tank
38. 9-M-08 Diesel Storage Tank #1
39. 9-M-09 Diesel Storage Tank #2

B. Buzzi Unicem shall notify the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, MO 65102, no later than 15 days after the following events occur:

- 1) The date of initial start-up of the new PH/PC kiln system (4-K-09),
- 2) The date the shake down period ends and the new kiln system becomes fully operational or 180 days after initial start-up of the new kiln system, whichever is sooner, and
- 3) The date the equipment listed in Special Condition Number 1.A is rendered inoperable.

2. Control Requirements for the New PH/PC Kiln System Equipment

A. Buzzi Unicem shall install baghouses on the new equipment listed below to control the particulate matter less than 10 microns in diameter (PM₁₀) emissions from these sources as specified in the permit application.

<u>No.</u>	<u>Unit ID</u>	<u>Emission Unit Description</u>
1.	1-Q-15	Clay/Correctives Crusher and Conveying
2.	1-Q-16	Clay Conveying to Raw Mill Feed Bins
<u>3.</u>	<u>1-Q-17</u>	<u>Sand Crusher & Sand Unloading to Crusher</u>
4.	1-Q-18	Sand Discharge from Crusher to Conveyor Belt

Page No.	4
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

5. 2-R-13 Discharge from Belts 1702/1743 and Conveying to Diverter
6. 2-R-14 Raw Material Diverter to Stock Pile or Raw Mill Feed Bins
7. 2-R-15 Conveying to and Discharge into Raw Mill Feed Bins
8. 2-R-16 Discharge into Raw Mill Feed Bins from Clay & Limestone Crushing
9. 2-R-17 Discharge into Raw Mill Feed Bins from Sand Crushing
10. 2-R-18 Enclosed Limestone Stock Pile/Storage Building
11. 2-R-19 Weigh Feeder #1 from Limestone Stock Pile
12. 2-R-20 Weigh Feeder #2 from Limestone Stock Pile
13. 2-R-21 Mill Feed Bins Weigh Feeder #1 Discharge to Mill Feed Belt
14. 2-R-22 Mill Feed Bins Weigh Feeder #2 Discharge to Mill Feed Belt
15. 2-R-23 Mill Feed Bins Weigh Feeder #3 Discharge to Mill Feed Belt
16. 2-R-24 Mill Feed Bins Weigh Feeder #4 Discharge to Mill Feed Belt
17. 2-R-25 Mill Feed Bins Weigh Feeder #5 Discharge to Mill Feed Belt
18. 2-R-26 Mill Feed Bins Weigh Feeder #6 Discharge to Mill Feed Belt
19. 3-G-12 Discharge from Mill Feed Belt to Inline Raw Mill
20. 3-G-13 Inline Raw Mill
21. 3-G-14 Recirculation System from Raw Mill to Cyclones
22. 3-G-15 Raw Mill Cyclones Conveying
23. 3-G-16 Blend Silo Elevator
24. 3-G-17 Conveying to Blending Silos
25. 3-G-18 Kiln Feed Elevator Transfer to Conveyor and Discharge into Kiln Feed Bin
26. 3-G-19 Kiln Feed Bin Discharge to Preheater Elevator
27. 3-G-20 Preheater Elevator Discharge into Preheater
28. 4-K-09 PH/PC Kiln – Clinker Cooler System
29. 4-K-10 Discharge from Clinker Cooler to Conveyor
30. 5-L-11 Clinker Off-Spec Bin Conveying
31. 5-L-12 Clinker Diverters Discharge to New Clinker Conveyors
32. 5-L-13 Clinker Discharge to Belts 1716/1714
33. 5-L-14 Clinker Transfer to Belt 1703
34. 5-L-15 Belt 1703 to Belt Conv&Trip (1710/1732)(Old 2-R-11)

Page No.	5
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

35. 5-L-16 Trippers Discharge into Converted Clinker Silos (old 2-R-12)
36. 5-L-17 Clinker Conveying to Converted Clinker Silos
37. 5-L-18 Clinker Conveying to Converted Clinker Silos
38. 6-F-07 Clinker & Gypsum Weigh Feeder #1 from Silos to FM Conveyors
39. 6-F-08 Clinker & Gypsum Weigh Feeder #2 from Silos to FM Conveyors
40. 6-F-09 Clinker & Gypsum Weigh Feeder #3 from Silos to FM Conveyors
41. 6-F-10 Clinker & Gypsum Weigh Feeder #4 from Silos to FM Conveyors
42. 6-F-11 Clinker & Gypsum Weigh Feeder #5 from Silos to FM Conveyors
43. 6-F-12 Clinker & Gypsum Weigh Feeder #6 from Silos to FM Conveyors
44. 6-F-13 Clinker & Gypsum Transfer to Conveyor & Discharge to Feed Elevator
45. 6-F-14 Transfer from Feed Elevator to Weigh Feeder & then Diverter
46. 6-F-15 Reject Bin Discharge to Conveyor & Conveyor Discharge to Elevator
47. 6-F-16 Finish Mill #3 (Large Vertical Mill)
48. 6-F-17 Discharge from Cement Coolers to Cement Silo Elevator
49. 6-F-18 Cement Silo Elevator Discharge to Cement Silos
50. 6-F-19 Finish Mill #3 Natural Gas Furnace
51. 7-C-12 New Cement Silos (2)
52. 7-C-13 Discharge from New Cement Silos to Cement Elevator and Transfer to Belt 1720
53. 7-C-14 Transfer from Belt 1720 to Surge Bin, Barge Loading Spout 5715
54. 8-B-13 Coke/Coal/Bottom Ash/Iron Ore Barge Unloading to Conveyor
55. 8-B-14 Raw Material Conveyor Transfer to Coke/Coal Pile or Covered Conveyor
56. 8-B-15 Covered Conveyor Discharge to Truck
57. 9-M-16 Discharge into CKD Hopper
58. 9-M-20 Synthetic Gypsum Hopper Loadout
59. 9-M-21 Synthetic Gypsum Conveyor Transfer to Belt 1703 & 1716

Page No.	6
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- B. Buzzi Unicem shall modify the existing baghouses on the existing equipment listed below to control the PM₁₀ emissions from these sources as specified in the permit application.

<u>No.</u>	<u>Unit ID</u>	<u>Emission Unit Description</u>
1.	6-F-06	F-K Pump (Finish Mills)
2.	7-C-01	Cement Storage Silos
3.	7-C-02	Cement Pump Feed Bins (2 pumps)
4.	7-C-04	Filling of Cement Storage Dome
5.	7-C-05	TP: Cement Storage Dome Loadout: Feeders-Belt 1719
6.	7-C-06	TP: Cement from Belt 1719 to Belt 1720
7.	7-C-08	Truck Loading Spout

- C. Buzzi Unicem shall enclose and vent all of the emission units specified in Special Conditions 2.A and 2.B to the baghouses as specified in the permit application. The enclosure of the emissions units specified by Special Conditions 2.A and 2.B shall be constructed and maintained such that no visible emissions [zero percent (0%) opacity from the enclosure] are allowed to occur from these sources except through the gasses exiting from the baghouses.
- D. The baghouses specified by Special Condition Number 2.A and 2.B must be in use at all times when that associated piece of equipment is in operation, and shall be operated and maintained in accordance with the manufacturer's specifications. These baghouses shall be equipped with a gauge or meter, which indicates the pressure drop across the control device. These gauges or meters shall be located such that the Department of Natural Resources' employees may easily observe them.
- E. Buzzi Unicem shall monitor and record the operating pressure drop across the baghouses specified by Special Condition Number 2.A and 2.B at least once in every 24-hour period when the associated equipment is in operation.
- F. Appropriate replacement filters for each baghouse specified by Special Condition 2.A and 2.B shall be kept on hand at all times. These replacement filters shall be made of fibers appropriate for operating conditions expected to occur (i.e. temperature limits, acidic and alkali resistance, and abrasion resistance).
- G. Buzzi Unicem shall maintain an operating and maintenance log for each baghouse indicated by Special Condition Number 2.A and 2.B which shall

Page No.	7
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

include the following:

- 1) Incidents of malfunction(s) including the date(s) and duration of the event, the probable cause, any corrective actions taken and the impact on emissions due to the malfunction,
 - 2) Any maintenance activities conducted on the unit, such as parts replacement, replacement of equipment, etc., and
 - 3) A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.
3. Best Available Control Technology (BACT) – Carbon Monoxide (CO)
- A. Buzzi Unicem shall use good combustion practices at all times for the PH/PC kiln system (4-K-09) and the finish mill #3 furnace (6-F-19) in order to meet BACT.
 - B. Buzzi Unicem shall not emit more than 2.73 pounds of CO per ton of clinker produced from the PH/PC kiln system based on a 30-day rolling average.
 - C. Buzzi Unicem shall not emit more than 691.29 pounds of CO per hour of operation from the PH/PC kiln system based on a 30-day rolling average.
 - D. Buzzi Unicem shall not emit more than 2.88 pounds of CO per hour of operation from the finish mill #3 furnace.
 - E. Buzzi Unicem shall develop an Operating and Maintenance Manual for the finish mill #3 furnace based on manufacturer's specifications and recommendations for burner operation to ensure that good combustion practice of natural gas occurs as a routine operating practice.
 - 1) System operators shall be provided training on those procedures prior to operation of the furnace.
 - 2) A written record will be maintained detailing the names of employees, date of the initial training, and dates of subsequent review of the good combustion practice procedures.
4. Continuous Emission Monitoring System (CEMS) –PH/PC Kiln System
- A. Buzzi Unicem shall install, calibrate, maintain and operate a CEMS for measuring CO emissions discharged to the atmosphere and record the output of the system for purposes of showing compliance with the CO emission limitations in Special Conditions 3.B and 3.C.
 - B. The system shall be designed to meet the 40 CFR 60, Appendix B,

Page No.	8
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Performance Specification 4A (PS4A) and Performance Specification 6 (PS6) requirements.

- C. The specifications of 40 CFR 60, Appendix F (Quality Assurance/Quality Control) shall apply. Appendix F requirements shall be supplemented with a quarterly notice to the Department with the dates of the quarterly cylinder gas audits and annual relative accuracy test audit.
- D. Compliance with all non-New Source Performance Standards (NSPS) CO emissions limits of this permit shall be demonstrated through the use of the required CEMS. Buzzi Unicem shall use the procedures described in 40 CFR §75.32 to determine monitor availability.
- 1) The CEMS required by this permit shall be operated and data recorded during all periods of operation except for CEMS breakdown and repairs. Data will be recorded during calibration checks and zero and span adjustments, although this data should not be used for calculation of hourly values.
 - 2) The 1-hour average CO concentrations and flow rates measured by the CEMS required by this permit shall be used to calculate compliance with the emission standards of this permit. At least 2 data points must be used to calculate each 1-hour average.
 - 3) For each hour of missing CO emissions data, Buzzi Unicem shall substitute data by:
 - a) Whenever the monitor data availability is equal to or greater than 95.0%, the owner or operator shall calculate substitute data by means of the automated data acquisition and handling system for each hour of each missing data period according to the following procedures:
 - (1) For a missing data period less than or equal to 24 hours, substitute, as applicable, for each missing hour, the arithmetic average of the flow rates or CO concentrations recorded by a monitoring system during the previous 2,160 quality- assured monitor operating hours, as determined using the procedure in Appendix C to 40 CFR Part 75.
 - (2) For a missing data period greater than 24 hours, substitute as applicable, for each missing hour, the greater of:
 - (a) The 90th percentile hourly flow rate or the 90th percentile CO concentration recorded by a monitoring system during the previous 2,160 quality-assured monitor operating hours, as

Page No.	10
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- B. Buzzi Unicem may use data collected with the required CEMS to confirm CO emission performance of the kiln in lieu of stack testing for CO if the CEMS has been certified using appropriate relative accuracy test audits (RATA) testing prior to the dates outlined below.
- C. A completed Proposed Test Plan (form enclosed) must be submitted to the Air Pollution Control Program at least 30 days prior to the proposed test date of any such performance tests so that a pretest meeting may be arranged, if necessary, and to assure that the test date is acceptable for an observer to be present. The Proposed Test Plan must be approved by the Director prior to conducting the above required emissions testing.
- D. Within 60 days of achieving the maximum production rate of the new PH/PC kiln system, and in any case, no later than 180 days after initial start-up, the owner/operator shall have conducted the required performance tests. If one (1) or more of the above air pollutants for which testing is required by Special Condition 5.A is also required to be tested to demonstrate compliance with another applicable rule (such as 40 CFR Part 63 Subpart LLL, National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry), then Buzzi Unicem may conduct the performance testing according to the time frames indicated by the applicable regulation.
- E. Any required performance testing shall be conducted during periods of representative conditions and should also be conducted at the maximum process/production rates or within ten percent (10%) of this rated capacity, not to include periods of start-up, shutdown, or malfunction. However, if a new performance testing is conducted at a production rate which is less than 90% of the maximum rated capacity of the equipment, then ten percent (10%) above the production rate at which the performance test was conducted shall become the new maximum allowable hourly production rate for the unit.
- F. Two (2) copies of a written report of the performance test results must be submitted to the Director within 90 days of completion of the performance testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required Environmental Protection Agency (EPA) Method for at least one (1) sample run for each air pollutant tested.
- G. No later than thirty (30) days after the performance test results are submitted, Buzzi Unicem shall provide the Director with a report that

Page No.	11
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

establishes the potential emissions of each air pollutant tested in Special Conditions No. 5.A. This report shall report the potential emission rates in pounds per hour, tons per year and pounds per ton of clinker or cement produced from the new PH/PC kiln system (4-K-09) in order that the Air Pollution Control Program may verify the potential emissions from this project.

- H. If the results of the performance testing shows that the emission rates for PM₁₀, SO_x, NO_x or VOC are greater than those used in the emissions analysis herein, then Buzzi Unicem shall evaluate what effects these higher emission rates would have had on the permit applicability of this project. Buzzi Unicem shall submit the results of any such evaluation in a timely manner for Air Pollution Control Program review and approval.
 - I. The above time frames associated with this performance testing condition may be extended upon request of Buzzi Unicem and approval by the Director.
6. Stack Testing Requirements – Finish Mill #3 Furnace
- A. Buzzi Unicem shall conduct performance testing on the finish mill #3 furnace (6-F-19) sufficient to quantify the emission rate of CO from this source. These tests shall be done in accordance with the procedures outlined below.
 - B. A completed Proposed Test Plan (form enclosed) must be submitted to the Air Pollution Control Program at least 30 days prior to the proposed test date any such performance tests are conducted so that a pretest meeting may be arranged, if necessary, and to assure that the test date is acceptable for an observer to be present. The Proposed Test Plan must be approved by the Director prior to conducting the above required emissions testing.
 - C. Within 60 days of achieving the maximum production rate of the finish mill #3 furnace, and in any case, no later than 180 days after initial start-up, the owner/operator shall have conducted the required performance tests.
 - D. Any required performance testing shall be conducted during periods of representative conditions and should also be conducted at the maximum process/production rates or within ten percent (10%) of this rated capacity, not to include periods of start-up, shutdown, or malfunction. However, if a new performance testing is conducted at a production rate which is less than 90% of the maximum rated capacity of the equipment, then ten

Page No.	12
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

percent (10%) above the production rate at which the performance test was conducted shall become the new maximum allowable hourly production rate for the unit.

- E. Two (2) copies of a written report of the performance test results must be submitted to the Director within 90 days of completion of the performance testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required EPA Method for at least one (1) sample run for each air pollutant tested.
 - F. The above time frames associated with this performance testing condition may be extended upon request of Buzzi Unicem and approval by the Director.
7. Stack Testing Requirements – PM₁₀
- A. Buzzi Unicem shall not emit more than 0.0085 grains per actual cubic foot (gr/ACF) of PM₁₀ from any of the baghouses associated with the equipment listed in Special Conditions 2.A with the exception of the PH/PC kiln system (4-K-09) and the finish mill #3 (6-F-16).
 - B. Buzzi Unicem shall not emit more than 0.1925 pounds of PM₁₀ per ton of clinker from the PH/PC kiln system (4-K-09).
 - C. Buzzi Unicem shall not emit more than 0.04 pounds of PM₁₀ per ton of cement from the finish mill #3 (6-F-16).
 - D. Buzzi Unicem shall conduct performance testing on the PH/PC kiln system (4-K-09), the finish mill #3 (6-F-16) and at least ten percent (10%) of the baghouses subject to the emission limit stated in Special Condition 7.A. These tests shall be done in accordance with the procedures outlined below.
 - E. Buzzi Unicem shall conduct performance testing on each of the modified baghouses associated with the equipment listed in Special Conditions 2.B sufficient to substantiate the use of the combined capture/control efficiency of 99% for PM₁₀ emissions cited in the New Source Review permit application. These tests shall be done in accordance with the procedures outlined below.
 - F. A completed Proposed Test Plan (form enclosed) must be submitted to the Air Pollution Control Program at least 30 days prior to the proposed

Page No.	13
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

test date of any such performance tests so that a pretest meeting may be arranged, if necessary, and to assure that the test date is acceptable for an observer to be present. The Proposed Test Plan must be approved by the Director prior to conducting the above required emissions testing.

- G. Within 60 days of achieving the maximum production rate of the listed equipment, and in any case, no later than 180 days after initial start-up of the listed equipment, the owner/operator shall have conducted the required performance tests.
- H. Any required performance testing shall be conducted during periods of representative conditions at the maximum process/production rates or within ten percent (10%) of this rated capacity, not to include periods of start-up, shutdown, or malfunction. However, if a new performance testing is conducted at a production rate which is less than 90% of the maximum rated capacity of the equipment, then ten percent (10%) above the production rate at which the performance test was conducted shall become the new maximum allowable hourly production rate for the unit.
- I. Two (2) copies of a written report of the performance test results must be submitted to the Director within 90 days of completion of the performance testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required EPA Method for at least one (1) sample run for each air pollutant tested.
- J. The above time frames associated with this performance testing condition may be extended upon request of Buzzi Unicem and approval by the Director.
- K. If the performance testing required by Special Condition 7.D of this permit indicates that the PM₁₀ emission rates listed in Special Condition 7.A are being exceeded, Buzzi Unicem shall
 - 1) Correct any malfunctions discovered, and retest the unit(s) within 60 days of the initial test.
 - 2) For each baghouse that exceeds the limits outlined in Special Condition 7.A, performance testing on an additional ten percent (10%) of the baghouses subject to the emission limits stated in Special Conditions 7.A will be required.
 - 3) These performance tests shall be done in accordance with the procedures outlined in Special Conditions 7.F, 7.H, 7.I and 7.J.
 - 4) These performance tests shall be conducted within 60 days of the

Page No.	14
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

initial test results written report submission to the Director.

- L. In lieu of further testing, Buzzi Unicem may evaluate what effects these higher emission rates would have had on the permit applicability of this project. Buzzi Unicem shall use the largest outlet grain loading determined during testing and apply that rate to each of the untested baghouses associated with the equipment listed in Special Conditions 2.A with the exception of the PH/PC kiln system (4-K-09) and the finish mill #3 (6-F-16). Buzzi Unicem shall submit the results of any such evaluation in a timely manner for Air Pollution Control Program review and approval.
8. Restriction on the Maximum Amount of Clinker Production Allowed From the PH/PC Kiln System
- A. Buzzi Unicem shall not produce over 2,220,000 tons of clinker from the PH/PC kiln system (4-K-09) in any consecutive 12-month period.
 - B. Buzzi Unicem shall maintain an accurate record of clinker production from the PH/PC kiln system (4-K-09). The installation shall record the monthly and running 12-month totals of clinker production from this emission unit.
 - C. Buzzi Unicem shall report to the Air Pollution Control Program Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of the month during which the records from Special Condition Number 8.B indicate that the source exceeds the limitation of Special Condition Number 8.A.
9. Haul Road Paving/Sweeping
- A. Buzzi Unicem shall pave the haul roads (4-K-11 and 4-K-13) with materials such as asphalt, concrete, and/or other materials(s). The pavement will be applied in accordance with industry standards. The paving shall be completed prior to the startup of the new PH/PC kiln system.
 - B. Maintenance and/or repair of the surfaces will be conducted as necessary to ensure that the physical integrity of the pavement is adequate to achieve control of fugitive emissions from these areas while the plant is operating.
 - C. The operator(s) shall periodically water, wash and/or otherwise clean all of the paved portions of the haul road(s) as necessary to achieve control of fugitive emissions from these areas while the plant is operating.

Page No.	15
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

10. Revised Maximum Allowable Hourly Production Rate – #1 Finish Mill Air Separators
Buzzi Unicem shall not operate the existing #1 finish mill air separators (6-F-04B) at a rate greater than 97.0 tons of cement per hour upon issuance of this permit. Operation at a higher rate shall not occur without first obtaining a New Source Review permit from the Air Pollution Control Program.
11. Operational Requirement – Enclosed Limestone Stockpile/Storage Building
 - A. Buzzi Unicem shall keep all doors, windows, and other openings to the ambient air of the enclosed limestone stockpile/storage building (2-R-18) closed at all times while in operation and for 30 minutes subsequent to the shutdown of the unloading conveyor system (2-R-18) to allow settling of PM₁₀ to occur.
 - B. Should maintenance personnel be required to enter the enclosed limestone stockpile/storage building (2-R-18) while the unloading conveyor system (2-R-18) is in operation, or during the 30 minute settling period, doors shall not remain open for any reason other than to allow passage into and out of the building.
 - C. Buzzi Unicem shall maintain an operating and maintenance log for the stockpile/storage building which shall include the following:
 - 1) Incidents of malfunction(s) including the date(s), time and duration of the event, the probable cause, any corrective actions taken and the impact on emissions due to the malfunction, and
 - 2) Any maintenance activities conducted on the unit, such as parts replacement, replacement of equipment, etc.
12. Restriction on Type of Material Processed
 - A. Buzzi Unicem shall not process any material other than limestone in the primary crusher (1-Q-10) and secondary crusher (2-R-03B) except during emergency periods when the sand crusher (1-Q-17) or clay/correctives crusher (1-Q-15) are rendered inoperable.
 - B. During emergency periods defined above, Buzzi Unicem shall not process more than 35,000 tons each of sand and clay/correctives on a rolling 12-month average through the existing primary crusher (1-Q-10) and secondary crusher (2-R-03B).
 - C. Buzzi Unicem shall maintain an accurate record of the quantity of sand and clay/corrective materials processed in the existing primary crusher (1-Q-10) and secondary crusher (2-R-03B). The installation shall record the

Page No.	16
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

monthly and running 12-month totals of sand, clay/corrective materials processed through the primary and secondary crushers.

- D. Buzzi Unicem shall maintain an operating and maintenance log for the sand crusher (1-Q-17) and clay/correctives crusher (1-Q-15) which shall include the following:
- 1) Incidents of malfunction(s) including the date(s), time and duration of the event, the probable cause, any corrective actions taken and the impact on emissions due to the malfunction, and
 - 2) Any maintenance activities conducted on the units, such as parts replacement, replacement of equipment, etc.
- E. Buzzi Unicem shall report to the Air Pollution Control Program Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after the end of the month during which the records from Special Condition Number 12.B indicate that the source exceeds the limitation of Special Condition Number 12.A.
13. Record Retention Requirements
Buzzi Unicem shall maintain all records required by this permit, on-site, for the most recent 60 months of operation and shall make such records available immediately to any Missouri Department of Natural Resources' personnel upon request.
14. Restriction of Public Access
- A. Buzzi Unicem shall preclude all public access to the area surrounding the "core plant" as declared in the modeling analysis, and as shown in Appendix A, Figure 1 entitled "River Cement Company, dba Buzzi Unicem USA – Selma Plant – Plant Operation Area". Buzzi Unicem shall submit documentation to demonstrate preclusion to the Air Pollution Control Program for review and approval.
- B. Buzzi Unicem shall have at least one (1) shift foreman per shift that has received training to be aware of unescorted and/or unauthorized personnel in the operating areas, and to see that trespassers are immediately removed from the facility.
- C. A shift foreman will inspect the "core plant" area at least once every two (2) hours to ensure that no unescorted and/or unauthorized personnel have gained access to the operating areas of the plant.
- D. Buzzi Unicem shall maintain records which shall include the following:

Page No.	17
Permit No.	
Project No.	2004-12-050

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

- 1) A current list of all shift foremen,
 - 2) Documentation of training received by each shift foreman, and
 - 3) Shift inspection forms detailing any unescorted and/or unauthorized persons encountered during inspection rounds.
15. Placement of Sources and Buildings
Buzzi Unicem shall submit new modeling files to the Air Pollution Control Program for further analysis should the placement of emission units and buildings change from the configuration submitted for review on February 24, 2005.

DRAFT

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (8) REVIEW

Project Number: 2004-12-050
Installation ID Number: 099-0002
Permit Number:

River Cement Company,
dba Buzzi Unicem USA - Selma Plant
1000 River Cement Road
Festus, MO 63028

Complete: December 22, 2004
Reviewed: July 28, 2005

Parent Company:
Buzzi Unicem USA, Inc.
100 Brodhead Road
Bethlehem, PA 18017

Jefferson County, S40N, T23, R6E

REVIEW SUMMARY

- Buzzi Unicem has applied for authority to construct a single new clinker production line that will operate with an in-line raw mill and PH/PC kiln system to replace two (2) existing long-dry clinker production systems and their attending raw mill systems, in addition to adding finish grinding capacity.
- Hazardous Air Pollutant (HAP) emissions are expected from the increase in clinker production levels. HAPs of concern from the cement manufacturing processes are lead, beryllium, mercury, fluorides, benzene and hydrogen chloride. However, the HAP emitting units at the installation are governed by the requirements of a Maximum Achievable Control Technology (MACT) standard, therefore a Missouri Section (9) review is not required.
- Subpart OOO, *Standards of Performance for Nonmetallic Mineral Processing Plants*, of the NSPS applies to some of the proposed equipment. Subpart Y, *Standards of Performance for Coal Preparation Plants*, applies to some of the coal handling equipment.
- The MACT standard, 40 CFR Part 63, Subpart LLL, *National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry*, applies to some of the proposed equipment.
- Various types of dust control devices will be used to control the PM₁₀ emissions from the new equipment being added under this permit.
- Buzzi Unicem is an existing major source for criteria pollutants. The potential emissions for this project were initially calculated to be above the major source level for PM₁₀ [15.0 tons per year (tpy)], SO_x (40.0 tpy), NO_x (40.0 tpy), CO (100.0 tpy), VOC (40 tpy) and beryllium (0.0004 tpy). The potential emissions of lead, mercury

and fluorides were calculated to be below their respective significant levels. A net emissions increase analysis was submitted for PM₁₀, SO_x, NO_x, CO, VOC and beryllium in which the company proposed to remove two (2) existing long-dry clinker kilns at the installation. This net emissions increase analysis demonstrated that this project would not exceed the significant threshold associated with major review for PM₁₀, SO_x, NO_x, VOC or beryllium. However, this review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of CO from the project are above de minimis levels.

- The BACT requirements apply to the proposed equipment that emits CO. CO emissions from the PH/PC kiln system and the finish mill #3 furnace will be controlled through the use of good combustion practices.
- This installation is located in Jefferson County, which is currently considered to be a maintenance area for the 1-hour ozone (O₃) standard and nonattainment for the 8-hour O₃ standard. The area is also a Prevention of Significant Deterioration (PSD) baseline area for PM₁₀, sulfur dioxide (SO₂) and NO_x.
- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2, Number 3, *Portland Cement Plants*].
- Air quality modeling for this project was performed to determine the ambient impact of CO that will be emitted in significant amounts. Based upon the model reviewed by the Air Pollution Control Program staff, the study submitted by Buzzi Unicem is complete and demonstrates there will not be an exceedance of the National Ambient Air Quality Standards (NAAQS) or available increment.
- Ambient air monitoring was not required for this project since the modeling analysis indicated that the ambient impacts of the modeled pollutants were below significant thresholds.
- Emissions testing is required for several pieces of the new equipment subject to a NSPS or MACT standard. Several pieces of existing equipment will need to be retested due to increased utilization of the equipment. Testing is also required for the new PH/PC kiln system, to quantify emission rates of PM₁₀, SO_x, NO_x, CO and VOC.
- Revision to the Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

Buzzi Unicem currently operates a Portland cement manufacturing installation in

Festus, Missouri that performs quarrying and crushing of raw materials, and processing of these materials into Portland cement via two (2) cement-production systems. These systems are described in detail below and consist of equipment to prepare raw material into pyro-process kiln feed (Raw Grinding), process kiln feed into clinker (Burning), prepare raw fuel for combustion (Fuel Grinding), and process clinker into cement (Finish Grinding). Once the final cement is produced, both production systems use common bulk storage and distribution systems.

- Quarry – Crushing

Limestone is quarried on the plant property; corrective materials, such as sandstone, clay, iron-rich minerals, silica-bearing materials, and other materials are received from off-site sources. Raw materials are introduced to a single gyratory-type primary crusher that crushes these to a material size of less than six (6) inches in diameter. From this unit, material is conveyed into two (2) parallel hammer-type secondary crushers that further reduce the maximum particle size to less than 1 inch in diameter. The materials are then individually conveyed via belt conveyors to several silos/bins for temporary storage. From these storage units the raw materials are extracted and conveyed to one (1) of two (2) parallel and substantially identical cement-production systems that can operate independently or concurrently.

- Raw Grinding

For each cement-production system, the crushed raw materials are extracted from storage in pre-determined ratios and conveyed via a belt conveyor into a Raw Grinding system, where the combined materials are dried and pulverized. The grinding takes place in a tubular-type ball mill, where the materials are reduced to a fine powder. The drying and the separation of the finished product take place in a dynamic separator. A coal/coke-fired furnace provides the heat required for drying the raw materials. In the dynamic separator the hot air stream is forced through sets of rotating blades that remove oversized particles that are subsequently returned to the mill system for further grinding. Sufficiently ground material – kiln feed – exits the system and is conveyed pneumatically for blending into 4 kiln feed silos, common for both Raw Grinding systems, for temporary storage. Process air and water vapor from the mill and the separator are treated in baghouses prior to release to the atmosphere.

- Clinker Burning

From the kiln feed silos, the kiln feed is pneumatically conveyed into each long dry-process rotary kiln for pyro-processing into cement clinker nodules. The kiln feed is introduced at the upper, or “cold”, end of the kiln and travels downhill via the kiln rotation and gravity. Fuel (primarily coal and/or coke) is fired at the lower, or “hot”, end of the kiln and the resulting combustion gases travel countercurrent to the feed via an induced draft fan. The kiln system can also be fired with natural gas. This fuel is typically used only during kiln start-up or during upsets as supplemental fuel. The gas is hard-piped to the kiln floor and fed via a separate firing lance into the main burner assembly at the hot end of the kiln.

As the kiln feed is gravity-conveyed through the kiln it is progressively heated and undergoes calcination and sintering processes. When the material reaches the hot

end of the kiln it has completed a chemical transformation into Portland cement clinker nodules, typically sized between ½ - inch and 2-inches in diameter. The clinker nodules are deposited directly from the hot-end of the kiln into the clinker cooler system.

The kiln gases exit the cold end of each kiln and are treated in two (2) electrostatic precipitators per kiln located in series, where particulate matter (PM) is separated and recovered, prior to being vented to atmosphere through a single main process stack.

- **Clinker Cooling**
Clinker discharged from the kiln passes through a forced-air, reciprocating Clinker Cooler. The majority of the spent cooling air is forced into the hot end of the kiln to provide the oxygen for combustion. A portion of the heated air is also diverted to the fuel grinding process for use as drying air. Excess spent air is passed through fabric filters before venting to atmosphere. The cooled clinker is conveyed to either a covered storage area or to storage silos that feed the Finish Grinding process. From the covered clinker storage building, clinker is reclaimed via underground vibrating feeders and conveyed via belt conveyors, bucket elevators and drag chain conveyors to the clinker storage silos.
- **Fuel Grinding**
Solid fuel is currently delivered to the installation and placed in stockpiles for storage. The fuel is reclaimed by front-end loaders and conveyed via conveyor belts to intermediate storage tanks. The fuel is reclaimed from each intermediate tank and conveyed by drag chain and screw conveyors to a tubular-type ball mill for drying and grinding. A slipstream of hot air from either clinker coolers is diverted to the mill for use as both drying and sweep air. Ground fuel entrained in the drying/sweep air is transported, via the air stream, to a dynamic separator. In the separator, the air stream will pass through sets of rotating blades that will remove oversized particles of solid fuel, which will be returned to the mill system for further grinding. Process air and water vapor from the mill and the separator are treated in fabric filters prior to release into the atmosphere. The finely ground fuel is conveyed to, and collected in, two (2) pulverized fuel storage tanks, one (1) tank providing fuel to each kiln system. The pulverized fuel is metered from the storage tanks and is conveyed to the burner of each kiln via pneumatic conveying. The mix of fuel and conveying air is deployed through the burner into the kiln's combustion zone.
- **Finish Grinding**
In the Finish Grinding process, gypsum is ground with clinker to produce cement. Gypsum is received at the plant by barge, and conveyed by trucks to an outdoor gypsum storage pile. Gypsum is then unloaded from the pile into a hopper and transferred via belt conveyors and bucket elevators to gypsum storage silos.

Clinker and gypsum are extracted from their respective storage silos, metered and fed in predetermined proportions into a tubular-type mill. A high molecular weight organic compound solution is also injected to the mill to aid in the grinding process. The clinker/gypsum blend is introduced to the mill where it is pulverized. Sweep air

is introduced to the mill to entrain ground cement particles and carry them to the cement separator system. In the separator, the air stream passes through sets of rotating blades that remove oversized particles of clinker and gypsum and causes them to return to the mill system for further grinding. Sufficiently ground particles of clinker and gypsum are transported by the air stream into fabric bag filters; the clean air passes through the fabric bag and is released into the atmosphere, while the material particles are trapped on the outside of the fibers of the fabric bag. Jet pulses of compressed air are periodically forced inside the fabric bag, causing the material particles to dislodge and fall into the fabric filter hopper, where they are collected and conveyed via rotating screw conveyors to either a cement cooler or to a pneumatic conveying system. The ground clinker and gypsum particles mix, or Portland cement, are processed for cooling through a cement cooler for temperature control, and are then pneumatically conveyed to either cement storage silos or to a cement storage monolithic dome.

The Portland cement is gravity withdrawn, and shipped off-site via barges, railcars and trucks. Air-gravity conveyors are used for truck loading and railcar operations; barges are loaded using either a pneumatic conveying system or belt conveyors.

Buzzi Unicem, formerly known as River Cement Company, is considered to be an existing major source of air pollutants for New Source Review (NSR) purposes and a Part 70 source for Operating Permit purposes. Buzzi Unicem submitted a Part 70 Operating Permit application for the cement manufacturing plant on May 14, 1997, and Permit No. OP2000-112 was issued on November 6, 2000. The following NSR permits and amendments have been issued to River Cement Company from the Air Pollution Control Program.

Table 1: New Source Review Permits and Amendments

Permit Number	Description
122003-008	A Section (5) permit issued for the replacement of the direct-fired solid fuel systems used on the existing cement kilns with an indirect-fired solid fuel mill/feed system.
052002-013	A Section (5) permit issued for the replacement of four (4) existing air separators at Finish Mill Number 1 and Finish Mill Number 2 with two (2) air separators of a slightly larger capacity.
1299-018	A temporary permit issued to conduct a test program of oxygen enrichment to the combustion zone of the cement kiln.
0693-008	A Section (5) permit issued for the modifications of fuel storage permit 0687-13A and fuel utilization permit 1288-004A. This permit was issued in order to allow for a change in the total number and volume of tanks, for an increase in the annual fuel storage and utilization quantity, for the addition of a vacuum operated truck, railcar, and on site container cleaning facility and for the addition of another burner system to each kiln for the direct burning of a high viscosity liquid (HVL) waste fuel.
0293-006	A Section (5) permit issued to increase the cement storage capacity by one (1) silo with the addition of a reclaim conveyor and five (5) dust collectors.
0687-013B	An amendment to Permit No. 0687-013A issued for the modification of a waste fuel storage permit.
1288-004A	An amendment issued to modify the hazardous waste combustion Permit No. 1288-004.
0687-013A	An amendment issued to modify Permit No. 0687-013 to allow the

	installation and operation of three (3) 22,000 gallon and six (6) 39,000 gallon storage tanks in place of the ten (10) 30,000 gallon storage tanks originally permitted.
1288-004	A Section (5) permit issued on December 9, 1988, to allow River Cement Company to burn hazardous waste fuel D001 [ignitable, nonlisted hazardous waste]. This submittal covers the physical burning of the fuel. (Ref. J.Pintor, RC, letter to M.Stansfield, MDNR, 1/29/87) "Peripherals necessary to allow a cement kiln to burn hazardous waste fuel. These include a fuel supply system and an oxygen monitor in the kiln stack."
0687-013	A Section (5) permit issued on June 29, 1987 for construction of storage tanks associated with the burning of hazardous waste fuel D001 [ignitable, nonlisted hazardous waste], (Ref. J.Pintor, RC, letter to M.Stansfield, MDNR, 1/22/87). Construction of ten (10) 30,000 gallon tanks for storage of hazardous waste fuel.

Buzzi Unicem entered into a settlement agreement at the beginning of 2004 with the Air Pollution Control Program due to repeated instances of excess PM emissions from the installation. Excess emissions have emanated from the installation's electrostatic precipitator, kiln stacks and dust collectors. In addition, emissions monitoring equipment was found to have excessive downtime. The settlement agreement contains a formal Air Quality Compliance Plan that contains several deadlines and specific actions that Buzzi Unicem must meet. Since the settlement agreement has taken effect, two (2) additional notice of excess emissions have been issued: 014CN1 and 1104CN1. Incidences of excessive emissions should be eradicated with the removal of the two (2) existing kilns associated with this project.

PROJECT DESCRIPTION

Buzzi Unicem is proposing to replace both long-dry clinker production systems and their attending raw mill systems, with a single new clinker production line that will operate with an in-line raw mill. In addition, Buzzi Unicem is proposing to increase capacity to produce cement by adding finish-grinding capacity. The following discussion provides a description of the changes to be made to the existing plant configuration.

- Quarry – Crushing
No changes to the equipment or procedures are expected for the quarry operations. Additionally, the existing primary and secondary crushing systems will not be physically modified. However, while they currently process all raw materials, after the proposed project is completed, they will be used primarily to process limestone. Other raw materials will only be processed under emergency back-up situations.

A new crushing system will be installed solely for the processing of clay and corrective materials. This system will include two (2) crushers; one for clay and corrective materials, the other for sand; and attending conveying systems to transport the materials during and after processing. This new system may be used in emergency back-up situations to process limestone also.

- Raw Materials Storage

While the acquisition and receipt of raw materials will be conducted under existing procedures, a new storage hall will be constructed for limestone and clay storage, and new silos will be constructed for the other corrective materials. Raw materials will be extracted from their respective storage units in metered quantities by belt weigh feeders and conveyed to the raw grinding system by means of belt conveyors.

- Raw Grinding

A new in-line raw grinding system will be installed to process raw materials into kiln feed, replacing the two (2) existing raw mill systems. Raw materials will be conveyed from the storage hall and silos via a system of belt conveyors and elevators to the new grinding system. The mill will be of the in-line design where hot combustion gases from the kiln system are forced into the raw grinding system with the dual function of drying the materials during grinding and to sweep the finely ground particles from the grinding system. The particles are carried through a dynamic separator system similar in function to those described above. The off-gases from the in-line mill system will be combined with the vent air from the clinker cooler, and directed to a fabric filter baghouse. All material collected by the baghouse will be conveyed to the existing kiln feed silos via air gravity feeders and elevators, while the clean gases leaving the baghouses will be vented to atmosphere through a common stack.

- Clinker Burning/Cooling

From the kiln feed silos, feed will be conveyed via a system of air gravity conveyors and elevators to a new PH/PC kiln system. The kiln feed will be introduced at the top of the preheater tower that supports a vertically stacked series of cyclones. The kiln feed will travel countercurrent to the upward flow of the combustion gases from the kiln. Heat is transferred from the kiln gases to the kiln feed as the kiln feed moves downward through each cyclone. On exiting the bottom-most cyclone vessel, the partially calcined feed will enter the rotary kiln. As in the traditional long-dry kiln, rotation and gravity conveys the material along the entire length of the kiln where the calcination and sintering processes are completed. When the kiln feed reaches the hot end of the kiln it has undergone a chemical transformation into Portland cement clinker nodules.

The kiln feed equipment needs to be sized to a higher maximum hourly design rate (MHDR) than the kiln itself for the following reasons:

An internal re-circulation of material occurs due to the effect of kiln exhaust stripping feed from the input stream at the top of the preheater tower. The stripped material is carried to and captured by the air pollution control device. From the air pollution control device, the material is returned back to the kiln feed delivery system together with newly introduced feed creating an increased load to the system.

Over-sizing the kiln feed input equipment provides for greater reliability in consistently meeting feed demand of the process, since the equipment will not need to operate at max capacity in ensuring sufficient feed to the kiln system.

The kiln gases exit the upper end of the preheater tower and are forced through the Raw Grinding system when this system is operating or they by-pass the Raw Grinding system. In either case, the kiln gases are routed to a mixing chamber where they are combined with the vent air from the clinker cooler. This occurs prior to the kiln gases being treated by a fabric filter control device that vents to the atmosphere through the new kiln stack. Clinker discharged from the kiln will pass through a forced-air, reciprocating grate clinker cooler.

Coal/petroleum coke will be fired in the precalciner vessel (i.e. the lowest stage of the cyclone tower) and simultaneously at the hot end of the kiln to provide the required energy for the burning process. The kiln system can also be fired with natural gas. This fuel will typically be used only during kiln start-up or during upsets as supplemental fuel.

- Fuel Grinding

No changes are expected to the equipment currently permitted for use in processing and transporting fuel to the two (2) existing kiln systems. However, under operation of the new PH/PC kiln system, one of the existing tanks will be used to provide fuel to the rotary kiln and the other will be used to provide fuel to the precalciner vessel.

- Clinker Handling and Storage

The cooled clinker will be conveyed via a system of pan conveyors, belt elevators and belt conveyors to either the existing covered storage building or clinker storage silos, including new silo capacity resulting from conversion of existing raw feed silos.

Clinker cooling/handling equipment needs to be sized to a higher MHDR than the kiln because, on a short-term basis, the quantity of material input to the kiln typically will not equal the quantity of material being discharged to the cooler. The kiln MHDR reflects the rate at which the kiln system can pyro-process raw meal into clinker and is not necessarily related to the short-term rate at which that clinker will exit the kiln. There are many routine operating conditions that can either impede or accelerate the clinker discharge rate. Some examples include:

As the raw feed is transformed from calcium carbonate to calcium silicates, it will progress through a phase where the material will have an affinity to adhere to the interior surface of the kiln. As the temperature of the load increases, more feed sticks to the side of the kiln and more material is retained in the kiln. As the temperature of the load decreases, less feed sticks to the kiln lining and the accumulation of feed progresses through the kiln.

A gradual build-up of coating on the refractory liner may also occur. As this coating continues to build in mass, it reaches a point where the coating will become too heavy to continue adhering to the refractory and slough off into the clinker bed. This "slug" of coating can be several tons to tens of tons in volume. As the "slug" is discharged to the cooler, the quantity of clinker entering the cooler can easily exceed the MHDR of the kiln for a brief period.

- Finish Grinding

Gypsum will continue to be received at the plant as it is now. However, additional gypsum storage will be created through conversion of existing Raw Feed silos. A new synthetic gypsum production process will also be added which will use cement kiln dust (CKD) as a major constituent of the synthetic gypsum.

The two (2) existing Finish Grinding systems will not be modified. However, a third new Finish Grinding system will be added as part of the proposed project.

- **Cement Barge Shipping Facilities**

The cement distribution system will be upgraded with the construction of new cement silos feeding the existing barge loading belt conveying system and the existing barge loading hopper modified for the higher volume. The existing pneumatic cement conveying lines will be used to convey cement to the new silos. Air gravity conveyors will be used to transfer cement from the silos to the existing belt conveying system currently employed to load barges from the cement storage dome.

- **Barge Unloading System**

A new barge unloading system will be installed as part of the proposed project. Materials received at the plant by barge will be unloaded by a dedicated crane unloading system transferring the materials on to a new belt conveying system. Coal or petroleum coke will be deposited on a stockpile directly from the belt conveying system, while raw materials will be transferred to a loading hopper and from there to trucks.

A listing of the new equipment/processes being added under this permit are identified in Table 2 below.

Table 2: New Emission Units/Processes Associated with this Permit

No.	Unit ID	Description of Unit	Maximum Hourly Design Rate (MHDR)	Control Device ID	Control Device Description
Quarry					
1	1-Q-15	Clay/Correctives Crusher and Conveying	330.7	TB-01	Baghouse
2	1-Q-16	Clay Conveying to Raw Mill Feed Bins	330.7	TB-02	Baghouse
3	1-Q-17	Sand Crusher & Sand Unloading to Crusher	330.7	TB-03	Baghouse
4	1-Q-18	Sand Discharge from Crusher to Conveyor Belt	330.7	TB-04	Baghouse
Raw Material Handling and Storage					
5	2-R-13	Discharge from Belts 1702/1743 and Conveying Diverter	1,200	TB-11	Baghouse
6	2-R-14	Raw Material Diverter to Stockpile or Raw Mill Feed Bins	1,200	TB-12	Baghouse
7	2-R-15	Conveying to and Discharge into Raw Mill Feed Bins	1,200	TB-13	Baghouse
8	2-R-16	Discharge into Raw Mill Feed Bins from Clay and Limestone Crushing	1,200	TB-14	Baghouse
9	2-R-17	Discharge into Raw Mill Feed Bins from Sand Crushing	1,200	TB-15	Baghouse

10	2-R-18	Enclosed Limestone Stockpile/Storage Building (Raw Material Longitudinal)	1,200	TB-16	Baghouse
11	2-R-19	Weigh Feeder #1 from Limestone Stockpile	689.0	TB-17	Baghouse
12	2-R-20	Weigh Feeder #2 from Limestone Stockpile	689.0	TB-18	Baghouse
13	2-R-21	Mill Feed Bins Weigh Feeder #1 Discharge to Mill Feed Belt	689.0	TB-19	Baghouse
14	2-R-22	Mill Feed Bins Weigh Feeder #2 Discharge to Mill Feed Belt	689.0	TB-20	Baghouse
15	2-R-23	Mill Feed Bins Weigh Feeder #3 Discharge to Mill Feed Belt	689.0	TB-21	Baghouse
16	2-R-24	Mill Feed Bins Weigh Feeder #4 Discharge to Mill Feed Belt	689.0	TB-22	Baghouse
17	2-R-25	Mill Feed Bins Weigh Feeder #5 Discharge to Mill Feed Belt	689.0	TB-23	Baghouse
18	2-R-26	Mill Feed Bins Weigh Feeder #6 Discharge to Mill Feed Belt	689.0	TB-24	Baghouse
Raw Grinding and Kiln Feed					
19	3-G-12	Discharge from Mill Feed Belt to Inline Raw Mill	689.0	TB-25	Baghouse
20	3-G-13	Inline Raw Mill	689.0	TB-33	Baghouse
21	3-G-14	Recirculation System from Raw Mill to Cyclones	689.0	TB-26	Baghouse
22	3-G-15	Raw Mill Cyclones Conveying	689.0	TB-27	Baghouse
23	3-G-16	Blend Silo Elevator (Discharge from Cyclones Conveying & Large Dust Collector)	689.0	TB-28	Baghouse
24	3-G-17	Conveying to Blending Silos	689.0	TB-29	Baghouse
25	3-G-18	Kiln Feed Elevator Transfer to Conveyor and Discharge into Kiln Feed Bin	536.0	TB-30	Baghouse
26	3-G-19	Kiln Feed Bin Discharge to Preheater Elevator	536.0	TB-31	Baghouse
27	3-G-20	Preheater Elevator Discharge into Preheater	536.0	TB-32	Baghouse
Preheater – Kiln – Cooler					
28	4-K-09	PH/PC Kiln – Clinker Cooler System	330.7	TB-33	Baghouse
29	4-K-10	Discharge from Clinker Cooler to Conveyor	443.0	TB-37	Baghouse
30	4-K-11	Haul Road (Paved) Calcium Hydroxide Entrance to Bin	7.8 VMT/hr	N/A	Sweeping
31	4-K-12	Calcium Hydroxide Tank and Discharge to Preheater	75.0	N/A	N/A
32	4-K-13	Haul Road (Paved) Ammonia Hydroxide Entrance to Tank	2.6 VMT/hr	N/A	Sweeping
33	4-K-14	Ammonia Hydroxide Tank	500 gals	N/A	N/A
Clinker Handling					
34	5-L-11	Clinker Off Spec Bin Conveying	443.0	TB-38	Baghouse
35	5-L-12	Clinker Diverters Discharge to New Clinker Conveyors	443.0	TB-39	Baghouse
36	5-L-13	Clinker Discharge to Belts 1716/1714	443.0	TB-40	Baghouse
37	5-L-14	Clinker Transfer to Belt 1703	443.0	TB-41	Baghouse
38	5-L-15	Belt 1703 to Belt Conv & Trip (1710/1732) (old 2-R-11)	443.0	2215 2262	Baghouse
39	5-L-16	Trippers Discharge into Converted Clinker Silos (old 2-R-12)	443.0	220109 220111 220113 220115	Baghouse
40	5-L-17	Clinker Conveying to Converted Clinker Silos	443.0	TB-42	Baghouse
41	5-L-18	Clinker Conveying to Converted Clinker Silos	443.0	TB-43	Baghouse
Finish Mill #3 – New Large Vertical Mill					
42	6-F-07	Clinker & Gypsum Weigh Feeder #1 from Silos to FM Conveyors	242.0	TB-44	Baghouse

43	6-F-08	Clinker & Gypsum Weigh Feeder #2 from Silos to FM Conveyors	242.0	TB-45	Baghouse
44	6-F-09	Clinker & Gypsum Weigh Feeder #3 from Silos to FM Conveyors	242.0	TB-46	Baghouse
45	6-F-10	Clinker & Gypsum Weigh Feeder #4 from Silos to FM Conveyors	242.0	TB-47	Baghouse
46	6-F-11	Clinker & Gypsum Weigh Feeder #5 from Silos to FM Conveyors	242.0	TB-48	Baghouse
47	6-F-12	Clinker & Gypsum Weigh Feeder #6 from Silos to FM Conveyors	242.0	TB-49	Baghouse
48	6-F-13	Clinker & Gypsum Transfer to Conveyor and Discharge to Feed	242.0	TB-50	Baghouse
49	6-F-14	Transfer from Feed Elevator to Weigh Feeder and then Diverter	297.0	TB-51	Baghouse
50	6-F-15	Reject Bin Discharge to Conveyor and Conveyor Discharge to Elevator	242.0	TB-52	Baghouse
51	6-F-16	Finish Mill #3 (Large Vertical Mill)	242.0	TB-53	Baghouse
52	6-F-17	Discharge from Cement Coolers to Cement Silo Elevator	242.0	TB-54	Baghouse
53	6-F-18	Cement Silo Elevator Discharge to Cement Silos	242.0	TB-55	Baghouse
54	6-F-19	Finish Mill #3 Natural Gas Furnace	0.034 MMCF/hr	TB-53	Baghouse
Cement Distribution					
55	7-C-12	New Cement Silos (2)	750.0	TB-56	Baghouse
56	7-C-13	Discharge from New Cement Silos to Cement Elevator and Transfer to Belt 1720	750.0	TB-57	Baghouse
57	7-C-14	Transfer from Belt 1720 to Surge Bin, Barge Loading Spout 5715	750.0	TB-58	Baghouse
Coal/Coke Handling					
58	8-B-13	Coke/Coal/Bottom Ash/Iron Ore Barge Unloading to Conveyor	200.0	TB-59	Baghouse
59	8-B-14	Raw Material Conveyor Transfer to Coke/Coal Pile or Covered Conveyor (Iron Ore/Bottom Ash to Covered Conveyor)	200.0	TB-60	Baghouse
60	8-B-15	Covered Conveyor Discharge to Truck (Bottom Ash/Iron Ore)	200.0	TB-61	Baghouse
Synthetic Gypsum Handling					
61	9-M-13	Gasoline Storage Tank	560 gals	N/A	N/A
62	9-M-14	Diesel Storage Tank	560 gals	N/A	N/A
63	9-M-15	Kerosene Storage Tank	560 gals	N/A	N/A
64	9-M-16	Discharge into CKD Hopper	200.0	TB-62	Baghouse
65	9-M-17	Pug Mill/Mixer	200.0	N/A	N/A
66	9-M-18	Conveyor Transfer from Pug Mill to Storage Building	200.0	N/A	N/A
67	9-M-19	Synthetic Gypsum Storage Building	200.0	N/A	N/A
68	9-M-20	Synthetic Gypsum Hopper Loadout	200.0	TB-63	Baghouse
69	9-M-21	Synthetic Gypsum Transfer to Belt 1703 & 1716	200.0	TB-64	Baghouse

N/A = Not Applicable

Net Emissions Increase Analysis

Buzzi Unicem River Cement Company requested to conduct a net emissions increase analysis for the criteria pollutants: PM₁₀, SO_x, NO_x, CO and VOC in their permit application, as well as for beryllium. A net emissions increase analysis examines all the emission increases and decreases that have occurred at the installation for the air pollutants of concern during a contemporaneous time period. The amount of these

emission increases and decreases are determined by finding the actual emissions (average of a representative two-year period), if available. Typically, if there are not two (2) years of actual emissions data for an emissions unit, the potential emissions for the unit are used instead.

In this instance, actual emissions data were taken from the 2000 and 2003 EIQ submittals. Neither 2001 nor 2002 were representative years. In 2001, the installation experienced a failure on the frame of one of the kiln trunions on Kiln 1. The unit required replacement resulting in an extended unscheduled shutdown and a significant loss of production. Additionally, severe cold weather hampered shipping on the Mississippi River and prevented the installation from both receiving materials into the facility and shipping product from the facility. In 2002, a failure of a kiln tire on Kiln 2 caused the installation to operate at reduced rates for nearly one (1) month, followed by a 3-week shutdown of the kiln for replacement of the tire.

After the netting analysis has determined the amount of actual or potential emissions for all of the units where increases and decreases have occurred, or will occur during this period, the increases are added together and the decreases are subtracted from this total. If the resulting level of emissions from the netting analysis is below the significant level for that air pollutant, then the project is evaluated as a de minimis review instead of a PSD review.

This contemporaneous period is defined as the previous five (5) year period from the date the construction on the project begins (i.e. permit issued) through the date the new equipment actually starts operations. For the netting analysis for this project, the date to begin construction (i.e. permit issued) was estimated to be by September 1, 2005. The new PH/PC kiln system is expected to begin operation by September 2008. Therefore, the contemporaneous period for this netting review was determined to be from September 2000 through September 2008.

Net Emissions Increase Analysis for PM₁₀

The potential emissions from the new equipment added under this permit were included as an emissions increase for this netting analysis. In addition, as this project involves an increase in the maximum clinker production capacity of the installation, there is an increased utilization associated with most of the existing equipment at the installation that must also be included in the netting analysis. The difference in PM₁₀ emissions (actual to limited PTE comparison) resulting from this increased utilization of existing equipment was considered to be a creditable emission increase for the netting analysis. The limited potential was based upon a maximum clinker production of 2,220,000 tons annually.

To avoid major review of the project, the installation proposed removal of several pieces of equipment, as well as increased control of select pieces of existing equipment. Revisions to the original netting analysis application were received April 4, 2005 and again on June 22, 2005 incorporating the changes. Special conditions are incorporated in this permit to insure that some pieces of existing equipment are removed from the installation and modifications made to some existing controls to increase efficiency are completed on other pieces of existing equipment.

A review of the permitting projects during the contemporaneous period at this installation identified two (2) additional projects incurring PM₁₀ emissions increases. The first project involved the replacement of four (4) existing air separators in the Finish Mill Number 1 and Finish Mill Number 2 with two (2) air separators of a slightly larger capacity (6-F-04B and 6-F-05, Project Number 2001-11-077). During the original review for Permit Number 052002-013, a PM₁₀ netting analysis was conducted for this air separator replacement that demonstrated the project would not exceed the significant level of 15 tons per year of PM₁₀. This netting analysis contains a change in the MHDR of 6-F-04B. Although originally permitted at 102 tons of cement per hour, the air separator has been examined by Buzzi Unicem and found to have a potential throughput of 97.0 tons of cement per hour. A special condition is included in this permit concerning the change in design rate.

The second project included the construction of two (2) fuel silos (8-B-10 and 8-B-11) associated with an indirect-fired solid fuel mill/feed system (8-B-12) to replace the direct-fired solid fuel systems (Project Number 2003-05-118). That project resulted in an increase of five percent (5%) in the maximum clinker production capacity of the installation. A PM₁₀ netting analysis was also conducted for this project that showed the net emissions increase would be de minimis. The Fuel Mill System Replacement (Project Number 2003-05-118) is currently underway and the Finish Mill System Modification (Project Number 2001-11-077) has not had two (2) years of representative emissions thus, potential emission increases were used to determine the net emissions increase from both of these projects. Net emissions decreases were based on two-year representative average actual emissions.

The permit application contained a third project in its netting analysis. The decrease in emissions caused by the installation of a new baghouse on the tripper discharge into the raw feed bins (2-R-12) was determined to fall outside of the contemporaneous period. Therefore, the net emissions decrease from that project were determined not to be creditable.

During the course of the netting analysis, it was determined that 2-R-04B and 2-R-04D (now combined as 2-R-04) was incorrectly listed as having no control. In fact, the screen has been controlled by a baghouse since it was initially installed. Therefore, in this netting analysis, a baghouse control efficiency of 89.48% has been assigned to this emissions source.

Additionally, the netting analysis was conducted assuming that all gypsum was imported into the plant. Buzzi Unicem intends on manufacturing 60,000 tons per year of synthetic gypsum. However, potential emissions occurring from the handling and conveying of imported gypsum provided the worst case scenario for the netting analysis.

An extensive review of all the permitting projects submitted by the installation during the contemporaneous period did not identify any other emission units, besides those indicated above, involving any increases or decreases in PM₁₀ emissions. Installation of the new kiln system and supporting equipment, modifications to existing equipment, removal of several pieces of existing equipment, increased utilization from existing

equipment and the permitting of the two (2) contemporaneous projects caused a net emissions increase in PM₁₀ emissions of 6.60 tons per year. Since the results of this net PM₁₀ emissions increase analysis is below the 15 ton per year significant level, this project was reviewed in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required for PM₁₀*. The results of this net emission increase analysis for PM₁₀ are provided in Appendix B.

Net Emissions Increase Analysis for SO_x

The same method of analysis as was used in the PM₁₀ analysis was employed in determining the net emissions increase analysis for SO_x. Some of the emission units identified during the PM₁₀ analysis are also emitters of SO_x. Therefore, the same emission units' emission increases and decreases were examined here.

Removal of the existing kilns (4-K-02) and the elimination of fuel combustion, particularly coke combustion, in the raw mill fluid bed furnaces (8-B-09) account for the decreases in SO_x emissions during the contemporaneous period. Increases come from the new PH/PC system (4-K-09) and from the combustion of natural gas in the Finish Mill #3 Furnace (6-F-19). The remaining increases came from the increased utilization of existing equipment at the installation. The SO_x emissions increase analysis yielded a decrease in emissions of 59.58 tons per year, causing this project to be reviewed in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required for SO_x*.

Net Emissions Increase Analysis for NO_x

The netting analysis for NO_x incurred creditable decreases and increases from the same emission units as the SO_x analyses. Removal of the existing kilns (4-K-02), which are huge emitters of NO_x, and the elimination of fuel combustion in the raw mill fluid bed furnaces (8-B-09) account for the decreases in NO_x emissions during the contemporaneous period. Increases come from the new PH/PC system (4-K-09) and from the combustion of natural gas in the Finish Mill #3 Furnace (6-F-19). The remaining increases came from the increased utilization of existing equipment at the installation. A substantial decrease in emissions of 1,977.31 tons per year was incurred by completing the NO_x emissions increase analysis, causing this project to be reviewed in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required for NO_x*.

Net Emissions Increase Analysis for VOC

In addition to the sources that also contribute SO_x and NO_x emissions, VOC emissions were considered from working and breathing losses from numerous storage tanks at the installation. Both gasoline and diesel storage tanks are being replaced, and new kerosene tanks are being added. The increased utilization of the existing storage tanks and volatile degreasers are contributing sources of emissions, leading to a final net emissions increase of 28.84 tons of VOC per year, less than the significance threshold of 40 tons per year. Therefore, this project was reviewed in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required for VOC*.

Net Emissions Increase Analysis for CO

Again, the same emission units that caused changes in the SO_x and NO_x emissions

caused changes in CO emissions. The final netting analysis determined that the net CO emission increase for the project would be 2,129.83 tons per year, since the new kiln system emits a much larger quantity of CO than the removed kilns did. This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required* since potential emissions of CO from the project are above de minimis levels (100 tons per year).

Net Emissions Increase Analysis for Be

The same sources that emit SO_x, NO_x, and CO also are emitters of Be. Creditable increases and decreases were summed, and the net emissions increase for Be was determined to be 2.88E-4 tons per year, causing this project to be reviewed in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required* for Be.

The results of the net emission increase analysis for SO_x, NO_x, VOC, CO and Be are provided in Appendix B.

EMISSIONS/CONTROLS EVALUATION

PM₁₀, SO₂, NO_x and CO are the primary emissions in the manufacture of Portland cement. Small quantities of VOC, ammonia, chlorine and hydrogen chloride also may be emitted. Emissions may also include residual materials from the fuel and raw materials or products of incomplete combustion that are considered to be hazardous. Also, raw material feeds and fuels typically contain trace amounts of heavy metals that may be emitted as PM or vapor.

Sources of PM₁₀ at cement plants include (1) quarrying and crushing, (2) raw material storage, (3) grinding and blending, (4) clinker production, (5) finish grinding, and (6) packaging and loading. Additional sources of PM₁₀ are raw material storage piles, conveyors, storage silos and unloading facilities. The PM₁₀ emission factors and control efficiencies used in this analysis were obtained from the following sections of the EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.

Section 11.19.2	<i>Crushed Stone Processing Operations (1/95),</i>
Section 11.19.2	<i>Crushed Stone Processing and Pulverized Minerals Processing (8/04),</i>
Section 11.6	<i>Portland Cement Manufacturing (1/95),</i>
Section 11.12	<i>Concrete Batching (11/03),</i>
Section 13.2.2	<i>Unpaved Roads (12/03),</i>
Section 13.2.4	<i>Aggregate Handling and Storage Piles (1/95), and</i>
Section 1.4	<i>Natural Gas Combustion (7/98).</i>

The wind erosion PM₁₀ emission factor is from current ACP guidance on storage piles. The PM₁₀ emission factor for vehicular activity around the storage pile was obtained from the Noyes Data Corp. book, Orlemann, et al.1983, *Fugitive Dust Control*. Emission factors for the crushing and screening of clay, ore transfer, sand transfer and screening, cement loadout and transfer, coal unloading and crushing, and gypsum

conveying were obtained from the EPA Factor Information Retrieval (FIRE) Version 6.23 (SCC Codes: 3-05-009-04, 3-03-023-04, 3-05-025-03, 3-05-025-11, 3-05-006-19, 3-05-006-12, 3-03-003-05, 3-05-010-10, and 3-05-015-04). Emission factors for the existing cement kilns came from stack tests approved by the Air Pollution Control Program conducted by the installation in 1996.

All new emission points controlled by new baghouses are assumed to operate with a PM₁₀ outlet grain loading of 0.0085 gr/ACF, but for the new kiln system (4-K-09) and the finish mill #3 (6-F-16). Special conditions are included in this permit to verify the maximum outlet grain loading will not be exceeded. Additional special conditions limit emissions from the kiln system (4-K-09) and the finish mill #3 (6-F-16) in terms of pounds of PM₁₀ per ton of product. Finally, there are a certain number of existing baghouses that will be modified to achieve 99% control efficiency; the permit contains special conditions related to the modifications.

Other changes in operation include the use of the primary crusher (1-Q-10) and secondary crusher (2-R-03B) strictly for limestone after installation of the new system except for in emergency situations, rather than for regular processing of limestone and clay, as they are currently being used. The haul road (1-Q-11B) had been increased in length by 0.5 miles to accommodate travel to the sand crushing processes. To calculate the worst-case scenario for PM₁₀ emissions, emissions calculations for gypsum processing assumed that all gypsum would be imported, rather than produced synthetically at the installation.

Oxides of nitrogen are generated during fuel combustion by oxidation of chemically bound nitrogen in the fuel and by thermal fixation of nitrogen in the combustion air. SO₂ may be generated both from the sulfur compounds in the raw materials and from sulfur in the fuel. If the combustion reactions do not reach completion, CO and VOC can be emitted. Incomplete combustion also can lead to emissions of specific HAPs.

Emission factors for SO_x, NO_x, CO and VOC for the new kiln system are engineering estimates from Buzzi Unicem. Emission factors for the remaining pollutants are from the Portland cement section of AP-42 for both the kiln and the finish mill. The breathing/working loss of VOC emission factors for the gasoline, diesel and kerosene storage tanks were obtained from the EPA FIRE Version 6.21 (SCC Codes: 4-03-010-03, 4-03-010-09, 4-03-010-19, 4-03-010-21, 4-03-010-16 and 4-03-010-18, respectively). As previously mentioned, emission factors for the combustion of natural gas in the Finish Mill #3 Furnace were taken from AP-42 Section 1.4, *Natural Gas Combustion*.

Potential emissions for the existing installation were calculated based on information submitted in the 1997 Emissions Inventory Questionnaire (EIQ) and do not include any increases or decreases in emissions from more recent permits. Existing actual emissions were taken from the applicant's 2004 EIQ submittal. Potential emissions of the application represent the potential of the new equipment, and increased utilization of existing equipment, assuming a production limit of 2,220,000 tons of clinker annually. The Net Emissions Increase from Project includes all emissions increases and decreases incurred during the contemporaneous period. The following table provides

an emissions summary for this project.

Table 3: Emissions Summary (tons per year)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2004 EIQ)	Potential Emissions of the Application	Net Emissions Increase from Project
PM ₁₀	15.0	13,374.50	934.30	470.60	6.60
SO _x	40.0	1,133.50	584.25	535.63	-59.58
NO _x	40.0	6,564.38	5,228.81	3,342.67	-1,977.31
VOC	40.0	28,793.74	227.18	249.54	28.84
CO	100.0	1,082.24	893.97	3,034.63	2,129.83
Pb	0.6	N/D	2.07	0.18	N/A
Hg	0.1	N/D	N/D	0.03	N/A
Be	0.0004	N/D	N/D	0.0007	0.0003
Fluorides	3.0	N/D	N/D	1.00	N/A
Benzene	10.0	N/D	N/D	17.76	Subpart LLL
Hydrogen Chloride	10.0	N/D	N/D	155.40	Subpart LLL
HAPs	25.0	N/D	73.56	184.62	Subpart LLL

*N/A = Not Applicable; N/D = Not Determined

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of CO are above the major threshold.

APPLICABLE REQUIREMENTS

Buzzi Unicem shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110

The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required April 1 for the previous year's emissions.

- *Operating Permits*, 10 CSR 10-6.065
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Control of Odors in the Ambient Air*, 10 CSR 10-5.160

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400
- *New Source Performance Regulations*, 10 CSR 10-6.070 – *NSPS for Nonmetallic Mineral Processing Plants*, 40 CFR Part 60, Subpart OOO
- *New Source Performance Regulations*, 10 CSR 10-6.070 – *NSPS for Coal Preparation Plants*, 40 CFR Part 60, Subpart Y
- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Hazardous Air Pollutants From the Portland Cement Manufacturing Industry*, 40 CFR Part 63, Subpart LLL

BACT ANALYSIS

Introduction

Any source subject to Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, Section (8) must conduct a Best Available Control Technology (BACT) analysis on any pollutant emitted in greater than de minimis levels. The BACT requirement is detailed in Section 165(a)(4) of the Clean Air Act, at 40 CFR 52.21 and 10 CSR 10-0.60(8)(B).

A BACT analysis is done on a case by case basis and is performed using a “top-down” method. The following steps detail the top-down approach:

1. Identify all potential control technologies – must be a comprehensive list, it may include technology employed outside the United States and must include the Lowest Achievable Emission Rate (LAER) determinations.
2. Eliminate technically infeasible options – must be well documented and must preclude the successful use of the control option.
3. Rank remaining control technologies – based on control effectiveness, expected emission rate, expected emission reduction, energy impacts, environmental impacts, and economic impacts.
4. Evaluate the most effective controls – based on case by case consideration of energy, environmental, and economic impacts.
5. Select BACT.

The new PH/PC kiln system and the new finish mill being permitted by Buzzi Unicem are subject to BACT analysis for CO emissions, which exceed the significant threshold of 100.0 tons per year. Buzzi Unicem prepared a BACT analysis based on the U.S. EPA RACT/BACT/LAER Clearinghouse (RBLC) database, vendor information, and permit applications for kiln systems issued in the State of Missouri and elsewhere. The BACT analysis is summarized below.

CO Control Technologies for PH/PC Kiln

The following BACT options were evaluated:

- Process Optimization – Good Combustion Practices
- Thermal Oxidation
- Selective Mining/Raw Material Substitution
- Catalytic Oxidation

Process Optimization – Good Combustion Practices

Good combustion practices (process controls) are commonly employed methods of regulating the process to optimize fuel efficiency and to limit products of incomplete combustion. The proper amount of oxygen assures that complete combustion occurs associated with the complete conversion of CO to carbon dioxide (CO₂) from the process. Use of process optimization as a CO control technology is considered both demonstrated and it is technically feasible.

Thermal Oxidation

Thermal oxidation is performed with devices that use an open flame or combustion within an enclosed chamber to oxidize pollutants. Thermal oxidizers typically operate at temperatures that range from 1,200 °F to 2,000 °F, with a residence time of up to two (2) seconds.

The three types of thermal oxidizers that are most commonly used in industrial plants are:

- Regenerative (RTO)
- Recuperative
- Open-flame (Flare)

The most energy efficient of these three types is the RTO. The RTO can theoretically recover up to 98% of the heat used during oxidation under ideal conditions. In the routine operation of a Portland cement plant, it is estimated that a maximum of 75% heat recovery rate over the operating life of the RTO can be expected. Typical gas stream characteristics of effluent emitted from a PH/PC kiln system contain PM that can render the RTO prone to fouling of the heat transfer media. The maximum of a 75% heat recovery rate is attributable to anticipated fouling of the heat transfer media in the RTO. Use of RTO is considered to be technically feasible.

Recuperative systems incorporate primary and sometimes secondary heat exchangers. The primary heat exchangers are used to preheat the air stream before it enters the combustion chamber. The recuperative systems do recover heat, but not as efficiently

as a regenerative system. Secondary heat exchangers return heat to the building or are used for other purposes in the plant. The open flame (flare) technology is the least energy efficient thermal oxidizer since it does not recover any heat. Since both the recuperative and open-flame systems are less energy efficient without providing additional control of CO, only RTO will be considered further.

Catalytic Oxidation

Catalytic oxidation is the oxidation of CO in the presence of a catalyst, typically platinum, which allows oxidation to proceed at lower temperatures than those required for thermal oxidation. A catalytic oxidizer usually operates effectively between temperatures of 600 °F to 900 °F.

The lower oxidation temperature allows for potential supplemental fuel savings using a catalytic oxidizer compared to a thermal oxidizer. However, since the catalyst required for the catalytic oxidation technology is significantly more expensive than the thermal oxidation catalyst, the potential fuel savings are offset by the capital costs required to obtain the more expensive catalyst material. Similar to the thermal oxidizer, the catalytic oxidizer uses supplemental fuel, such as natural gas, to maintain the proper oxidation temperature.

According to technical sources, catalytic oxidation is prone to catalyst “poisoning”. Poisoning occurs when certain chemical poisons such as mercury, lead and cadmium are contained in the gas stream as PM. When the platinum catalyst is exposed to these chemicals, inactive alloys are formed which reduces the effectiveness of the catalyst. Due to the poisoning effect of PM emissions, the use of catalytic oxidation as an add-on CO control device is not considered technically feasible as BACT for CO.

Selective Mining/Raw Material Substitution

Selective mining causes a decrease in emissions of CO caused by the incomplete combustion of VOC-containing components in the raw material. The most common approach to selective mining at cement plant quarries is to eliminate, to the maximum extent possible, the use of the shale layer, high in VOC content, that lies above the limestone.

There are potentially several different sources of raw materials available that can provide the ingredients necessary to produce a quality product. Calcium is the chemical element of highest concentration contained in Portland cement and is potentially found in limestone, chalk, marl, aragonite, and cement rock. Silica, aluminum and iron are the next most prevalent chemical elements contained in Portland cement. Examples of raw material sources of these elements include quarried/mined sand, foundry sand, shale, clays, iron ore, mill scale, iron slag, fly ash, and bottom ash.

Ranking of Remaining Control Technologies by Control Effectiveness

Table 4: Ranking of CO Control Technologies by Effectiveness

Control Technology	CO Control Efficiency (%)
Regenerative Thermal Oxidation	98%
Process Optimization – Good Combustion Practices	95%

Evaluation of Most Effective CO Controls

Regenerative Thermal Oxidation

Buzzi Unicem believes that use of a stand alone RTO system will likely result in significant oxidation of SO₂ to sulfur trioxide (SO₃). The SO₃ emissions that would exit the new kiln stack will have the potential to react with other stack gas constituents and produce elevated opacity in a “detached plume” effect. In order to eliminate this potential opacity problem, the additional installation of a wet lime scrubber (WLS) would be required to decrease the SO₂ concentration entering the RTO. The WLS needs to be located upstream of the RTO in order to provide additional PM control to reduce fouling of the heat transfer media and to decrease the SO₂ concentration entering the RTO.

The kiln exit gas stream would have to be reheated from 135° F to 1,800° F for the system to operate properly. Natural gas would be used to reheat the exit gas stream. Since a significant amount of natural gas is required for reheat, the RTO would produce a significant amount of NO_x emissions, resulting in a substantial negative environmental impact since Buzzi Unicem is located in a St. Louis ozone area. Operation of the RTO system would also require a significant amount of electricity to be used. The generation of the RTO system electricity demand would result in additional air pollution being generated.

The RTO system also presents substantial economic feasibility issues. An economic feasibility analysis was performed for the combined WLS and RTO system. An approximate total of 2,967 tons per year of CO would be removed through the installation and operation of a combined WLS and RTO system at a total cost of approximately \$6,600,000. The calculated cost effectiveness of a RTO system is estimated to be \$2.95 per ton of clinker produced. Increasing the cost of producing clinker by that sum would place the installation at a severe economic disadvantage and cause the project to be considered economically infeasible. The use of an RTO system is excluded from consideration due to expected substantial negative environmental impacts and economic infeasibility.

Process Optimization – Good Combustion Practices

There are no additional costs attributed to process optimization. Complete combustion is accomplished through careful monitoring and adjustment of fuel rates and combustion air. Process optimization will lead to lower production costs, optimization of fuel resources, and optimal combustion efficiency.

Selective Mining/Raw Material Substitution

The implementation of selective mining would require the conduct of extensive expulsion testing throughout the quarry in order to identify areas of elevated hydrocarbon content. Once identified, the excavation and removal of the elevated hydrocarbon material would need to be performed. Since significant vertical and lateral variability of hydrocarbons typically occur within a geologic deposit, effective mitigation of organic compounds is not likely. The calculated cost effectiveness of using selective

mining for CO BACT is estimated to be \$4.27 per ton of clinker produced. It is concluded that use of selective mining for the control of CO emissions as BACT is economically infeasible.

The ready availability of cost-effective sources of raw materials required to meet the expected demands is a critical consideration in the design of a new kiln system intended for expansion at an existing facility. However, the scope of viable raw material candidates is limited by the extremely exacting requirements of raw mix chemistry. Substitution of the limestone source, iron source, silica source and red clay source were all determined to be economically infeasible.

Selection of BACT CO Control Technology for the PH/PC Kiln

The only remaining control technology is process optimization. Buzzi Unicem will use good combustion practices to control CO emissions, with an annual CO BACT limit of 2.73 pounds per short ton of clinker produced.

CO Control Technologies for Finish Mill System

The following BACT option was evaluated:

- Clean Fuel/Good Combustion Practice

Good combustion practice is commonly employed to maximize fuel efficiency and to minimize the generation of products of incomplete combustion. This is typically achieved by assuring sufficient oxygen is available for the quantity of fuel being delivered to the system, resulting in the maximum conversion of CO to carbon dioxide from the combustion process. Natural gas is inherently considered a clean fuel. Use of good combustion practice as a CO control technology is considered both available technically feasible.

Selection of BACT CO Control Technology for the Finish Mill System

Good combustion practice is chosen as CO BACT for the finish mill system. The continued use of good combustion practices will be ensured by establishing an Operating and Maintenance Manual based on manufacturer's specifications and recommendations, and by providing system operators with training on those procedures.

AMBIENT AIR QUALITY IMPACT ANALYSIS

An ambient air quality impact analysis (AAQIA) was performed to determine the impact of CO emissions at or beyond the "core plant" property boundary used in the modeling analysis of the proposed Buzzi Unicem installation. The declared area, using Universal Transverse Mercator (UTM) Zone 15, North American Datum (NAD) 27, is: Southwest corner – 733000, 4228900; Northwest corner – 733000, 4229400; Northeast corner – 733800, 4229400 and Southeast corner – 733800, 4228900. The "core plant" is mostly surrounded by a gated fence, which is manned by a security guard, or locked during his absence. Two (2) areas are unfenced: the first is an area that provides a 100-foot bluff to preclude access; the second is along the Mississippi riverfront. In addition to the security guard at the gated entrance, shift foreman are provided training specifically on

their responsibility to be watchful for the presence of unauthorized persons on site during the course of their inspection rounds.

The AAQIA must be completed for any air contaminant that exceeds the de minimis emission levels outlined in 10 CSR 10-6.020 (3)(A) Table 1. Due to the net emissions increase analysis conducted by the installation for PM₁₀, SO_x, NO_x, VOC and beryllium, the only air contaminant that exceeds its respective de minimis level is CO.

A preliminary analysis was conducted to determine if the applicant would be required to perform preconstruction monitoring, additional air quality modeling, or if the applicant can forego further analysis altogether. If the preliminary analysis indicates that the facility will not significantly impact the air quality within a region, no further analysis is required. In addition to providing an indication of what pollutants must undergo a full impact analysis, the results of the preliminary analysis determine what, if any, preconstruction monitoring will be required. If the preliminary analysis indicates that the facility will not exceed the monitoring significance level, no preconstruction monitoring is necessary. Table 5 summarizes that no further modeling or preconstruction monitoring is required for CO based on the results of the preliminary analysis.

Table 5: Significance Levels for Modeling and Preconstruction Monitoring ($\mu\text{g}/\text{m}^3$)

Averaging Period	Modeling Significance Level	Preliminary Analysis Results	Monitoring Significance Level	Preliminary Analysis Results
1 – hour	2000	947.44	575	449.97
8 - hour	500	449.97		

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Lina Klein
Environmental Engineer

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated December 10, 2004, received December 13,

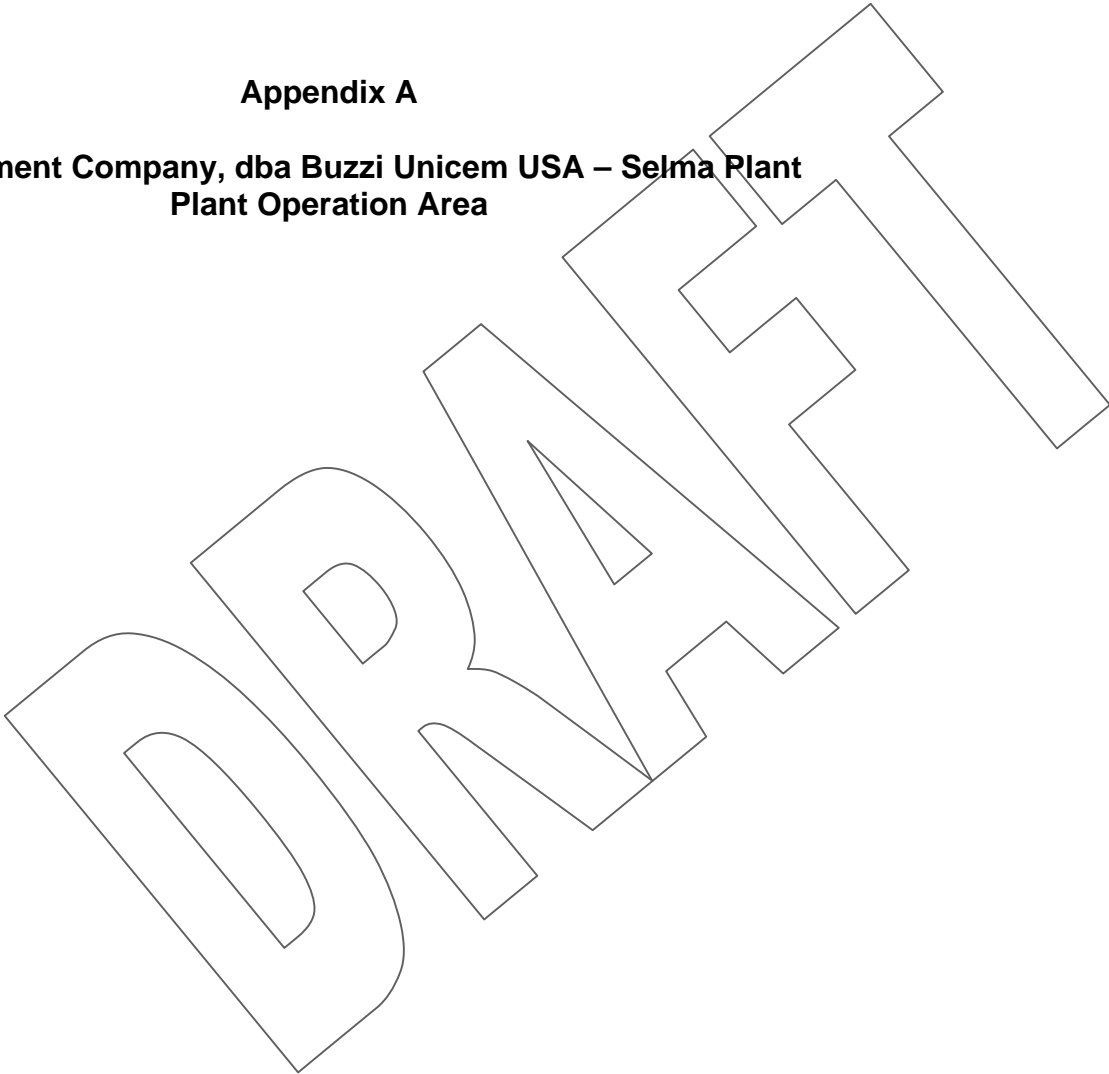
2004, designating Buzzi Unicem USA, Inc. as the owner and operator of the installation.

- Map of Property Boundary and Material Safety Data Sheets, dated December 22, 2005 and received December 27, 2004.
- St. Louis Regional Office Site Survey, dated January 7, 2005.
- Revision of PM₁₀ Potential-To-Emit Air Emissions Inventory, PM₁₀ Contemporaneous Air Emission Changes, and New Source Review Applicability, dated April 1, 2005 and received April 4, 2005.
- Revision #2 to CO BACT Analysis, dated July 6, 2005 and received July 12, 2005.
- Revision to Application for Authority to Construct, received August 3, 2005.
- Revision #2 to PSD Modeling Memorandum, dated August 22, 2005.
- Revision #2 to Application for Authority to Construct, dated and received September 6, 2005.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Stack test reports provided by the applicant.

DRAFT

Appendix A

**River Cement Company, dba Buzzi Unicem USA – Selma Plant
Plant Operation Area**



Appendix B
Net Emissions Increase Analysis

DRAFT

