Synopsis:

Weathering steel is NYSDOT’s first choice for steel multi-girder bridges under most conditions. This decision has been made in part because of the cost savings that can be realized due to decreased painting and maintenance requirements. However, recent studies have shown that this may not always be the case. This presentation will discuss some situations where bridges with weathering steel are underperforming and whether or not the situation can be rectified for future applications.

About the Presenters:

**Brian McMahon** is currently the Regional Design Engineer for NYSDOT in Rochester. During his 19 year career at NYSDOT he has also served as a Regional Structures Engineer and Engineer-In-Charge. He has a B.S. degree in Civil Engineering from the University of Notre Dame, and an MBA in Management from Syracuse University.

**Richard McFadden** has been employed as an engineer for the New York State Department of Transportation for 21 years. He is currently on temporary assignment as the Assistant Resident Engineer for the Ontario/Wayne County Transportation Maintenance Residency. He has 8 years of experience as a highway designer and 13 years experience as a bridge design squad supervisor including time spent as Acting Regional Structures Engineer. He has had varied engineering design experience throughout his career including major interstate interchanges to lift bridge rehabilitations and major bridge rehabilitations and replacements. Mr. McFadden has a B.S. degree in Civil Engineering and Environmental Engineering from Clarkson University.
So What Do You Do?

• Is the sky falling because you are loosing section loss a lot quicker than advertised?

• Are you going to get the full design life of the bridge of 70 years?
Where is the problem?

- Is the section loss occurring at a joint with easy access?
- Is the problem at midspan over a busy road?
Painting Could Be A Solution
• There are other options for protecting your investment in your bridge that maybe coming to the market but you need to investigate to make sure you’re not getting a cure all that promises everything such as the following product.
This medicine never fails to cure Coughs, Colds, Sore Throat, Diarrhea, Dysentery, Cholera Morbus, Colic, Cramps, Cholera Infantum, Sour Stomach, Sea-Sickness, Heartburn, and Flatulence, and is an invaluable Tonic in recovery from Fevers and exhausting sickness.

It is a great aid to Digestion, and surpasses all other remedies in the cure of Dyspepsia, Headache, Nervousness, Low Spirits, Wakefulness, Palpitation of the Heart, Distress in the Stomach, Costiveness, Rheumatism, Bronchitis, Consumption, Malarial Fevers, and Female Weakness.

DIRECTIONS FOR USE:
Weather-Act®

SUMITOMO METALS

“Weather-Act®” Treatment
Proposal for Application of “Weather-Act”

STEP 1.  Test Piece Exposure

STEP 2.  Trial Application to an existing weathering steel located near the proposed bridge

STEP 3.  Actual Application
Weather-Act®

- Atmospheric corrosion-resistant steel plate for painting
- Atmospheric corrosion-resistant steel plate for bare use or rust stabilizing treatment
- Highly atmospheric corrosion-resistant steel plate
Bridges coated by “Weather-Act”

Total: 263000m²
(75 Bridges)
New Surface Treatment for Promoting Protective Rust Formation

“Weather-Act” Coating

Just After Treatment

Weathering Steel

After a Few Years

Protective Rust (Patina)

After Fading Out of “Weather-Act” Coating
Micrograph of Weathering Steel Rust

Surface Treated by “Weather-Act”

5 Years Exposure
**WEATHER-ACT PROJECTS**

<table>
<thead>
<tr>
<th>SHIN-SAKURAGAOKA INTERCHANGE BRIDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>Hodogaya-ku, Yokohama, Japan</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
</tr>
<tr>
<td>1-Span 4-Box Plate Parallel Girder</td>
</tr>
<tr>
<td><strong>Length</strong></td>
</tr>
<tr>
<td>55.6 Meters</td>
</tr>
<tr>
<td><strong>Date</strong></td>
</tr>
<tr>
<td>September 2000</td>
</tr>
</tbody>
</table>
VIEW FROM BOTTOM OF BRIDGE
Project Location
Kendrick Road
4. CONCLUSION

We performed the investigation on the rusts taken from the bridges at Rochester. The Sumitomo Metal Industries, Ltd. results clearly show that its corrosion condition is quite severe. The chloride content in the rust is much higher (approximately 1.1 mass%) than we have ever experienced.

We have carried out the exposure test for two years at “X”bridge (salt content in rust: 0.16 mass%) for “Weather-act”, and made a conclusion that it is likely that the protective rust layer (patina) cannot form at such a severe condition.
The corrosion of steels is not dominated by only the salt content in the rust but also depends upon the other environmental factors such as humidity, condensation, temperature and wind directions, etc. When the above results are taken into consideration, it can be said that the conditions at Rochester are extremely severe for the chloride concentration.
PROPOSED VARIATIONS OF SURFACE TREATMENT AND WEATHER-ACT APPLICATION

GENERAL NOTES
1. This is a modification for an original scope of work described under item 16573.74 in contract documents D258586 for this project.
2. Weather-Act refers to materials manufactured by Sumitomo Metal Industries in Japan.
3. Weather-Act includes 2 types of Liquid A: P8 for undercoat, and F for topcoat. Both P8 and F are mixed with one type of hardener: Liquid B.
5. Beams (1, 2, 3, 4 and 5) and limits of “zones” are shown on the sketch on this sheet. Any modifications shall be as directed by NYS DOT’s project manager.
6. Symbols of A, B, C, D, E, F, and G refer to the combinations of Blast Standards, Post Blast Cleaning Methods, and Mixing Ratio of Weather-Act as described in Table (1) below.

TABLE (1) PROPOSED TYPE OF TREATMENT AND APPLICATION OF WEATHER-ACT

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>BLAST STANDARD</th>
<th>POST BLAST CLEANING METHOD</th>
<th>MIXING RATIO OF WEATHER-ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Near white Blast Cleaning SSPC-SP10</td>
<td>Wash to remove all debris</td>
<td>No Weather-Act Applied</td>
</tr>
<tr>
<td>B</td>
<td>Commercial Blast Cleaning SSPC-SP6</td>
<td>Wash to remove all debris</td>
<td>Ratio of Liquid A : Liquid B ▶ 4 : 1</td>
</tr>
<tr>
<td>C</td>
<td>Commercial Blast Cleaning SSPC-SP6</td>
<td>Pressure wash at min. 3000psi with 1 to 100 solution of Chlor*Rid in water</td>
<td>Ratio of Liquid A : Liquid B ▶ 4 : 1</td>
</tr>
<tr>
<td>D</td>
<td>Near white Blast Cleaning SSPC-SP10</td>
<td>Wash to remove all debris</td>
<td>Ratio of Liquid A : Liquid B ▶ 4 : 1</td>
</tr>
<tr>
<td>E</td>
<td>Near white Blast Cleaning SSPC-SP10</td>
<td>Pressure wash at min. 3000psi with 1 to 100 solution of Chlor*Rid in water</td>
<td>Ratio of Liquid A : Liquid B ▶ 32 : 1</td>
</tr>
<tr>
<td>F</td>
<td>Near white Blast Cleaning SSPC-SP6</td>
<td>Pressure wash at min. 3000psi with 1 to 100 solution of Chlor*Rid in water</td>
<td>Ratio of Liquid A : Liquid B ▶ 32 : 1</td>
</tr>
<tr>
<td>G</td>
<td>Near white Blast Cleaning SSPC-SP6</td>
<td>Pressure wash at min. 3000psi with 1 to 100 solution of Chlor*Rid in water</td>
<td>Ratio of Liquid A : Liquid B ▶ 32 : 1</td>
</tr>
</tbody>
</table>

NEW YORK DEPARTMENT OF TRANSPORTATION
KENDRICK BRIDGE REHABILITATION, ROCHESTER, NEW YORK

ABM CORPORATION
580 BROADWAY, NEW YORK, NEW YORK 10012
TEL: 212 274 8221 . FAX 212 274 0372

DATE: JUNE 14, 2002
DWG NO.: SMI.KD001
<table>
<thead>
<tr>
<th>No.</th>
<th>PROCESS DESCRIPTION</th>
<th>METHOD (GRADE)</th>
<th>STANDARD THICKNESS</th>
<th>INTERVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SURFACE PREPARATION SANDBLASTING</td>
<td>CONVENTIONAL (SIS Sa2.5)</td>
<td>N/A</td>
<td>&gt; Within 2 Hours</td>
</tr>
<tr>
<td>2</td>
<td>UNDERCOAT WEATHER-ACT P8</td>
<td>SPRAYING (230 g/m²)</td>
<td>20μ</td>
<td>&gt; Within 24 Hours (refer to section 4.2.c)</td>
</tr>
<tr>
<td>3</td>
<td>TOPCOAT WEATHER-ACT F</td>
<td>SPRAYING (150 g/m²)</td>
<td>10μ</td>
<td></td>
</tr>
</tbody>
</table>
CHLOR*RID®

CHLOR*RID® LIQUID SOLUBLE SALT REMOVER

DESCRIPTION:

CHLOR*RID is an organic bonding chemical blend which aids in the removal of chlorides, sulfates and surface reacted salts. Contains no volatile organic compounds (VOC’s), and is biodegradable.
CHLOR*RID®

- CHLOR*RID® is recommended for use in a maintenance wash solution to reduce corrosion and as part of surface preparation prior to application of primers or coatings on a variety of surfaces, including ferrous and non-ferrous metals, concrete, wood, plastics and others.
SURFACE PREPARATION:

Best surface preparation yields the best results. If hydrocarbons are present, they should be removed prior to salt removal. Barrier materials, such as rust or scale or delaminated coatings, should be removed prior to salt removal. Sufficient mechanical force, such as high pressure water or wet abrasive blast, may be utilized so barrier materials are removed as part of salt removal procedures.
Product Information Product

- CHLOR*RI D International, Inc.
- P.O. Box 908 Chandler, AZ 85244
- 800-422-3217 480-821-0039 fax 480-821-0364
- www.chlor-rid.com
- Email: info@chlor-rid.com
One Year Later
One Year Later
Himeji Institute of Technology
Masato YAMASHITA, Dr. Eng. Associate Professor
Department of Mechanical Engineering,
Graduate School of Engineering,
Himeji Institute of Technology
This medicine never fails to
cure Coughs, Colds, Sore
Throat, Diarrhoea, Dysen-
tery, Cholera Morbus, Colic,
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DIRECTIONS FOR USE