

Gravestone and Historical Marker Restoration: Stone or Concrete

This instruction sheet has been reviewed and approved by Jason Church, Materials Conservator at the National Center for Preservation Technology and Training of the **National Park Service**. The D/2 protocol is used by Arlington National Cemetery. Shirley Stirling, NSDAR, Sacajawea Chapter.

CLEANING A GRAVE OR HISTORICAL MARKER – Stone or Concrete

Please determine the general condition of the stone beforehand. Special instructions are included below for stones in a fragile condition. Stones should be cleaned and maintained carefully so as to avoid human-initiated deterioration. Use a soft-bristle brush, or at most a plastic scraper or wooden craft stick, instead of a wire brush or abrasive pad. If feasible, soft water is preferred. Avoid products that contain soluble salts: compounds like sodium bicarbonate, sodium chloride, sodium sulfate, ammonium carbonate, and trisodium phosphate (TSP or Calgon); they contribute to the build-up of soluble salts beneath the surface of the stone. Do not use a household cleaner like soap, borax, Spic and Span, Fantastik, Formula 409, muriatic acid, phosphoric acid, and other strong acids and bases as because they tend to be corrosive. Do not use chlorine bleach. Acids and salts are dangerous!

Non-ionic surfactant cleaners, unlike other products, do not cause the deposition of soluble salts on the stone. Examples: Simple Green or Orvus. But they are ONLY cleaners! It is best to go a step further, however, because these products simply clean a stone, and to maintain cleanliness it must be done repeatedly as biological growth continues. Architectural and monument conservators recommend Quaternary Ammonium Compounds, **such as D/2, as they inhibit biological re-growth, and they continue working weeks and months after the treatment is complete** to prevent regrowth. According to the D/2 manufacturer: Nearly pH-neutral quaternary ammonium solution with surfactants to remove contaminants. When regrowth is inhibited, there is less need to clean the stone in the future. This is not only convenient but very desirable to maximize the life of the stone. **Note: Most Quaternary Ammonium Compound products require special equipment such as a respirator. That is a big reason to use D/2 instead of another product, as (unlike other similar products) it does not require extraordinary user protection.** In fact, the lab work with D/2 originally aimed to prevent fresh food from turning brown! To save money one idea presented to me is to clean with Simple Green or Orvus, rinse, and then end with D/2 to prevent biological growth. However, the National Park Service representative I talked to recommends the following: The first time use it full strength in your spray bottle. The second time use it diluted, half water and half D/2 for the general surface. Use another spray bottle of full strength for any difficult areas like inscribed text.

Avoid pressure washing a gravestone. I say this because I have literally seen a stone/concrete with aggregate washing away under high water pressure. Keep in mind that markers made from materials like sandstone, marble, slate, concrete conglomerate, etc. are **POROUS**. Liquids and salts soak into them and should not be cleaned/restored too often lest they deteriorate prematurely. You should intervene as infrequently as possible to avoid human-initiated deterioration of the surface. Some suggest only once every ten years!

Fragile Stones: If you have a fragile stone (with cracking, spalling, chipping, etc.), then you can wet the stone and then spray with D/2. Let it set for 30 minutes, then rinse. D/2 will kill the biological growth over the next few weeks without risking any damage done by scrubbing.

Other notes: Do what you can to keep vegetation from setting on or growing on markers and also keep dirt from getting on markers. Stones are best kept dry. Watering systems can be very detrimental, especially watering with hard water followed by the heat of the day or freezing weather. If the stone is subject to a sprinkler system and please consider advocating with maintenance.

Materials needed will depend on what type of Memorial or Monument you are preserving.

Lots and lots of water with rinsing and scrubbing with soft bristles.

Orvus soap. (A gentle cleaning soap for animals, quilts and delicate fabrics). Made in the USA, HE Safe, Residue free, Hypoallergenic, Biodegradeable, no phosphates.

If it is painted, try and find out who painted it last and what they used.

Most painted Memorials and Artifacts are repainted and never taken back to bare metals due to the old paint used in years past.

If it is a **Brass Plaque**, Clean it first with water removing all surface debris using a soft nylon brush. Next scrub it gently with "Barkeepers Friend". Rinse well after each step. After it is clean and dry, apply an old fashioned technique, dark brown "Leather Dye" to bring back the background of the plaque to an umber color. Then you lightly with a green pad clean all the raised surfaces. A power buffing pad on the end of a battery powered drill works good. Clean it again with clean water. If satisfied and it is warm weather apply Wax and Oil to it. If in cold weather apply a coat of Clear Polyurethane.

For Marble or light colored stone, sand stone or slate, only clean if Permission is granted. Rinse the stone well and then using a soft nylon brush gently brush out the detailed areas. Then apply D/2 Biological Soution. (Non-toxic, biodegradeable, no bleach, no salts, no acids, safe around plants and wildlife), over the entire stone again gently scrubbing all over the stone. Rinse well and apply again if necessary. After it is all clean apply a residual coating of D-2 and let nature work for you.

Instructions for Preserving a Bronze Plaque

The following preservation protocol was established and will improve the appearance of the bronze tablet/plaque and retard the rate of corrosion for this and others. After cleaning, protecting and applying the wax/oil will provide a barrier against moisture, contaminants, and abuse.

Caution from Mick: "This process is only to be used with bronze plaques/tombstones that were previously dyed or painted. If they are solid Brass without being fully dyed, that is a different restoration technique that I would prefer to do myself - or train on an individual basis as it is much more detailed." Please see DAR Regent for Mick's phone number. Many supplies below are included in a kit compiled by Marion (Mick) Hersey.

SUPPLIES:

Water source **Pail/bucket** used for cleaning the marker (and we used on concrete a pressure washer)

Heat gun or hair dryer (1800 watts) and electricity source/ Portable Generator

Cordless drill

Drop cloth or Brown paper may also be used. Sheet or drop cloth for the ground

Knee pad

Cloth Towels and paper towels for clean up

Gloves - thin latex or rubber*, several pairs (kit provides 3 pairs)

Masking tape 2"-wide

Bamboo skewers

"Barkeeper's Friend" cleaner, spray-foam bottle (NOT Brasso)

Emery cloth, 240 grit (very fine) on a sanding block (buy at an auto body or auto supply store)

Paper nut cups (or you can get 10 plastic nut cups with lids)

Brushes - Nylon/plastic/natural (NEVER use a metal brush!) **Brushes for cleaning -Stiff laundry scrub brush** they have no handles and are held in your hand, **Stiff brush with a handle for washing dishes**, **Very soft brush long bristled with handle** (is similar to a dustpan brush)

Buffing Brush, such as a shoe brush

Paint brushes (1.5" and 3") or **Acid brushes** (disposable) or regular fine paint brushes that has been cut down to the stub

Green buffing pads

Rotary "Flap brush" buffing pad (3" round, for cordless drill: Scotch Brite Flap brush CPFBS)

Fieblings Leather Dye (Dark brown or black) Just one 2.2 oz. jar will do about 10 plaques. (It is for sale at Michael's). Look at your plaque background for the color you need - the older ones are brown and the newer ones may be black.

H/L Mortar or Liquid Mortar, if the plaque is loose, to remount it to base, since our OT monument bases are made of concrete)

"Krylon" Crystal Clear, Acrylic Coating 1303 (It is a spray.)

Wax/oil coating Mick Hersey will provide about a quart.

Plastic Bags to collect trash/garbage around restoration site

Wear an apron or old clothes.

Spread out a drop cloth beneath the plaque and lay out your supplies in the order in which you will use them. Avoid touching the bronze with your hands, if possible, as the oil on your skin can cause more oxidation.

Before you start any marker preservation project:

1. The biggest thing on doing any restoration/refinishing is to do no harm and also ensure permission is granted before starting. Be sure you know who is in charge and get approval.
2. Take photos of the 'before' condition of your project.

To Preserve Memorials:

1. Clean thoroughly removing all previous cleaners or preservatives, moss, debris, bird droppings, etc. This may be done with a pressure washer and bucket of water and a nylon laundry scrub brush. (Note: This is done preferably a day or several days prior to your restoration work so that the monument can thoroughly dry... be careful around the mortar, go gently! Inspect marker for any cracks or loose pieces but it is best to leave most cracks alone as any repair stands out like a sore thumb!) After cleaning, mask off surrounding area to avoid streaking down marker base. Apply tarp if necessary. Spray (liquid or foam) the plaque with **Bar Keepers Friend**. Then scrub down plaque. (Note: Use

Bar Keeper's Friend only. All other products leave a film.) **Rinse thoroughly** after cleaning and dry again. If you have access to electricity, a blow dryer or heat gun can be used to speed things along.

2. Using the **Emery cloth on ONLY high-edged areas**, borders, letters and objects, to shine up the metal. (**Do not use Emery cloth on a textured background!**) Go back and forth in one direction with emery cloth, dipping it in water as needed. If you mistakenly use circular movements, you will see swirl mark scratches. Tear the emery cloth into pieces to work properly on details as needed. Don't go for a super brilliant shine. Decide on the level of patina you want to retain and work accordingly. When you wet the emery cloth, ensure you rinse the plaque off again afterward to remove all residues. Dust off all of the debris/small metal shaving with soft brush. Let it dry completely before dyeing the plaque.

3. If the background was originally colored, **apply the Brown/Black leather dye** to all of the background. (Note: Pour some dye in a nut cup from the dye bottle. Paint the background with the dye using the 2" paint brush. Brush the "leather" background on the marker from left to right, ensuring there are no drips. Just wet the end of the paint brush about a 1/4". Keep applying evenly.... do not go back over any places until the marker is done. Take care not to let it drip on the stone/concrete. Make sure the dye gets into every little crevice. Use a cloth to wipe off immediately any that drips. Any dye left over can be returned to the dye bottle.) Let dry. If you have a hair dryer/heat gun, use it on this step as well to thoroughly dry the plaque, beginning at the top. Some green patina will come back which is good as you want to retain the aged look, while improving the appearance and protecting the metal.

4. When dry, lightly **re-sand ONLY the high-edged metal areas**. Use **emery cloth** and then use a **buffing wheel** (flap brush) on a cordless drill to shine it up. The green buffing pads can also be used. Brush off all debris again with the soft brush. Before the next step, once again ensure the plaque is totally dry. (Note: Go back and inspect for any places that may need attention such as inside lettering and other crevices. Make corrections. Stand back once again and look at the plaque and see if all is ok.)

5. Spray clear Acrylic Coating over the entire plaque including the raised border and raised letters. Let dry 30 minutes to 2 hours. Let it dry naturally – **don't use a dryer/heat gun**. While waiting for it to dry, clean up the area of all your supplies. Put everything away except wax/oil coating and brushes needed to apply it

6. Apply wax/oil coating over the whole plaque with a clean paint brush. Ensure you get around all of the lettering and edges. (Note: Go from top to bottom, left to right. You must go quickly and evenly... or the streaks will show.) **Dry:** Let dry 10-15 minutes, buff over the entire surface of the plaque. Use green buffing pads or a shoe brush to smooth the finish. (Note: You may use the dryer/heat gun again but, if so, go gently and not too close. Then let it cool and dry before buffing.)

7. Clean up: Remove Masking tape, tarps and clean up the area that you worked in. Put away the rest of your supplies leaving the area as clean as it was when you arrived, (Hopefully cleaner)

8. Stand back, take photos, and admire your refinished/refurbished plaque.

Note: In the moist NW climate it is advisable to reapply the wax/oil coating every other year. For follow-up: If the background color on the plaque is good, just clean the plaque with plain water, dry it, and apply the wax/oil coating, steps 5-8.)

Compiled by Sally Buckingham and Shirley Stirling. Information is based on live instructional sessions by Marion (Mick) Hersey, Historical Memorial Preservationist, John Paul Jones WASSAR – Last Revised 10-20-2018.