NATIONAL ROOFING CONTRACTORS ASSOCIATION

The voice of professional roofing contractors.

January 1998

To: All NRCA Members

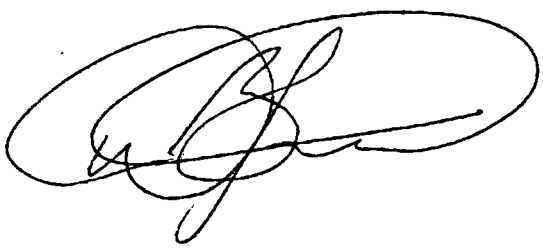
Subject: Blistering of SBS Modified Bitumen Membrane Systems
Interim Report

Dear NRCA Member:

Enclosed is an interim report addressing blistering of SBS modified bitumen membrane systems. The Technical Operations Committee will issue a final report in the spring of 1998.

If you have questions or comments regarding this interim report, please contact NRCA's Research Department.

Very truly yours,



Dane Bradford, Technical Operations Committee Chairman

enclosure

10255 West Higgins Road, Suite 600 ■ Rosemont, Ill. 60018-5607 ■ 847/299-9070 Fax: 847/299-1183
Internet Address: www.roofonline.org ■ E-Mail: NRCA@roofonline.org

Publisher of *Professional Roofing* magazine.

Printed on recycled paper.

NATIONAL ROOFING CONTRACTORS ASSOCIATION

The voice of professional roofing contractors.

Blistering of SBS Modified Bitumen Membrane Systems

In August 1996, NRCA began a limited, preliminary investigation regarding blistering of SBS modified bitumen membrane systems in response to problem reports. The following is an interim status report. A final report will be issued in spring 1998.

A task force composed of several NRCA members and staff investigated a number of completed projects in Louisiana, Oklahoma and Wisconsin where blistering of SBS modified bitumen membranes was reported. In addition, samples from blistered membranes were obtained from members in Georgia and Montana. Samples from five projects were sent to a laboratory for extensive evaluation. The following discussion is based on the field and laboratory evaluations, literature review and discussions with manufacturers.

Most of the SBS modified bitumen membrane blister reports received by NRCA have involved systems attached with hot asphalt. Blisters have been reported between the base or ply sheet and the substrate; however, all of the blisters observed during NRCA's recent investigations have occurred between the cap sheet and the base sheet or ply sheets.

While the number of reported problems is relatively small, if corrective action is deemed to be necessary, repairs can be extensive and costly.

A recent paper [1] discusses previous research regarding blistering of built-up roofs (BUR). All of the factors associated with BUR blistering are applicable to hot-applied SBS membranes. However, because SBS cap sheets are essentially impermeable to vapor transmission, blistering is more problematic when applying these sheets, than when applying glass fiber ply sheets.

Another recent paper offers the opinion that torch-applied and cold-applied attachment will be the preferred methods in the future. [2] Although these attachment options reduce the risk of blistering, they are not trouble-free. Torching of SBS modified bitumen sheets has been done for many years; however, the widespread use of cold adhesive is relatively recent. A consensus material standard for this type of cold adhesive application has not been developed in the U.S.

Interim Recommendations

Critical application factors appear to be asphalt application temperature and ambient weather conditions (i.e., cold asphalt at the point of attachment), mop lead and use of dry materials, as described below.

If attachment with hot asphalt is the option that is selected, recognition of the following items should help minimize the blistering potential.

- **Asphalt Application Temperature:** Many manufacturers of hot-applied SBS systems need to re-evaluate their recommendations regarding asphalt application temperature. In a telephone survey conducted by NRCA, significant variation in recommendations was reported. The recommended asphalt temperature at the point of application varied by as much as 60° F (33° C). The majority of manufacturers recommend the EVT temperature at the point of application.

  Note: EVT and the EVT range is intended to be applicable to BUR. With BUR, the critical factor related to the mopping asphalt is film thickness. However, with SBS modified bitumen sheets, the critical factor is asphalt temperature. The mopping asphalt needs to be hot enough to obtain fusion with the modified sheet. Depending upon sheet formulation and the ambient conditions discussed below, application within the EVT range may result in an inadequate bond of the SBS sheet to the base ply(s).

(over)

10255 West Higgins Road, Suite 600 ■ Rosemont, Ill. 60018-5607 ■ 847/299-9070 Fax: 847/299-1183
Internet Address: www.roofonline.org ■ E-Mail: NRCA@roofonline.org

Publisher of *Professional Roofing* magazine.

Printed on recycled paper.

Request that the manufacturer provide a written recommendation regarding the asphalt application temperature. If the manufacturer recommends EVT or EVT range, caution is urged, as that recommendation may be technically incorrect and may contribute to the absence of positive bonding and consequently to blister formation.

> *Note:* Asphalt application temperature is defined by ARMA and NRCA as the temperature of the asphalt in the mop cart or mechanical spreader just prior to its application to the substrate.

- **Mop Lead:** In the telephone survey conducted by NRCA, many manufacturers reported significant variation in mop lead recommendations. (Mop lead is the distance in front of the roll that asphalt is applied to the substrate.) Many manufacturers had no specific recommendations, while others recommended a mop lead of from 4 to 10 feet (1.2 to 3 m). Mop lead is a critical factor, because if it is too long, the asphalt may become too cool to adequately bond to the SBS sheet when contact is made. The asphalt cooling rate, **which can be very rapid,** is influenced by rooftop wind speeds, ambient temperature, amount of solar radiation (i.e., amount of sunshine), substrate temperature and type, and temperature and mass of the SBS sheet.

Designers/specifiers should request that the manufacturer provide a written recommendation regarding mop lead. If the manufacturer's recommendation is in excess of 5 feet (1.5 m), caution is urged. Unless conditions are nearly ideal, premature cooling and blister formation is problematic with longer mop leads.

- **Materials and Weather:** Use dry materials and work in dry weather as discussed in the *ARMA/NRCA Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing*.

> *Note:* Application conditions and/or practices that can be successfully used with porous glass fiber BUR ply sheets may induce blistering when similar conditions or practices are employed in SBS modified bitumen membrane application.

If Blisters Occur

- If the roof system is warranted, notify the manufacturer.
- The building owner should alert people going on the roof to avoid stepping on blisters.
- Consider repairing blisters that occur in high traffic areas. Repair should also be considered if a blister has pulled apart a seam by about one-third or more of the seam width. For repair guidance, refer to the *Repair Manual for Low-Slope Roof Systems* published by ARMA/NRCA/SPRI, plate MB 8.

References

1. Murray, A., Booth, R. and Paroli, R., "Blistering in Built-up Roofs: A Review," *Proceedings of the Fourth International Symposium on Roofing Technology,* NRCA, 1997, pp. 302.
2. Duchesne, C., Kersey, T. and Lelong, M., "Durability of Two-Ply Modified Bitumen Roofing Membranes: 10-Year Performance Results," *Proceedings of the Fourth International Symposium on Roofing Technology,* NRCA, 1997, PP. 435.