



LCRA Wirtz Dam Project. Fig. 1 shows general cleaning activity. Fig. 2 compares panel just after cleaning to one three days later, just before painting. Photos courtesy of Advisory Council.

This article is reprinted with permission from *CleanerTimes*, a monthly trade journal serving

Flash Rust: *Amount*

the pressure cleaning/water blasting industry.
 contact at www.cleanertimes.com or
 800-443-3433

By Lydia Frenzel

Cleaner Times, June 2001 p 32

Editor's Note:

This is the last in a series of articles addressing the issue of flash rust, which forms after preparing surfaces by waterjetting.

In May 1996, *Marine Log* published remarks by Dr. John Kelly, International Paint. "There is more than one kind of rust...General atmospheric rusting or rusting in immersed conditions is contaminated with chemicals from the environment to which the metal has been exposed, such as chlorides or sulfates. In contrast, flash rust formed after preparing surfaces by waterjetting using potable water consists of pure iron oxide, which is actually a constituent of some coatings. At low to medium levels, flash rust is suitable for overcoating with many coating systems since it is tightly adherent and won't react with the metal substrate or the coatings applied over it."¹

All of us have had the experience of putting adhesive tape, glue, or paint on a dusty surface and then having it either not stick or having it lift from the substrate. Paint, rubber, or linings do not stick well to loose "dust" or particles. It doesn't matter if the dust is dirt, shattered abrasive, electrostatically stuck abrasives, shell dust from the parking lot, talcum powder, chalk, powdered mortar in concrete, or loose fibers.

If you are etching, scarifying, or blasting a concrete surface, you want to remove powdered mortar from the surface, perhaps by pressure washing. If you are preparing wood surfaces, you want to sand the surface to remove loose fibers. If you are preparing a steel surface, you want to remove loosely attached abrasives or flash rust, perhaps by pressure washing or brushing.

To properly adhere to the surface, paints or coatings have to wet, or intimately contact, the underlying substrate to give the coating the best chance to perform. Paint manufacturers add wetting agents to the formulation to assist in wetting small particles and to allow the liquid to flow into crevices. Think about adding water into a bowl of flour. Anyone who knows cooking knows that "first you make a roux" by adding a little oil to the flour. Once the flour mixes with the oil, each of the flour particles can easily be wetted to form a smooth paste as the water is added.

Flash rust or rust bloom, which results from water cleaning, begins as a thin layer that doesn't come off easily—"tight, light flash rust." The oxidation may continue until the original surface is covered with a heavy layer of powdery rust that is easily wiped off—"loose heavy rust." Even though it is "clean" iron oxide, if you slap the surface with your hand, the rust dust will fall off and applied paint may fall off.

Clean, handheld wire brushes, mechanical cleaning, or pressure washing with clean water can be used to remove heavy flash rust. The visual appearance of steel that has heavily flash rusted and is then re-cleaned by low pressure water cleaning (up to 5,000 psi) has a different appearance than the original light flash rust. Light, moderate, and heavy flash rust are defined in the visuals and revised NACE NO. 5-SSPC SP-12 documents which are due to be published in 2001.

In the summer of 1995, lead paint was removed from the LCRA Wirtz Dam in central Texas, to a WJ-3 to WJ-2 finish, using 20,000–25,000 psi handheld waterjetting units. (Fig. 1 shows the general activity on the project.) All water was contained, filtered, and recycled. The paint, water-cured polyurethane, filled with micaceous iron oxide, was applied over the tightly adherent, light to moderate flash rust that had formed three days after the waterjetting. (In Fig. 2, the panel on the left was just cleaned; the

panel on the right shows conditions just before painting three days later.) When this dam was inspected in 1999, the coating system was still in excellent condition.

I have spoken with technical directors from many paint companies, and they do not have to make new formulations for coatings for waterjet-cleaned surfaces. They feel that the obstacle of wetting light to moderate flash rust is acceptable, when compared to the long-term problem of invisible salts and chemicals left on the surface. Waterjetting will reduce invisible contaminants, including soluble salts, which can lead to osmotic blistering.

Coating manufacturers are now used to "flash rust" and write their

specifications for "light" or "moderate" levels of flash rust. "Heavy rust of any type should not be overcoated unless absolutely necessary since it does not provide a sound substrate."² The coating manufacturer should be consulted to ascertain the tolerance of the candidate coatings to the amount of flash rust commensurate with the in-service application.

1. *Marine Log*, May 1996, p.18.

2. *Ibid.*

Lydia M. Frenzel, Ph.D., is executive director of the Advisory Council. She is an industry resource and works as a pro-active advocate for emerging technology. She shares her knowledge and experience through custom courses, educational modules and presentations. She writes a monthly column for Cleaner Times.

SSPC/NACE Draft Definitions of Flash Rust

Below are the draft definitions of flash rust for painting to be released in NACE No. 5-SSPC SP-12. This draft is out for ballot this spring. Direct comments to Dr. Lydia M. Frenzel at lydiafrenzel@advisorycouncil.org.

No Flash Rust: A surface which, when viewed without magnification, exhibits no visible flash rust.

Light Flash Rust (L): A surface which, when viewed without magnification, exhibits small quantities of a yellow/brown rust layer through which the steel substrate can be observed. The rust or discoloration may be evenly distributed or present in patches, but it is tightly adherent and not easily removed by light wiping with a cloth.

Moderate Flash Rust (M): A surface which, when viewed without magnification, exhibits a layer of yellow/brown rust that obscures the original steel surface. The rust layer may be evenly distributed or present in patches, but it is reasonably well adherent and lightly marks a cloth that is lightly wiped over the surface.

Heavy Flash Rust (H): A surface which, when viewed without magnification, exhibits a layer of heavy red-brown rust that hides the initial surface condition completely. The rust may be evenly distributed or present in patches, but the rust is loosely adherent, easily comes off, and leaves significant marks on a cloth that is lightly wiped over the surface.