

Preparing Steel for Coatings

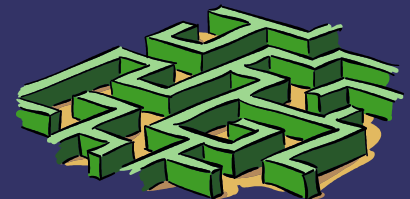
Feasibility Study of Two Alternative Surface Preparation Methods for Bridge Maintenance

Northeast Bridge Preservation Partnership

Portland, Maine

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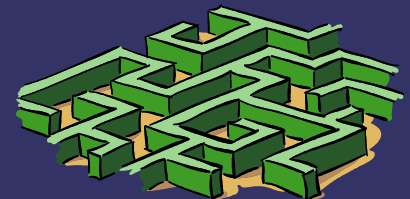
Overview

- ➔ Investigate options for the preparation of coated steel bridge for maintenance re-coating.
- ➔ Determine methods & materials suitable for implementation by bridge crews.
- ➔ Evaluate the health & environmental effects with oversight agencies.
- ➔ Advance promising methods to field applications.
- ➔ Specifications & guidelines



Long-term Goal

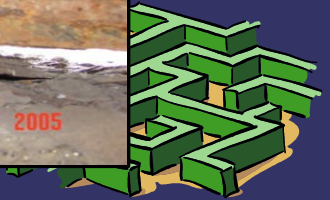
- ➔ Reduce the number of priority repair needs due to the section loss of steel.
- ➔ Develop a sustainable spot painting program for bridge maintenance crews.
- ➔ Industry, research, & field trials lead to refinement of specifications & guidance.
- ➔ Extend the service life of existing coatings.
- ➔ Maintenance of coatings is included in off-the-shelf bridge management systems.



The Present Situation

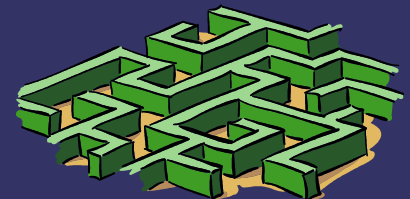
- ➔ More than 1/2 of all structural repair needs discovered through the bridge inspection process are because of section loss.
- ➔ Bridge crews are not involved with maintaining the coating system.
- ➔ All coatings tested by NEPCOAT were applied to SP-10 surface.
- ➔ Approved coatings require SP-10 surfaces.
- ➔ Contract painting programs are not keeping up with the needs.
- ➔ Transportation agencies have not kept pace with methods & materials implemented in other industries.

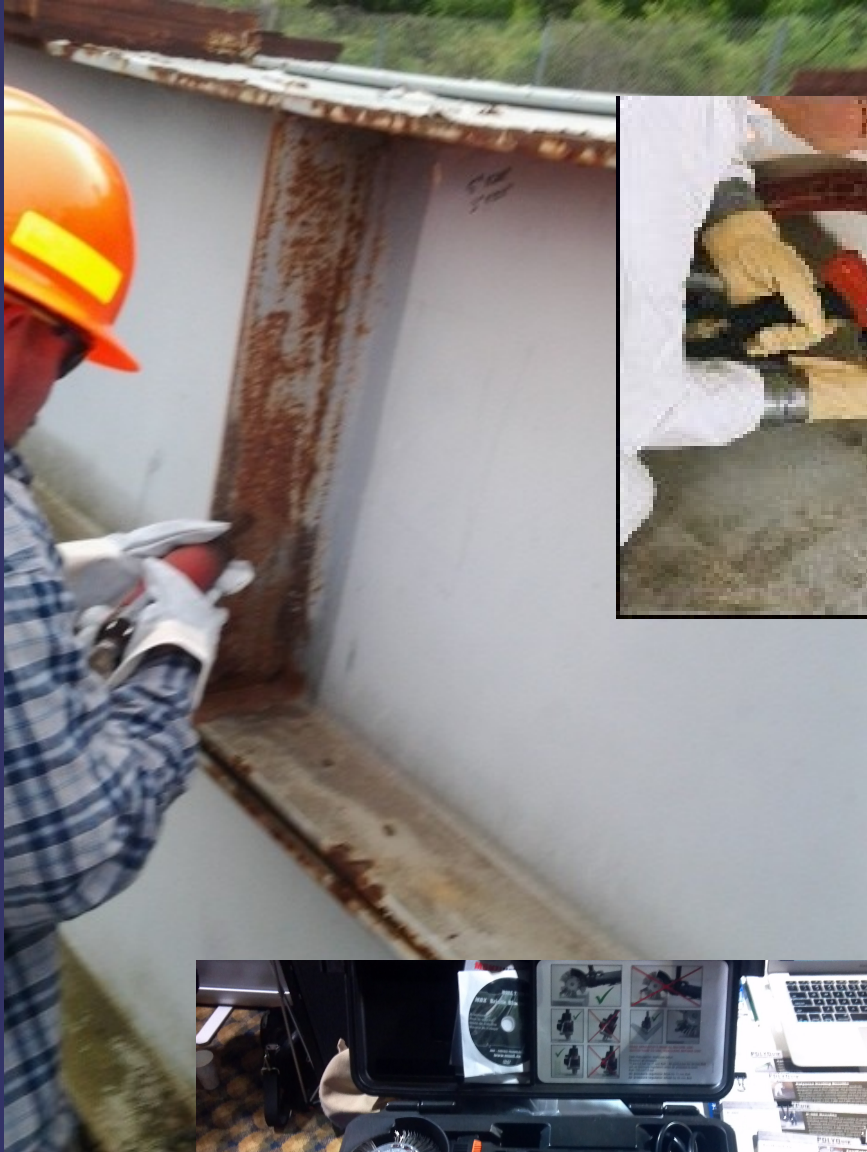




Development up to Present

- ➔ Crews use shrouded hand tools to prepare steel for coating.
- ➔ Open dry abrasive blasting is prohibited in agreement with environmental and health & safety oversight agencies.
- ➔ The post Pb coating system was based on a moisture cure primer. The anticipated service life was over estimated.
- ➔ Estimates of service life with zinc-based primer systems seem realistic.

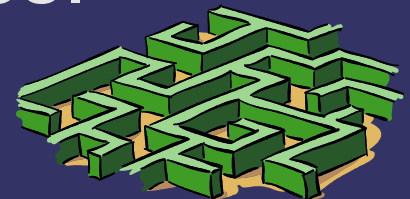






Potential Alternatives

- ➔ Increase funding of the bridge painting program and use existing specifications.
- ➔ Further develop the use of existing steel preparation techniques.
- ➔ Purchase Class A containment equipment for use by state crews.
- ➔ Investigate alternative corrosion protection systems.
- ➔ Use coatings designed for minimally prepared surfaces.
- ➔ Implement “dust-free” blasting strategies.



Field Trials



- ➔ Air Quality Monitoring
- ➔ Production rates
- ➔ Environmental concerns
- ➔ Containment design
- ➔ Equipment costs
- ➔ Implementability

0.1 to 10 microns

– 3 Air Quality

Monitors DataRAMs

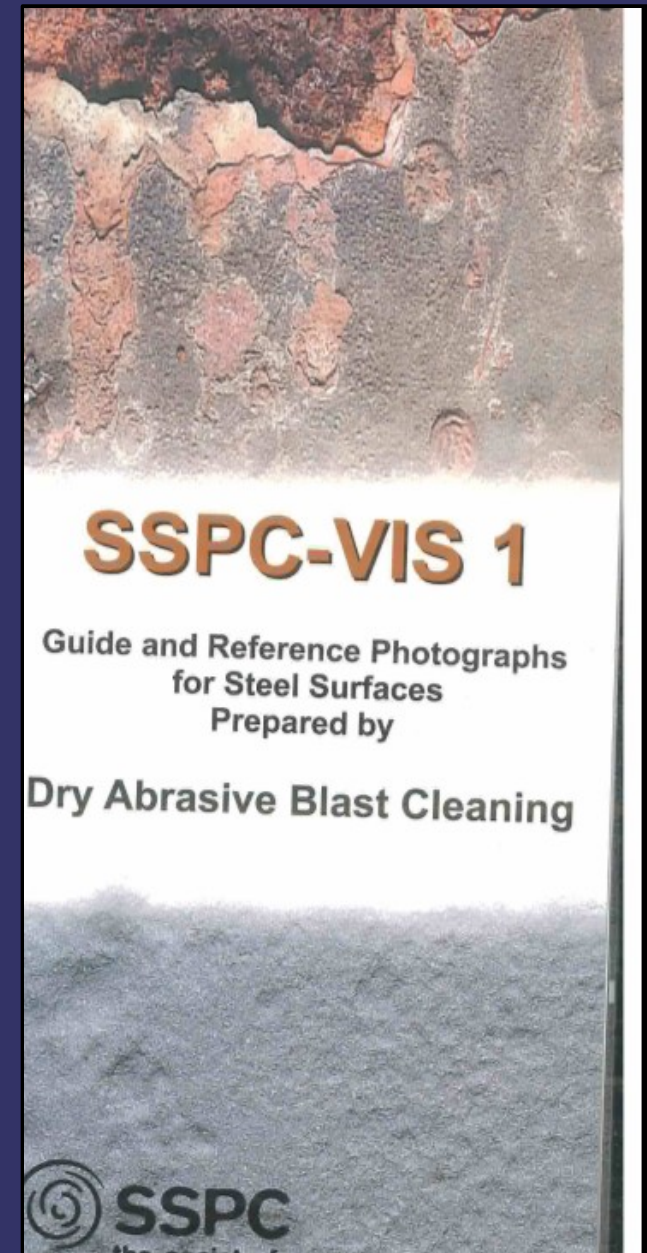
- Respirable aerosols
- Upwind, downwind & inside containment





SSPS/NACE Guides

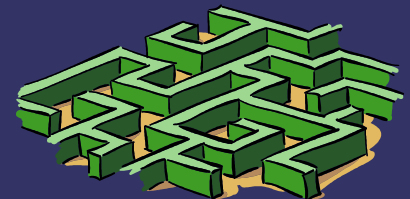
- ➔ Developed for various surface preparation methods
- ➔ Start with Begin Condition
- ➔ Coatings recommended for End Condition
- SP-3 describes an end condition in SSPC-VIS 3
Power & Hand Tool Cleaning
- SP-10 (Near-white metal) VIS 1 Dry Abrasive Blast
- Numbering is not sequential



Wet Blasting



- ➔ 7,2000 psi
- ➔ 6 gal/minute
- ➔ Heated water
 - 180°F – thermal shock
- ➔ 0° Rotating tip
- ➔ 275 gal water tank
- ➔ Ground tarp
- ➔ SSPC-VIS 4 Waterjet
 - Begin Condition C
 - <10k psi



Findings



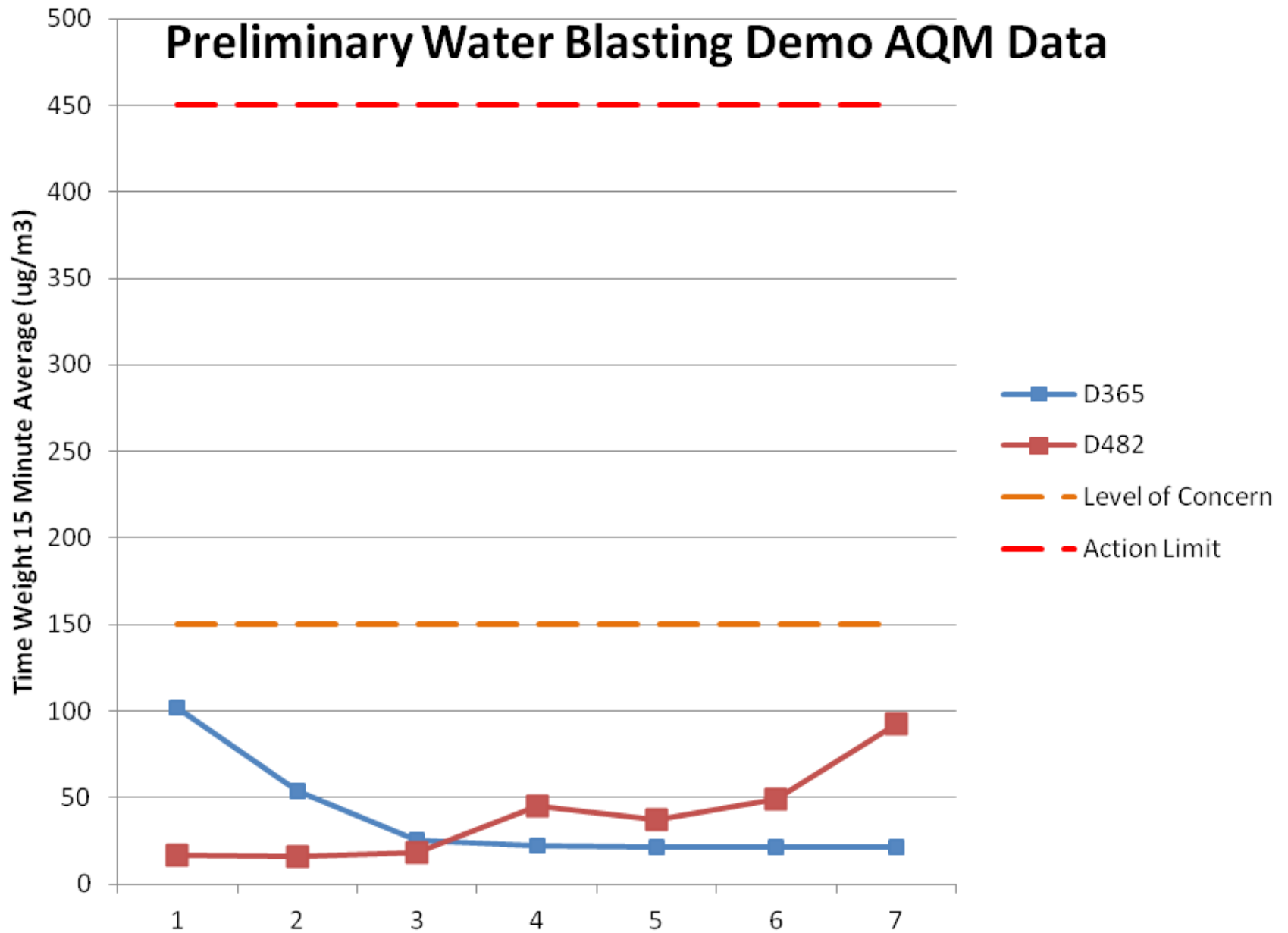
- ➔ Dust-free
- ➔ Restored profile
- ➔ End Condition G WJ-3
- ➔ PPE – face shield
- ➔ Waste water
 - filtration system

Pb bleeds

- ➔ Forced-air to dry
- ➔ Regains profile
- ➔ Production rate
 - 5 - 14 sq ft/minute

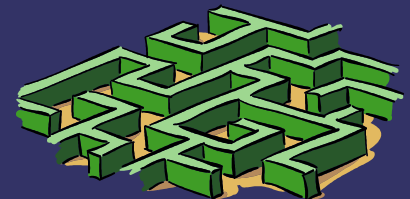


Preliminary Water Blasting Demo AQM Data



Feasibility

- ➔ Equipment
 - \$27k - own
 - \$5k/month - rent
- ➔ Coating for SP-3
 - One coat
- ➔ Dry time
 - Evaporation
 - Air dry crevices
- ➔ Cl⁻ removal
- ➔ Waste water
 - Reduced volume
 - Settlement basin?



Sponge Blasting



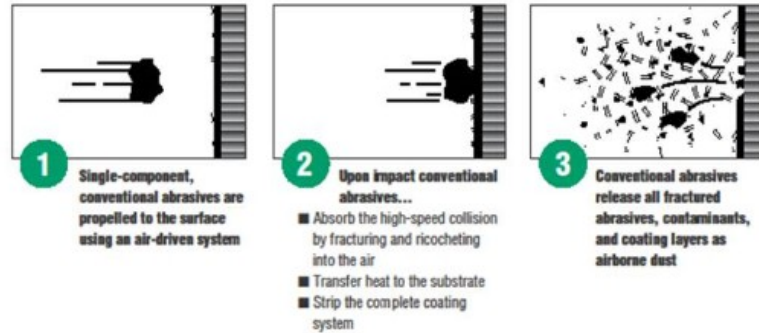
- ➔ Blast pot & Re-cycler
 - ➔ 375 CFM compressor
 - ➔ Sized grit embedded
 - Recyclable
 - 8 – 12 times
- ➔ Blast medium
 - \$100 1.5 cu ft/bag
- ➔ Containment
 - Medium collection
- ➔ SSPC VIS 1
 - Dry Abrasive
 - Begin Condition G1, G2



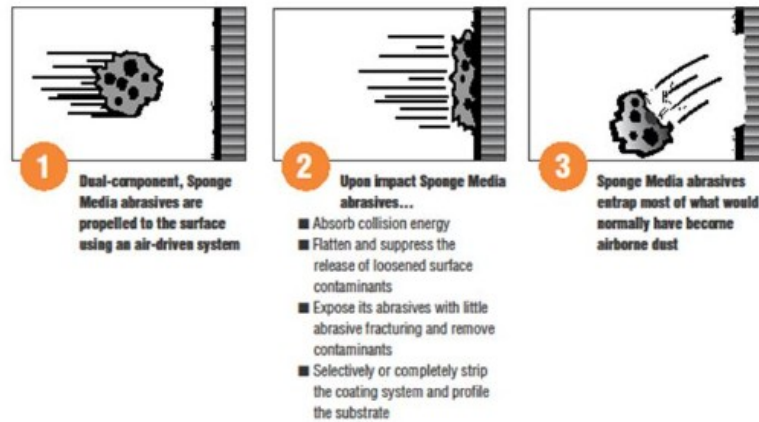


Comparing Abrasive Blasting Technologies

Conventional Abrasive Blasting Media



Conventional Abrasive Bonded Into Sponge Media

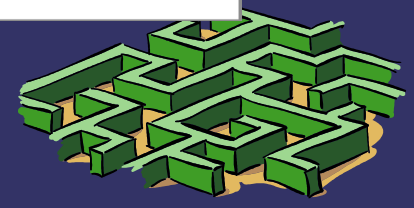
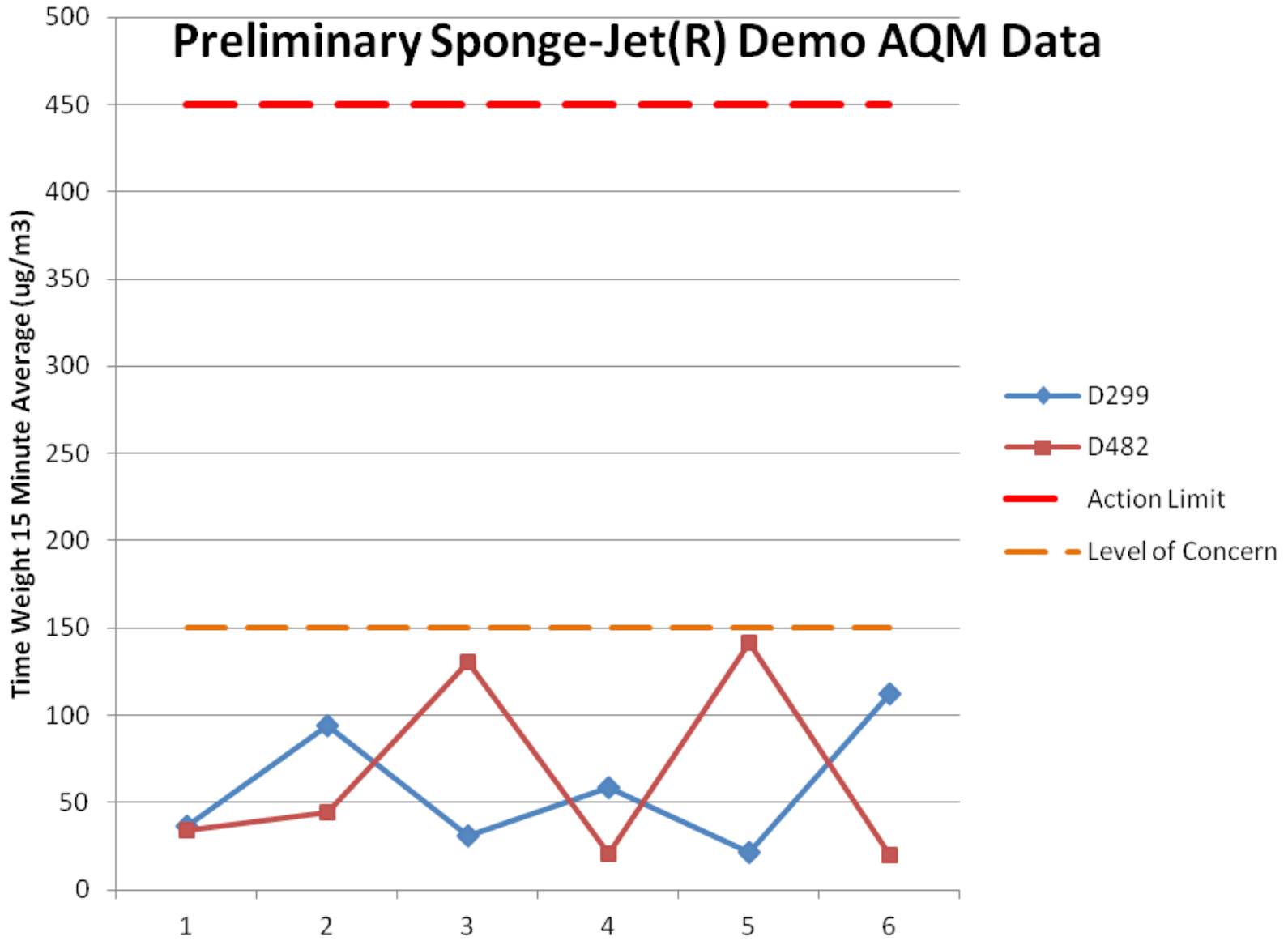


Results

- ➔ Reduced emissions
- ➔ Creates profile
- ➔ Removes mill scale
- ➔ End Condition SP-10
- ➔ Rinse required
- ➔ PPE
 - HEPA full-face mask
 - Tyvek & sealed seams
- ➔ Production rate:
 - 8 sq ft/min brush blast
 - 2 sq ft/min SP-10



Preliminary Sponge-Jet(R) Demo AQM Data



Feasibility

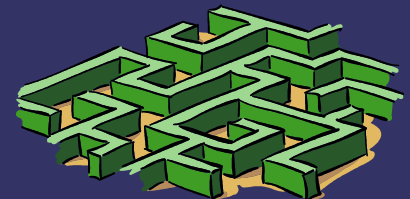


- ➔ Equipment
 - \$34k - own
 - \$3k / month - rent
- ➔ All coatings
- ➔ CF removal
- ➔ Ventilation Type J1
 - Dust collector
 - < \$1,200
- ➔ Containment
 - SSPC – Class 3
 - Penetrable wall, overlap seams
- ➔ Waste
 - Minimal



Recommendation

- ➔ “Dust-free/reducing” technologies are feasible for bridge maintenance operations.
- ➔ Advance technologies to field applications
 - Demonstrations
- ➔ Environmental & Health agency buy-in
- ➔ Determine service life extension with implementation of spot painting program.
 - Benefit / cost calculations
- ➔ Develop RNS
- ➔ Create specifications & standards that facilitate spot painting.





THANK YOU

QUESTIONS or
COMMENTS

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