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A FIELD REPORT

ABOVE GROUND STORAGE TANK PROTECTION

McCook County Highway Department Salem, SD

Industrial Customer:
McCook County Highway Department

Project:
Fortify 3 year old paint beginning to fail on an above ground asphalt storage tank

Project Location:
McCook County, Salem, SD

Applicator:
McCook County personnel

Coating Formulation:
Nano-Clear Industrial (**NCI**) coating

Application System:
HVLP

Dates:
Original Application: June 25, 2015

Conditions:
75F, 65%RH, overcast

PROJECT OVERVIEW:

Nano-Clear Industrial (**NCI**) polyurethane/polyurea hybrid aliphatic clear penetrating coating was applied to a highly oxidized and weathered asphalt storage tank fortifying the existing paint system. The application of **NCI** will extend asset protection with the goal of deferring the re-painting cycle saving the county significant money.

Coating Formulation:

NCI - a crystal clear, aliphatic, moisture cured, one component polyurethane/polyurea hybrid formulation with extreme cross-link density for UV, chemical and abrasion resistance.

NCI is formulated to penetrate and fortify existing paint systems (newly painted or highly oxidized), not replace them.

Applications:

Above ground storage tanks, equipment, implements, facilities, bridge rails, steel bridge girders, signs or trucks that have degraded paint from UV, chemical and abrasion forces. Newly painted assets should also be a primary application consideration.

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CURRENT SITUATION:

McCook County Highway department has two above ground storage tanks that hold asphalt.

Each tank is approximately 27’ long and 9’ in diameter = ~13,000 gallons.

Both were painted about 3 years prior to this demonstration with an aromatic paint system believed to be an enamel.

Over the years exposure to the UV and weather deteriorated the paint system resulting in oxidation to all of the paint on the storage tank.

There were areas the paint had peeled away from the substrate.

In some areas the paint had fallen off exposing the steel substrate forming rust which will result in asset damage in terms of structural material loss.

The county agreed to use **NCI** on one of the tanks as a field trial to fortify the existing paint system extending its service life so as not to have to re-paint the tank which would have cost significantly more money in material and labor.

Aromatic paint systems <u>need help</u> to achieve the years of protection required by asset owners/managers.

ISUSA SOLUTION:

NCI is formulated to penetrate and fortify oxidized, weathered paint systems. **NCI** is new cross linking formulation technology. This cross linking creates a "tough" coating that combines with the existing paint system forming a long lasting protection system.

NCI chemically bonds to the paint with adhesion promoters and also bonds mechanically by penetrating into the porosity of the underlying coating.

__NCI__ is formulated to work in tandem with existing paint systems (oxidized and new) to enhance the protective properties of the paint system – eliminating at least one maintenance cycle.

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APPLICATION:

The storage tank was coated with **NCI** on June 25, 2015.

Preparation:

- Pressure washed with ambient temperature water, no heat.
- The surface was brushed with a low concentration of biodegradable detergent and water.
- The surface was rinsed with the pressure washer and plain water.
- The storage tank air dried, some areas blown off with a power blower to remove pockets of water and loose paint.
- The storage tank was not media blasted or wire brushed.

The application procedures were reviewed prior to application. This was the first time the applicator had worked with **NCI**.

- Overlap spray pattern by 50%
- Maintain a smooth spray pass that is a little faster than used for paint because of the low viscosity of **NCI** (40cps).
- Spray one section the size that can be comfortably covered from the position on the ladder. Spray from side to side then cross-hatch by spraying up and down over the same section.
  This is important because oxidized paint will absorb the **NCI** differently over the surface of the tank. Two spray pass applications in a cross-hatch method will help to create a nice even finish.
- Visually inspect previous coated areas to notice “unevenly absorbed” patches and address each with another light coat of **NCI**.
- Spray the “ring” sections from the top of the storage tank working down to the bottom.

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Application:
NCI was applied to the top of the tank with a paint pad. Coverage was good but progress was slow due to several penetrations, weld lines and handrail on the tank. Application by HVLP gun would have been a better choice and was used for the rest of the storage tank.

Approximate time to coat the top of the tank using a paint pad was 1+ hours.

The oxidized paint required applying a second wet-on-wet coat of **NCI** because the porous paint surface absorbed the **NCI** at different rates which left some areas looking “patchy”. After the second coat the differences between areas evened out.

An HVLP gun was used to coat the rest of the storage tank. A ladder was used to reach the top of the storage tank with one person holding the ladder for the applicator.

- The applicator began the spray application process at the top of the tank overlapping the top area of the tank previously applied with the paint pad.
- The storage tank is made of “ring” sections” and the applicator started at the top of the ring section applying the **NCI** side-to-side working down the section.
- After the applicator covered an area he could comfortable and safely reach he returned to where he started and sprayed the area again using a crosshatch method going up and down across the section. This cross-hatch spray technique results in an even coverage of the substrate.
- After the section was complete the applicator stepped down from the ladder and repeated the procedure on the bottom portion of the ring section completing that ring.

We moved the ladder to each ring section repeating the application procedure. When each side/end was complete the applicator reviewed the storage tank so see where areas that needed to be touched up to even the finish.

Result:
Approximately 3 gallons of material was used to cover the storage tank. After review, the tank probably could have used 4 gallons of material.

Looking over the storage tank after 5 days:

- The overall finish was very good, the storage tank had a nice coating film protecting the tank.
- We experienced only a couple small areas of runs and those were when the applicator began spraying the **NCI**. He had never sprayed the material before so he had to adjust his spray cadence.
- Some of the loose paint seemed to peel away from the substrate from the effect of the **NCI** solvents.
- The cured **NCI** coating show some unevenness in some areas.
  - This occurs because of the varying degree of absorption by the oxidized paint system and uneven spray coverage.
  - Time is needed to review the coated sections as they are completed to identify uneven areas and touch them up during the spray process.
  - It is important to remember **NCI** is not a paint, it is formulated to work with existing paint systems fortifying them. This requires a little more attention to previously coated sections than with conventional paint application procedures to ensure an even coating of **NCI** after it has penetrated the existing paint.

The resulting protective dry film thickness was approximately 1 mil.

Time to complete the rest of the storage was approximately 1+ hours. If we had used the HVLP gun for the entire storage tank it would have taken approximately 1 ½ hours to spray the tank.

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Storage tank before the application of **NCI** on June 25, 2015.

Storage tank after the application of **NCI** on June 25, 2015.

Storage tank before the application of **NCI** on June 25, 2015

Storage tank after the application of **NCI** on June 25, 2015

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Storage tank **before** the application of **NCI** on June 25, 2015

Storage tank **after** the application of **NCI** on June 25, 2015

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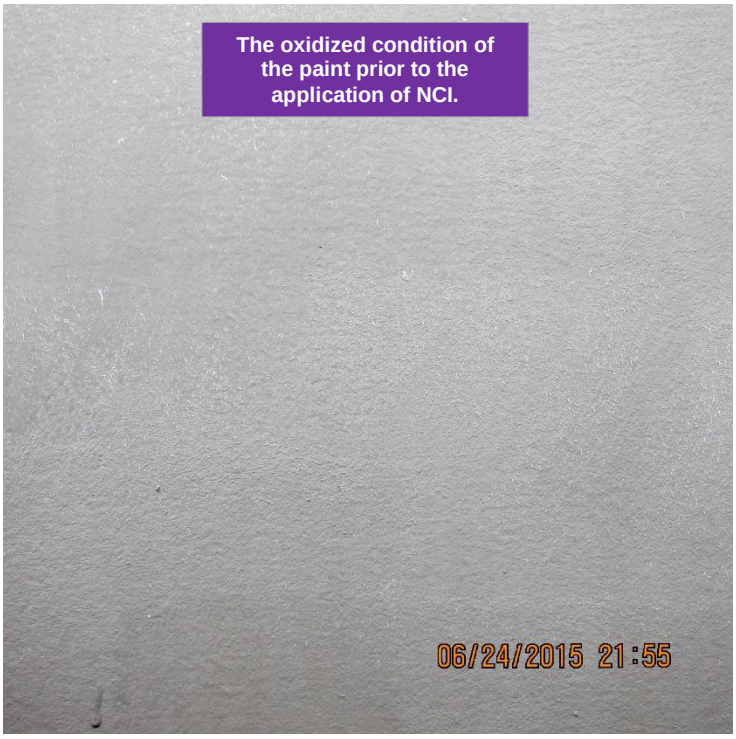

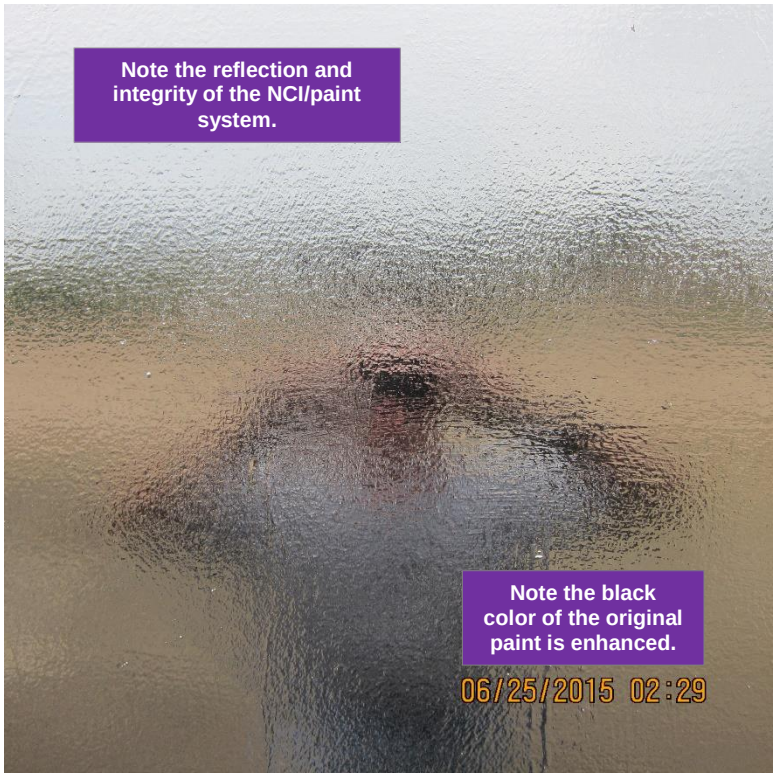

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Compare the two storage tanks.
The photos of end, middle and front sections of the **NCI** coated storage tank are on the top row and the corresponding section of the storage tank that did not receive the coating is directly beneath them on the bottom row.
The difference is remarkable.

Tank #1 End – NCI

Tank #1 Middle – NCI

Tank #1 Front - NCI

Tank #2 End – No NCI

Tank #2 Middle – No NCI

Tank #2 Front – No NCI

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SUMMARY & CONCLUSION:

NCI was applied to an above ground storage tank with approximately 3 year old enamel paint.

The enamel paint was oxidized over the entire storage tank with some areas of peeling and other areas where the paint was gone. There were isolated areas of rust.

The substrate preparation prior to application of **NCI** was minimal – rinse with pressure washer using ambient temperature water then brush with low concentration of biodegradable detergent followed with rinsing with pressure washer using ambient temperature water.

The photos in this report confirm the **NCI** penetrated the paint system and fortified it with superior physical properties – much better physical properties than the original enamel paint was warrantied with three years earlier.

In the areas where there was no paint, the **NCI** exhibited excellent direct to metal adhesion.

The combined **NCI**/enamel paint coating system extends the protection of the storage tank for years deferring re-painting maintenance costs.

In the future, it is recommended the **NCI** be applied after new paint has been applied and/or earlier in the lifecycle of the paint system.

NCI does not replace paint systems - **NCI** is the economical solution *to extend the performance life* of paint systems.

NCI Saves Money:

- Prevents pre-mature paint failures
- Eliminates substrate preparation required for new paint
- Eliminates labor for same
- Saves primer and paint material costs
- Saves labor for same

CALL TO ACTION:

Inspect the storage tank in 12 months – June 2016.

Industrial Solutions USA is asking McCook County Highway Department to implement the application of **NCI** on newly painted and oxidized county assets including storage tanks, facilities, equipment, implements, trucks and bridges.

Incorporating **NCI** into McCook County Highway Department maintenance protocol will extend the service life of all assets and save significant money over the current paint system(s) alone.

Industrial Solutions USA develops and sells "tough" ELASTOMERIC LININGS & COATINGS to help industrial customers protect their assets from destructive elements

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