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CONSULTANTS

August 31, 1994

Mr. Robert M. Owsiany, Esquire
KIRKPATRICK & LOCKHART
1500 Oliver Building
Pittsburgh, Pennsylvania 15222

Clayton Project No. 56848.00

Reference: Industrial Hygiene Evaluation of Harbison-Walker Metal-Clad Refractory
Brick Relative to Airborne Asbestos Exposure Potential

Dear Mr. Owsiany:

I am a chemical engineer and senior industrial hygienist certified by the American Board of Industrial Hygiene. I entered the practice of industrial hygiene in 1972 and continue in that profession to the present. I currently hold the position of Vice President, Director, Technical Services, for Clayton Environmental Consultants, Inc. and am based in Clayton's Georgia office located at 400 Chastain Center Boulevard, N.W., Suite 490, Kennesaw, Georgia 30144-5558.

I have testified as an expert witness regarding a variety of industrial hygiene and environmental matters, many involving asbestos. I have been admitted to testify before workmen's compensation hearings and county, state, and federal courts. A copy of my current curriculum vitae is attached for your review.

At your request, I have reviewed the following materials:

- Industrial Hygiene Asbestos in Air Sampling Reports conducted by the United States Steel Corporation at its Homestead Steel Works #5 Open Hearth Shop, dated July 18, 1973; June 8, 1976; November 7, 1980; December 1, 1980; and March 2, 1981
- Engineering Report of Thermal Effects on Asbestos Liners in Harbison-Walker Metal-Clad Brick, by John R. Verna, P.E., dated August 1984
- Expert Report involving 1202 Metal Encased Firebrick with Chrysotile Asbestos-Containing Expansion - Allowance Paper by Richard C. Bradt, Ph.D., dated August 25, 1993
- Expert Report Re: North American Refractories Co. (AHS-175) by Otto Wong, ScD, dated October 15, 1993

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- Expert Report titled "Fundamental Considerations with respect to Exposure to Asbestos from Metal Clad Refractory Brick Use", by Nurtan A. Esman, Ph.D., dated April 9, 1992
- Expert Report regarding metal-clad bricks by Nurtan Esman, Ph.D., dated May 2, 1989
- Drawing titled: "Roof for Open Hearth Furnace" dated 1968
- Assorted drawings General title Open Hearth Plant U.S. Steel Homestead Steel Works

Having reviewed these materials, I hold the following opinions regarding the potential for exposure to airborne asbestos fibers from Harbison-Walker metal-clad brick, within a reasonable degree of scientific certainty.

The construction of the metal-clad roof brick is sufficient to contain asbestos fibers from expansion strips within the metal jacket during open hearth furnace roof construction activities such that roof construction worker airborne asbestos fiber exposures remain very low.

Review of available reports indicate air sampling was conducted by U.S. Steel Corporation for bricklayers and bricklayer helpers during furnace rebuilding activities at the Homestead Steel Works. Workers wore equipment which sampled air from their breathing zones. The sampling followed methods appropriate for comparison of results with the Occupational Safety and Health Administration (OSHA) standards for asbestos. Separate samples were analyzed with individual short-term results combined to form time-weighted average (TWA) concentrations. Results remained below 0.1 fibers per cubic centimeter (f/cc) as TWAs which is the most recent OSHA standard for asbestos (1994). At the time of original sampling, the OSHA standard was 5.0 f/cc being lowered to 2.0 f/cc in 1976 and 0.2 f/cc in 1986, all as TWAs. All sampling indicated airborne fiber concentrations well below the applicable standards in effect at the time.

Available air sampling data indicate that during an open hearth furnace campaign involving metal-clad roof brick, measured airborne fiber concentrations for charging floor employees remained very low, below prior and current OSHA exposure limits for asbestos.

Due to the temperature experienced by roof brick during a furnace campaign, combined with the nature of furnace operation, asbestos fibers within metal-clad brick are likely converted to non-asbestos formate. Sampling for airborne fibers during furnace tear-out and debris removal indicated concentrations at or below the lower

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limit of detection for the methods used. These very low results support the forsterite conversion theory indicating an absence of fibrous material within roof debris.

For any airborne contaminant, the highest airborne concentrations are expected near a source with concentrations lowering, due to dilution, as one moves away from the source. Personal air samples typically describe the highest airborne concentrations.

Air sampling performed at source locations within and near open hearth furnaces during roof construction, furnace operation, and roof demolition, consistently indicates very low to marginally detectable airborne fiber concentrations. Mill areas more distant from these potential source locations are not expected to experience significantly elevated, if even measurable, airborne asbestos fiber concentrations from open hearth furnace roof bricks.

The phase contrast microscopy (PCM) method used for analysis of air samples in the report reviewed counts as "fibers" any particle three times longer than wide with overall lengths greater than 5 micrometers. This can include materials other than asbestos. Additionally, there exist several potential sources of asbestos fibers in open earth steel mills beyond expansion strips enclosed within metal-clad bricks. An example is asbestos expansion strips cut from stock and installed by bricklayers outside the metal enclosed bricks. One, therefore, cannot assume that fibers counted in the air sample reviewed, originated from expansion strips within Harbison-Walker metal-clad roof bricks.

Sincerely,



Charles L. Blake, CIH
Vice President
Director, Technical Services

LB/bb

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