OFFICE MEMORANDUM

MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

August 8, 1973

To: L. T. Oehler
Engineer of Research

From: A. J. Permoda

Subject: "Quaker-Koat" Black Bituminous Coating (Quaker State Oil Co.). Research Project 65 NM-144. (Also Supplement to Report No. R-696 under Research Project 49 G-50). Research Report No. R-877.

The subject coating was referred to the Laboratory for evaluatory comments as a possible bridge-steel coating at the New Materials Committee meeting of May 18, 1965.

The coating appears to be based on asphalt derived by the producer in their refining operations. It was originally developed as a rust preventive and sound deadener for auto underbodies. The producer, hoping to enlarge the market for his product, suggested its use on highway steel. We informed the Committee that a preliminary examination of the two submitted painted panels was made and for the September 8, 1965 meeting suggested getting a larger sample for a standard laboratory evaluation. This was approved by Committee.

We had some difficulty in obtaining the paint sample from producer representative E. F. Chocol of Milwaukee, who submitted the original samples, and had since moved to Bloomfield Hills, Michigan. His product information sheet stated that Quaker-Koat was available in solvated or emulsion type; our sample was the latter type. The suggested end-uses ranged from auto underbodies, bridge steel, home insulation, to burial vault coatings, etc.

The Laboratory plan was to evaluate Quaker-Koat in the next standard laboratory screening tests of a group of coatings, scheduled periodically. This did not occur until 1968.

The standard laboratory screening tests consist of cyclical exposure of painted steel panels from accelerated weathering in the weatherometer to a salt spray-humidity cabinet. The complete exposure totals seven cycles, each consisting of 200 hours exposure in the weatherometer followed by 50 hours in the salt spray cabinet. In these tests, Quaker-Koat performed rather poorly; ranking 26th in a group of 46 test coatings, as presented in Table 1 of Research Report No. R-696 (April 1969).

The comparatively poor rating was expected since experience with this type of soft (grease and/or bituminous) coating predicted poor performance in the accelerated type laboratory tests. Therefore, an additional panel was prepared of subject and similar soft coatings (plus a few standard controls) and exposed to the weather on our roof penthouse, vertically, facing east; exposures were made June 12, 1968. A preliminary inspection was made on February 12, 1969.

The latest inspection of the exposed panels (Fig. 1), was made in July 1973 when they were removed, rated and photographed (Fig. 2). The performance ratings are given below:

Performance Ratings of Paint Systems Exposed on Laboratory Roof for 5+ Years.
(Identification and data as presented in Table 2 of Report R-696)

	Test System	Performance Rating Comments*
Control Standard Coatings	1	Medium- gloss loss plus light chalking
	4	Medium+ gloss loss plus heavy chalking
	8	Medium- gloss loss plus light chalking
	11	Medium+ gloss loss plus heavy chalking
	16	Medium+ gloss loss plus heavy chalking
	28	Medium- gloss loss plus heavy chalking
	29	Medium gloss loss plus light chalking
Soft Coatings	35	Medium gloss loss plus very light graying
	36	Medium gloss loss plus light graying
	37**	Medium gloss loss plus heavy graying
	38	Medium gloss loss plus light-medium graying, plus light cracking
	39	Medium gloss loss plus light-medium graying, plus medium cracking
	42	Gloss loss plus darkening and 85 percent surface failure leading to panel rusting
	35A	Medium gloss loss plus very light graying
	38A	Light gloss loss plus light chalking and few line failures in topcoat
	39A	Light gloss loss plus light chalking

* All of above 2-coat paint systems were returned to roof exposure, after rating.

** Two coats of "Quaker-Koat" Black.

Review of Outdoor Test Results on All Coating Systems

As an introductory note, we wish to add that the above test coatings were divided into two groups; Control Standard Coatings consisting of standard paints, Systems 1 through 29; and Soft Coatings, consisting of bituminous and grease based ones, Systems 35 through 39A. In deference to the latter, the outdoor exposures were made vertically, facing east, rather than tilted at 45°, facing south, - considered a tougher exposure. Because of the different natures of these two types of coating systems, rating one against the other is difficult, but the review follows.

All of the above 16, test, two-coat systems showed some surface degradation during the 5+ years of outdoor exposure. This was evidenced by loss of gloss and chalking (color change due to surface accretion of a chalk-like residue): this varied as noted in the comments.

None of the Control Standard Coatings showed failure leading to steel panel corrosion, though three of the Soft Coating Systems did, Nos. 38, 39 and 42; these were grease-type coatings which from experience do not perform well when exposed to the sun. In the soft group, the bituminous coatings, Nos. 35, 36 and 35A, did not show any steel panel corrosion. As a pertinent note regarding application of soft coatings on auto underbodies, currently the grease type are used to minimize corrosion, while the bituminous type are used as sound deadeners, on body and fenders; both should not be applied on same parts of a car.

It is interesting to note, that in the Control Standard Coatings, the Aluminum topcoated ones, Nos. 1 and 8, showed less surface degradation, than the other colored ones. Accordingly, we recommend that the Department consider use of the Aluminum topcoat on a greater percentage of bridges than in the last 8 years.

Test Results on Quaker-Koat

Two coats of subject test coating, No. 37, did not perform as well, because of greater graying or chalking, as did No. 35, a competitor's bituminous coating. In retrospect, we regret not asking the producer to submit a compatible Aluminum topcoat for the tests, since a system of black primer plus Aluminum topcoat would be of more interest to Department as a bridge steel coating; and incidentally, the combination should yield improved performance as did Nos. 38A and 39A over Nos. 38 and 39, respectively. The former have Aluminum topcoats over soft coatings while the latter are self-topcoated.

Despite only costing about 1/3 of that of Standard Undercoats, though this is considerably diluted on a painting job where coating material costs constitute about 20 percent of the painting job cost, we do not know of an end-use where subject coating, No. 37, or better performing counterpart No. 35 can be used advantageously by the Department.

TESTING AND RESEARCH DIVISION

A. J. Permoda - Supervising Engineer
Materials Research Unit
Research Laboratory Section

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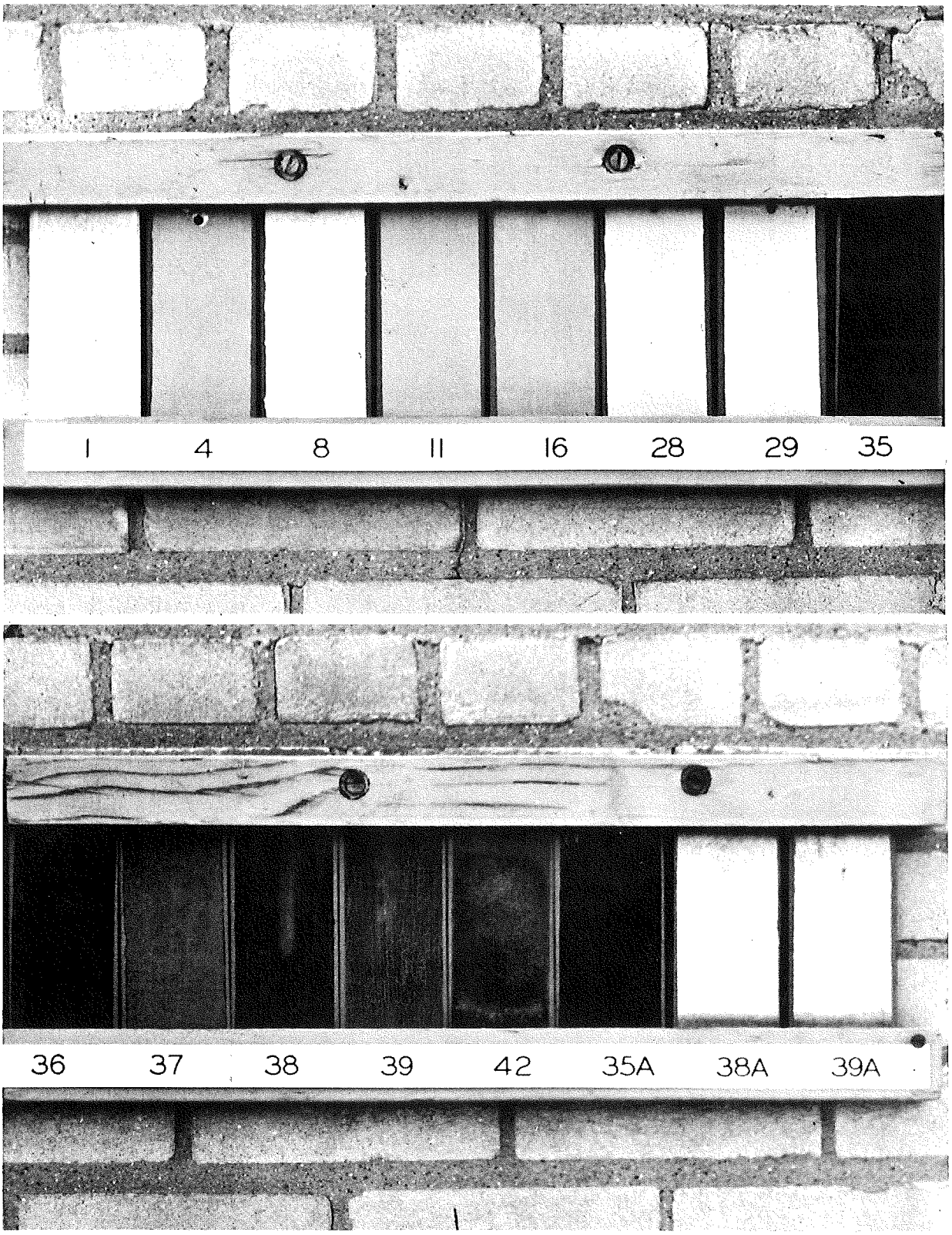

Figure 1. Appearance of test coatings on steel panels exposed to weather on wall of Laboratory roof penthouse, facing east (7-9-73).

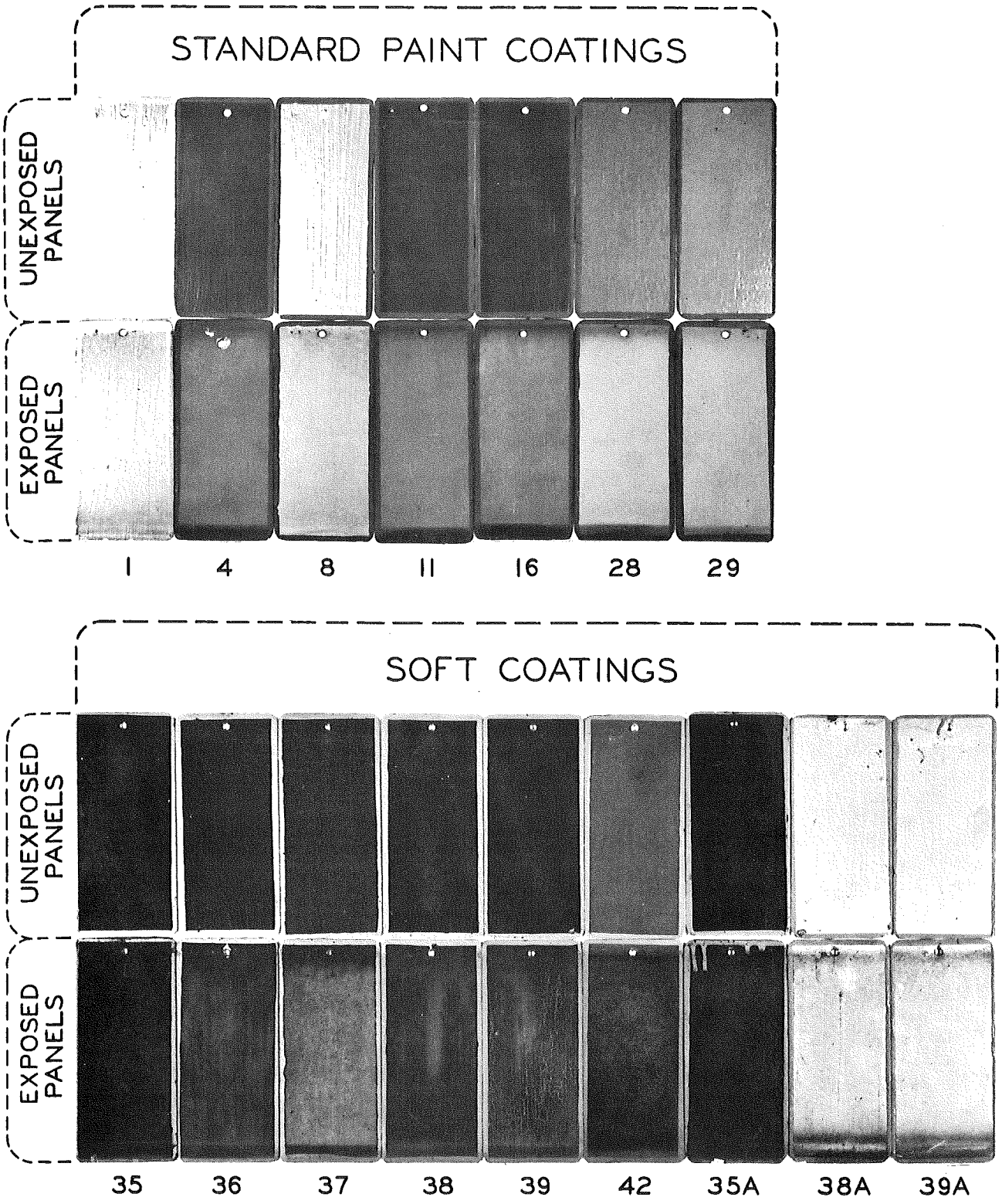

Figure 2. Comparative appearance of test coatings with and without being exposed to weather for 5+ years on roof of laboratory.