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Education

Ph.D. Inorganic Chemistry, University of Washington, 1968
B.S. Chemistry, University of Wisconsin, 1962

Professional Employment History

Consultant

2003-present

Construction Technology Laboratories

1998- Senior Principal Process Scientist

1997 Senior Principal Scientist, Division Manager

1994-97 Senior Principal Scientist

Cemtech, L. P.

1992-94 Director, Business Development, Raw Material
Substitutes and Technical Director

Southdown, Inc.

1992 Director, Process Engineering

Holnam Inc.

1990-91 Manager, Technical Affairs

Ideal Basic Industries

1988-90 Vice President - Technical Affairs (Ft. Collins, CO)

1986-88 Vice President/General Manager - New Mexico Division
(Tijeras, NM)

1981-86 Research Director/Director of Production and Quality Services
(Ft. Collins, CO)

F. L. Smidth and Co. A/S, Copenhagen, Denmark

1978-81 Research Chemist

Portland Cement Association

1974-78 Manager, Process Development Section (last position held)

Purity Corporation

1973-74 Research Physical Chemist

Professional Employment History - (continued)

Marquette Cement Manufacturing Co.
1969-73 Senior Research Chemist (last position held)

Principal Experience

- Hazardous waste fuels use in cement kilns.
- BIF compliance tests.
- Research on cement plant emissions and kiln dust utilization.
- Waste fuel management and combustion.
- Research on chemistry of formation of compounds of cement clinker.
- Kiln feed burnability and circulation of volatile elements in cement kilns.
- Production of specialty cement - practical and theoretical requirements.
- Utilization of industrial wastes as cement-making raw materials and fuels.
- Energy optimization in cement manufacture.
- Environmentally-friendly cement manufacturing.
- Beneficial reuse and responsible disposal of cement kiln dust.
- Trace metals and minor elements (alkalies, sulfur, chlorine).

Professional Affiliations

Air and Waste Management Association
American Chemical Society
American Society for Testing and Materials (ASTM)

Language Skills

English, Swedish, Danish, German, French

Publications

Has authored and coauthored publications on Combustion in Rotary Kilns, Energy Concerns, Waste Fuels, Microscopy of Cement Clinker, NO_x and SO_x emissions, and metals emissions from kilns burning waste fuels.

Publications

1. Tennis, Paul D., Bhattacharja Sankar, Klemm, Waldemar A., and Miller, F. MacGregor, "Assessing the Distribution of Sulfate in Portland Cement and Clinker and Its Influence on Expansion in Mortar," Cement, Concrete, and Aggregates, Vol. 21, No. 2, December 1999, pp. 212-216.
2. Bhattya, J. I., Campbell, D. H., Detwiler, R. J., Eddings, E. G., Gajda, J., Miller, F. M., Mishulovich, A., and Taylor, P. C., "Use of High Carbon Fly Ash as a Component of Raw Mix For Cement Manufacture," Final Report TR-110808, Electric Power Research Institute (EPRI), Palo Alto, California, May 1998.
3. Bhattya, J. I., Campbell, D. H., Detwiler, R. J., Eddings, E. G., Gajda, J., Miller, F. M., Mishulovich, A., and Taylor P., "Use of High-Carbon Fly Ash as a Component of Raw Mix for Cement Manufacture," Report WO 5661-01, Electric Power Research Institute (EPRI), Palo Alto, California, May 1998.
4. Miller, F. M., "Report on Removal of Sulfur Dioxide from Cement Kilns' Flue Gas, Wet Methods," PCA R&D Serial No. 2236, Portland Cement Association, Skokie, Illinois, April 1997, 17 pp.
5. Miller, F. M., "Report on Removal of Sulfur Dioxide from Cement Kilns' Flue Gas, Dry Methods" PCA R&D Serial No. 2235, Portland Cement Association, Skokie, Illinois, April 1997, 13 pp.
6. Miller, F. M., "Report on Removal of Sulfur Dioxide from Cement Kilns' Flue Gas, General," PCA R&D Serial No. 2234, Portland Cement Association, Skokie, Illinois, April 1997, 7 pp.
7. Miller, F. M., "Report on Emission of Sulfur Dioxide from Cement Kilns and Post-Emission Chemistry," PCA R&D Serial No. 2233, Portland Cement Association, Skokie, Illinois, April 1997, 15 pp.
8. Miller, F. M., "Report on Thermodynamics and Kinetics of SO₂ in Cement Kiln Systems," PCA R&D Serial No. 2232, Portland Cement Association, Skokie, Illinois, April 1997, 10 pp.
9. Miller, F. M., "Report on Formation of Sulfur Dioxide in Cement Kilns, High Temperature Gas Phase Chemistry and Gas-Solid Interactions," PCA R&D Serial No. 2231, Portland Cement Association, Skokie, Illinois, April 1997, 26 pp.

Publications - (continued)

10. Tennis, P. D., Bhattacharja, S., Klemm, W. A., and Miller, F. M., "Assessing the Distribution of Sulfate in Portland Cement and Clinker and its Influence on Expansion in Mortar," Symposium on Internal Sulfate Attack on Cementitious Systems: Implications for Standards Development, San Diego, California, December 9-10, 1997 (also PCA R&D Serial No. 2133).
11. Miller, F. M. and Klemm, W. A., "Mechanistic Considerations for the Efficiency of Portland Cement in Waste Stabilization," Proceedings, 10th International Congress on the Chemistry of Cement, Vol. 4, Gothenburg, Sweden, 1997, 4iv041, 9 pp.
12. Klemm, W. A. and Miller, F. M., "Plausibility of Delayed Ettringite Formation as a Distress Mechanism – Considerations at Ambient and Elevated Temperatures," Proceedings, 10th International Congress on the Chemistry of Cement, Vol. 4, Gothenburg, Sweden, 1997, 4iv059, 10 pp.
13. Klemm, W. A. and Miller, F. M., "Internal Sulfate Attack: A Distress Mechanism at Ambient and Elevated Temperatures?", PCA R&D Serial No. 2125, Portland Cement Association, Skokie, Illinois, 1997, 9 pp.
14. Tang, F. J. and Miller, F. M., "The Distribution of Sulfur in Present-Day Clinkers of Variable Sulfur Content," Cement and Concrete Research, Vol. 26, No. 12, December 1996, pp. 1821-1829.
15. Shkolnik, E. and Miller, F. M., "Differential Scanning Calorimetry for Determining the Volatility and Combustibility of Cement Raw Meal Organic Matter," World Cement, Research and Development Section, May 1996, pp. 81-87.
16. Powers-Couche, L. J. and Miller, F. M., "A Tale of Two Kiln Burners," Proceedings of the 18th Annual Meeting of the International Cement Microscopy Association, Houston, Texas, May, 1996.
17. Miller, F. M., "Some Measures to Help Control NO_x Emissions in Cement Manufacture," Joint Spring Meeting, Mill Session Paper, General Technical Committee, Portland Cement Association, Skokie, Illinois, March 8, 1994.
18. Miller, F. M., "Emerging Technologies for Utilizing Waste in Cement Production," World Cement, Vol. 25, No. 1, January 1994, pp. 49-51.
19. Miller, F. M., "Risk Assessment," Alternate Fuels, Kiln Process Short Course, Presented to Manufacturing Process Subcommittee, General Technical Committee, Portland Cement Association, Skokie, Illinois, December 13-17, 1993.

Publications - (continued)

20. Miller, F. M., "How to Use Alternate Fuels," Alternate Fuels, Kiln Process Short Course, Presented to Manufacturing Process Subcommittee, General Technical Committee, Portland Cement Association, Skokie, Illinois, December 13-17, 1993.
21. von Seebach, H. M., Miller, F. M., and Simmons, R., "Selection Criteria for Hazardous Waste Derived Fuels as Supplemental Fuels for Clinker Manufacturing," Proceedings, VDZ Congress '93, Process Technology of Cement Manufacturing, Düsseldorf, Germany, September 28, 1993.
22. von Seebach, M., Miller, F. M., Lamb, C., and Simmons, R., "The Use of Monochlorobenzene as a Principal Organic Hazardous Constituent for Destruction Efficiency Determinations in Cement Kilns," Proceedings of the AWMA Conference on Burning of Hazardous Wastes in Boilers and Industrial Furnaces, Orlando, Florida, 1992.
23. Miller, F. M., "Burning Hazardous Waste for Fuel: What are the Issues, Pro and Con? Cement Industry Perspective," Hazmat Southwest Conference, Dallas, Texas, October 7, 1992.
24. Miller, F. M., "Analytical Methods for Determination of Organics in Cement Raw Materials," Holderbank Cement Chemists Colloquium, St. Louis, Missouri, 1990.
25. Hansen, E. R. and Miller, F. M., "Leaching Study of Portland Cement Using the TCLP Procedure," Emerging Technologies in Resource Recovery & Emission Reduction in the Cement Industry, Portland Cement Association, SP112T, Dallas, Texas, September 19-20, 1990.
26. Giles, L. B., Hedrick, R. W., and Miller, F.M., "Improved Fuel Efficiency with a Direct-Fired System," Proceedings of the Thirty-First IEEE Cement Industry Technical Conference, Denver, Colorado, May 15-17, 1989, pp. 413-428.
27. Miller, F. M., "Raw Materials and Minerals, Their Effect on the Operation of the Kiln and on the Product Obtained," Presented annually to various plants of Ideal Basic Industries, 1984-1988.
28. Giles, L. B., Hedrick, R. W., and Miller, F. M., "The T.A.S. Mill, A Novel Approach to Improved Fuel Efficiency," Mill Session Seminar, Portland Cement Association, Golden, Colorado, September 11-15, 1988, 12 pp.
29. Miller, F. M., "Application of Optical Microscopy for Evaluation of Mix Burnability and Clinker Formation," Cement-Wapno-Gips, 36/50, June 1983.
30. Miller, F. M., "Gas Analyzers," Mill Session Paper M-209, Portland Cement Association, Skokie, Illinois, 1983, pp. 58-105.

Publications - (continued)

31. Miller, F. M., "Microscopy as an Aid in Evaluation of Mix Burnability and Clinker Formation," Ciments, Betons, Platres, Chaux, No. 731, April 1981, pp. 212-218, Also, Proceedings of the Third International Conference on Cement Microscopy, Houston, Texas, March 16-19, 1981.
32. Miller, F. M. and Egeløv, A. H., "Relationship Between Cement Kiln Operation and Content of NO_x in Kiln Exit Gases," Zement-Kalk-Gips 33, June 1980, pp. 310-313.
33. Miller, F. M., "Dusty Clinker and Grindability Problems," Rock Products 83, April 1980, pp. 152-157.
34. Helmuth, R. A., Miller, F. M., O'Connor, T. R., and Greening, N. R., "Cement," Kirth Othmer Encyclopedia Chemical Technology, 3rd Edition, Vol. 5, 1979, pp. 163-193.
35. Miller, F. M., "Clinker Microscopic Methods as a Tool for Cement Quality Control," Mill Session paper M-205, Portland Cement Association, Skokie, Illinois, 1978, pp. 129-136, Also, IEEE Transactions on Industry Applications 1A-15, July/August 1979, pp. 365-367.
36. Jaeger, F. A., Beshore, D. G., and Miller, F. M., "Applications of Thermal Energy Storage in the Cement Industry," Presented at 3rd Annual Thermal Energy Storage Contractor's Information Exchange Meeting, Springfield, Virginia, December 5, 1978, Published in Energy Technology, 1979, pp. 333-339.
37. Miller, F. M., "Use of Precalciners to Remove Alkali from Raw Material in the Cement Industry," Quarterly Technical Progress Report, August-October 1978, Portland Cement Association, Available through National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161, NTIS Accession No. u8004.
38. Miller, F. M., "Clinker Microscopic Methods as a Tool for Cement Quality Control," Portland Cement Association, Skokie, Illinois, available through IEEE Cement Industry Technical Conference, Paper 20th, Roanoke, Virginia, May 15-18, 1978.
39. Miller, F. M., "Microscopy and X-Ray Diffraction as Kiln Diagnostic Techniques," Cement Chemists Seminar, Portland Cement Association, Lincolnwood, Illinois, February 6-8, 1978, 10 pp.
40. Miller, F. M., "Mechanisms of NO_x Generation and the Results of PCA's NO_x Survey," from Session New Fuels, New Preheaters, New Problems, Mill Session Paper M-204, Portland Cement Association, Skokie, Illinois, 1977, 70 pp.

Publications - (continued)

41. Greening, N. R., Miller, F. M., Weise, C. H., and Nagao, H., "Elimination of Water Pollution by Recycling Cement Plant Kiln Dust," Portland Cement Association, Skokie, Illinois, Available through U.S. Environmental Protection Agency, EPA-600/2-76-194, July 1976, 69 pp.
42. Miller, F. M., "Minor Elements in Cement Clinker," Cement Chemists Seminar, Paper No. 16, Portland Cement Association, Lincolnwood, Illinois, February 23-25, 1976, 24 pp.
43. Miller, F. M., "Variations in Energy Requirements With Mineralogy and Composition of Raw Materials," Cement Chemists Seminar, Paper No. 8, Portland Cement Association, Lincolnwood, Illinois, February 23-25, 1976, 13 pp.
44. Browning-Ferris Industries, Inc., and Miller, F. M., "Development and Operational Testing of Refuse-Derived Fuel as Supplemental Energy for the Cement Industry," Browning-Ferris Industries, Inc., and Portland Cement Association, Project Supported by Energy Research and Development Administration, 1975, 69 pp.
45. Greening, N. R., O'Connor, T. R., and Miller, F. M., "Energy Conservation Potential in the Cement Industry," Joint Federal Energy Administration and Portland Cement Association Report, 1975.
46. Tabikh, A. A. and Miller, F. M., "Nature of Phosphogypsum Impurities and Their Influence on Cement Hydration," Cement and Concrete Research, Vol. 1, No. 6, November 1971, pp. 663-678.