TABLE OF CONTENTS

PALLET TAG PROGRAM
LABORATORY REPORT

PROSOCO, Inc.

FOR: Kirk Patton
cc: Ben Bates
James Holt
Steve Dean
Paul Tessier

SUBJECT: Mountain Stone
Bowling Green, KY

DATE: December 13, 2002

PROJECT: 0207-20 PTP

SAMPLES SUBMITTED:

Sample	Color/Finish	Size
(4) Smooth cast stone	"Quickstack Limestone"	Irregular
(2) Smooth cast stone	"Archstone"	6 ½" x 5" x 3"
(2) Smooth cast stone	"Keystone White"	Irregular
(2) Smooth cast stone	"Beveled Keystone"	7 ½" x 6" x 3 ¼"
(3) Smooth cast stone	"Ozark Fieldstone"	Irregular
(4) Smooth cast stone	"Sul. Springs Stackstone"	Irregular
(2) Smooth cast stone	"Adobe Ledgestone"	11 ½" x 4 ½" x 1 ½"
(4) Smooth cast stone	"Thinline Brick Concord"	8" x 1 ½" x 1"
(2) Smooth cast stone	"Wallcap Dark Slate"	Irregular
(2) Smooth cast stone	"Hearth Adobe"	Irregular
(2) Smooth cast stone	"Moss Ledgestone"	9" x 3" x 2"

Submitted by: Kirk Patton, Mountain Stone
4301 Industrial Drive
Bowling Green, KY 42101

PURPOSE OF TESTING:

Eleven different varieties of smooth cast stone were submitted to PROSOCO, Inc.'s Testing Laboratory with a request to determine if application of the products evaluated would produce any surface alteration during new construction cleaning operations. Additionally, the effectiveness of water repellents suitable for cast stone were evaluated.

A. New Construction Cleaning – Sure Klean® Burnished Custom Masonry Cleaner and Sure Klean® Custom Masonry Cleaner were evaluated at various dilutions for removal of laboratory applied mortar.

To simulate new construction soiling, all tiles are placed on a bench with finished surface facing upward. Hollow cylinders measuring 50 mm in diameter and 75 mm tall are positioned on top of each tile and filled with a wet mixture of Ash Grove® Type N cementitious mortar. The wet, mortar-filled cylinder is allowed to remain in contact with the tile for 10 minutes before removal.

Soiled tiles are allowed to dry before test cleaning.

Heavy deposits of mortar are removed with dry scraping after 24 hours. Prepared cleaning solutions are then evaluated for their effectiveness in removing residual Ash Grove ® Type N mortar staining after 14 days and 21 days of curing.*

NOTE: Due to small sample size, not all types of stone were allowed to cure for 14, and 21 days. Some types of stone cured for 21 days, and some types of stone cured for 14 and 21 days.

B. Limiting Surface Alterations Testing – Sure Klean® Burnished Custom Masonry Cleaner and Sure Klean® Custom Masonry Cleaner were tested at various dilutions to determine if a cleaning program implemented to remove excess mortar and related new construction soiling would otherwise alter the appearance of cleaned surfaces. Surface Alteration was evaluated visually based upon perceived discoloration or erosion/etching of the masonry unit.

Aggregate Exposure is the visual examination of the tile comparing aggregate exposure of the untreated control surface to surfaces cleaned with selected product(s) at given dilutions.

Surface Pigment Alteration/Removal is the visual examination of the tile comparing the surface pigmentation of the untreated control to surfaces cleaned with selected product(s) at given dilutions.

Matrix Erosion is the visual examination comparing the untreated control surface to surfaces cleaned with selected products at given dilutions looking for any potential erosion/digestion of the cementitious matrix of the tile.

Staining is the visual examination for changes that are the result of a chemical reaction that leaves a staining precipitate.

The following is the scale used for reporting results of all categories:

0 – no change
1 – slight
2 – moderate
3 – heavy
4 – excessive

C. Water Repellent Evaluation –Sure Klean® Weather Seal Siloxane WB Concentrate and Sure Klean® Custom Masonry Sealer were evaluated on the submitted samples for their ability to provide water repellency.

PRODUCTS EVALUATED

CLEANING PRODUCTS AND LIMITING SURFACE ALTERATIONS PRODUCTS EVALUATED

SAMPLE	Sure Klean® Burnished Custom Masonry Cleaner	Sure Klean® Custom Masonry Cleaner
All submitted cast stone	1:2	1:4 (if sample size permitted)
	1:3	1:6

WATER REPELLENT PRODUCTS EVALUATED

SAMPLE	TREATMENT	DILUTION
All submitted cast stone	Sure Klean® Weather Seal Siloxane WB Concentrate	1:9; 1:14
	Sure Klean® Custom Masonry Sealer (if sample size permitted)	Concentrate

Dilution ratios refer to mixtures of concentrated product : fresh water.

SECTION A – NEW CONSTRUCTION CLEANING

DESCRIPTION OF PRODUCTS EVALUATED – New Construction Cleaning

These cleaning trials were conducted to determine the optimal cleaning/cure time combination to most efficiently remove Ash Grove® Type N mortar from the submitted cast stone.

Ash Grove® Type N cementitious mortar was prepared in compliance with the manufacturers instructions, applied to the tile and allowed to cure for 14 and/or 21 days prior to removal with high pressure water rinse using pressure rinsing equipment and chemical assist.* The removal of gray Ash Grove® Type N cementitious masonry cement mortar after 14 and/or 21 days of curing was visually evaluated.*

*NOTE: Due to small sample size, not all types of cast stone were allowed to cure for 14 and 21 days. Some types of cast stone cured for only 21 days, and some types of cast stone cured for 14 and 21 days.

Sure Klean® Burnished Custom Masonry Cleaner – A general purpose, nonetching acidic cleaner for custom masonry and colored concrete. Removes rust, mud, oil, atmospheric dirt, and other stains without altering the surface texture. Liquid concentrate for dilution with 2-3 parts water. Apply by brush or low-pressure spray.

Sure Klean® Custom Masonry Cleaner – A general purpose, concentrated acidic cleaner for most custom masonry and colored concrete. Removes concrete splashes, excess mortar, mud, heavy efflorescence and surface soiling, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 2-6 parts water. Apply by brush or low-pressure spray.

TEST METHOD – New Construction Cleaning

Dilution ratios refer to mixtures of concentrated cleaner : fresh water. Chemical cleaners were evaluated using the following procedure:

1. Prewet the surface with water.
2. Apply the cleaner.
3. Allow the appropriate dwell time, as specified.
   - Burnished Custom Masonry Cleaner ..... 3 minutes
   - Custom Masonry Cleaner ..... 3 minutes
4. Pressure rinse thoroughly.*

***** Pressure rinsing was conducted at approximately 1300 psi with a warm water flow rate of 1.9 gallons per minute.

TEST RESULTS – New Construction Cleaning

% Removal

"Quickstack Limestone"

	14 day	21 day
Burnished Custom Masonry Cleaner (1:2)	100%	100%
Burnished Custom Masonry Cleaner (1:3)	100%	100%
Custom Masonry Cleaner (1:4)	100%	100%
Custom Masonry Cleaner (1:6)	100%	100%

"Archstone"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

"Keystone White"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

"Beveled Keystone"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

"Ozark Fieldstone"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

"Sul. Springs Stackstone"

	14 day	21 day
Burnished Custom Masonry Cleaner (1:2)	100%	100%
Burnished Custom Masonry Cleaner (1:3)	100%	100%
Custom Masonry Cleaner (1:6)	100%	100%

"Adobe Ledgestone"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

TEST RESULTS – New Construction Cleaning (cont.)

"Thinline Brick Concord"

	14 day	21 day
Burnished Custom Masonry Cleaner (1:2)	100%	100%
Burnished Custom Masonry Cleaner (1:3)	100%	100%
Custom Masonry Cleaner (1:4)	100%	100%
Custom Masonry Cleaner (1:6)	100%	100%

"Wallcap Dark Slate"

	14 day	21 day
Burnished Custom Masonry Cleaner (1:2)	100%	100%
Burnished Custom Masonry Cleaner (1:3)	100%	100%
Custom Masonry Cleaner (1:6)	100%	100%

"Hearth Adobe"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

"Moss Ledgestone"

	21 day
Burnished Custom Masonry Cleaner (1:2)	100%
Burnished Custom Masonry Cleaner (1:3)	100%
Custom Masonry Cleaner (1:6)	100%

CONCLUSIONS – New Construction Cleaning

Based on the test results, both cleaners and all dilutions performed well in removing excess mortar smears on the submitted cast stone. The cleaners performed well in removing the mortar soils even after allowing the mortar to remain on the surface of the cast stone for 21 days under ideal curing conditions.

It is also recommended that the selected cleaners always be used in the lowest possible concentration, typically a 1:3 dilution for Sure Klean® Burnished Custom Masonry Cleaner and 1:6 dilution for Sure Klean® Custom Masonry Cleaner. They should be rinsed with the lowest pressure of water as practical, garden hose strength preferred. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential adverse affect on the cast stone, clean within 7 days of construction.

RECOMMENDATIONS – New Construction Cleaning

Sample	Product
All submitted cast stone	Sure Klean® Burnished Custom Masonry Cleaner 1:3 OR Sure Klean® Custom Masonry Cleaner 1:6

SECTION B – LIMITING SURFACE ALTERATIONS

DESCRIPTION OF PRODUCTS EVALUATED – Limiting Surface Alterations

Sure Klean® Burnished Custom Masonry Cleaner – A general purpose, nonetching acidic cleaner for custom masonry and colored concrete. Removes rust, mud, oil, atmospheric dirt, and other stains without altering the surface texture. Liquid concentrate for dilution with 2-3 parts water. Apply by brush or low-pressure spray.

Sure Klean® Custom Masonry Cleaner – A general purpose, concentrated acidic cleaner for most custom masonry and colored concrete. Removes concrete splashes, excess mortar, mud, heavy efflorescence and surface soiling, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 2-6 parts water. Apply by brush or low-pressure spray.

TEST METHOD – Limiting Surface Alterations

Dilution ratios refer to mixtures of concentrated cleaner : fresh water. Chemical cleaners were evaluated using the following procedure:

1. Prewet the surface with water.
2. Apply the cleaner.
3. Allow the appropriate dwell time, as specified.
   - Burnished Custom Masonry Cleaner ..... 3 minutes
   - Custom Masonry Cleaner ..... 3 minutes
4. Pressure rinse thoroughly.*

***** Pressure rinsing was conducted at approximately 1300 psi with a warm water flow rate of 1.9 gallons per minute.

TEST RESULTS – Limiting Surface Alterations

Substrate: Smooth cast stone		**Pigment Color:** "Quickstack Limestone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:4	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0
Substrate: Smooth cast stone		**Pigment Color:** "Archstone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	3	0	3	0
Burnished Custom Masonry Cleaner	1:3	2	0	2	0
Custom Masonry Cleaner	1:6	3	0	3	0
Substrate: Smooth cast stone		**Pigment Color:** "Keystone White"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0
Substrate: Smooth cast stone		**Pigment Color:** "Beveled Keystone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0
Substrate: Smooth cast stone		**Pigment Color:** "Ozark Fieldstone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0

Scale used for reporting results of all categories

0 – no change
1 – slight
2 – moderate
3 – heavy
4 – excessive

TEST RESULTS (cont.) – Limiting Surface Alterations

Substrate: Smooth cast stone		**Pigment Color:** "Sul. Springs Stackstone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0
Substrate: Smooth cast stone		**Pigment Color:** "Adobe Ledgestone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0
Substrate: Smooth cast stone		**Pigment Color:** "Thinline Brick Concord"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	1	0	1	0
Burnished Custom Masonry Cleaner	1:3	1	0	1	0
Custom Masonry Cleaner	1:4	2	0	2	0
Custom Masonry Cleaner	1:6	2	0	2	0
Substrate: Smooth cast stone		**Pigment Color:** "Wallcap Dark Slate"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0
Substrate: Smooth cast stone		**Pigment Color:** "Hearth Adobe"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0

Scale used for reporting results of all categories

0 – no change
1 – slight
2 – moderate
3 – heavy
4 – excessive

TEST RESULTS (cont.) – Limiting Surface Alterations

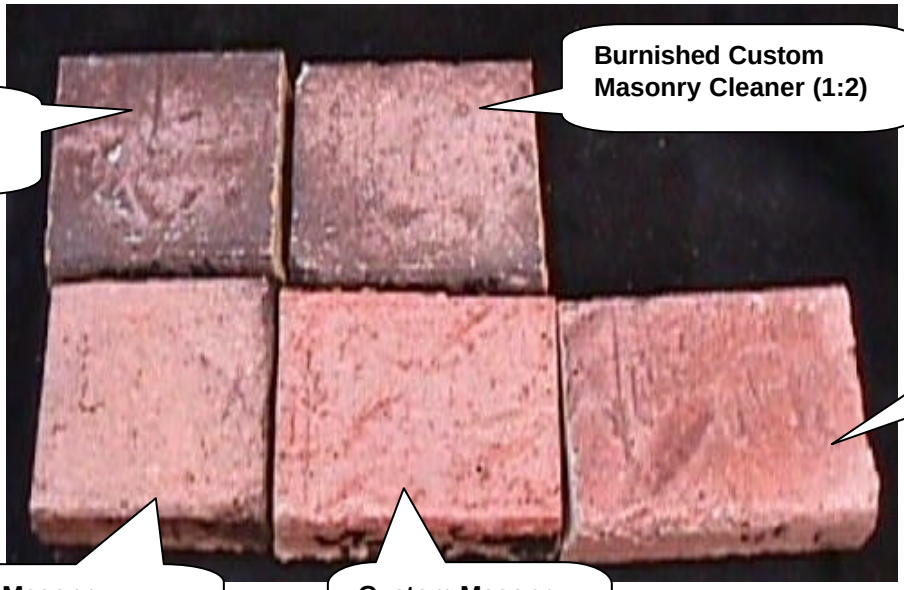
Substrate: Smooth cast stone		**Pigment Color:** "Moss Ledgestone"			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Burnished Custom Masonry Cleaner	1:2	0	0	0	0
Burnished Custom Masonry Cleaner	1:3	0	0	0	0
Custom Masonry Cleaner	1:6	0	0	0	0

Scale used for reporting results of all categories

0 – no change
1 – slight
2 – moderate
3 – heavy
4 – excessive

PHOTOGRAPHS – Limiting Surface Alterations

"Thinline Brick Concord" after 14 day cleaning



PHOTOGRAPHS (cont.)– Limiting Surface Alterations

"Archstone" after 21 day cleaning

CONCLUSIONS – Limiting Surface Alterations

These tests show that moderate to heavy surface alterations were caused by Sure Klean® Custom Masonry Cleaner to the "Archstone" and "Thinline Brick Concord" cast stone samples. Moderate surface alterations were caused by Sure Klean® Burnished Custom Masonry Cleaner on "Archstone", and slight surface alterations were caused by Sure Klean® Burnished Custom Masonry Cleaner on "Thinline Brick Concord". Using garden hose strength water pressure may help to minimize these surface alterations. There were no visible surface alterations to any of the other submitted cast stone.

It is recommended that the selected cleaners always be used in the lowest possible concentration. They should be rinsed with the lowest pressure of water as practical, garden hose strength preferred. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential adverse affect on the cast stone, clean within 7 days of construction.

RECOMMENDATIONS – Limiting Surface Alterations

Based on these evaluations, Sure Klean® Burnished Custom Masonry Cleaner diluted with three parts water can be recommended for job-site testing for removing excess mortar and job dirt from the cast stone submitted by Mountain Stone, Bowling Green, KY. It is recommended to use garden hose strength water pressure on the submitted cast stone to help eliminate surface alterations. The most appropriate dilution should be determined on the specific job site, and will be dependent primarily on the nature and severity of soiling present at that location.

Sample	Product
All submitted cast stone **EXCEPT** "Archstone"	Sure Klean® Burnished Custom Masonry Cleaner 1:3

SECTION C – PROTECTIVE WATER REPELLENTS

The testing described below evaluates the suitability of water repellent treatments.

The surface treatments evaluated were selected for their suitability for application based on the following selection criteria:

1. Weatherproofing properties
2. Color change
3. Ease of application

DESCRIPTIONS OF PRODUCTS EVALUATED – Protective Water Repellents

Sure Klean® Weather Seal Siloxane WB Concentrate – A self-emulsifying water-repellent concentrate designed for dilution with fresh water at the job site. This solvent-free blend of silanes and oligomeric alkoxysiloxanes mixes easily with water to produce a penetrating water-repellent ideal for application to dense or porous masonry surfaces.

Sure Klean® Custom Masonry Sealer - A clear, solvent-based silicone elastomer formulated to weatherproof custom masonry units, cast stone, architectural concrete block, precast concrete, wood, and porous masonry. Custom Masonry Sealer penetrates and fills pores to prevent water penetration through exterior walls expose to normal weathering.

SAMPLE PREPARATION – Protective Water Repellents

The submitted cast stone were cut; oven dried and allowed to reabsorb atmospheric humidity for 24 hours prior to treatment. The treatment method consisted of a wet-on-wet brush application. Samples were allowed to cure for at least 72 hours prior to testing.

TEST METHODS – Protective Water Repellents

Water Absorption Tube Test: RILEM II.4, 60 mph, 20 Minutes

The water absorption tube test simulating wind driven rain conditions was performed. This test simulates 60 mile per hour wind driven rain conditions for a period of 20 minutes. See Technical Services TECHNote RILEM Tube Test Procedures.

TEST RESULTS – Protective Water Repellents

Water Absorption Tube Test: RILEM II.4, 60 mph, 20 Minutes

RESULTS	
"Quickstack Limestone"	
Untreated Control	54 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	58 mph
Custom Masonry Sealer	57 mph
"Archstone"	
Untreated Control	<40 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	57 mph
Custom Masonry Sealer	58 mph
"Keystone White"	
Untreated Control	<40 mph
Siloxane WB Concentrate (1:9)	59 mph
Siloxane WB Concentrate (1:14)	59 mph
"Beveled Keystone"	
Untreated Control	50 mph
Siloxane WB Concentrate (1:9)	55 mph
Siloxane WB Concentrate (1:14)	55 mph
"Ozark Fieldstone"	
Untreated Control	<40 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	58 mph
Custom Masonry Sealer	56 mph

TEST RESULTS (cont.) – Protective Water Repellents

"Sul. Springs Stackstone"	
Untreated Control	55 mph
Siloxane WB Concentrate (1:9)	59 mph
Siloxane WB Concentrate (1:14)	56 mph
Custom Masonry Sealer	60 mph
"Adobe Ledgestone"	
Untreated Control	<40 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	58 mph
"Thinline Brick Concord"	
Untreated Control	56 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	58 mph
Custom Masonry Sealer	60 mph
"Wallcap Dark Slate"	
Untreated Control	50 mph
Siloxane WB Concentrate (1:9)	58 mph
Siloxane WB Concentrate (1:14)	58 mph
"Hearth Adobe"	
Untreated Control	<40 mph
Siloxane WB Concentrate (1:9)	54 mph
Siloxane WB Concentrate (1:14)	56 mph
Custom Masonry Sealer	58 mph
"Moss Ledgestone"	
Untreated Control	51 mph
Siloxane WB Concentrate (1:9)	57 mph
Siloxane WB Concentrate (1:14)	57 mph

CONCLUSIONS – Protective Water Repellents

Based upon laboratory evaluations, all of the applied treatments provided excellent water repellency to all of the submitted cast stone samples. None of the applied treatments changed the appearance of the cast stone in any way.

RECOMMENDATIONS – Protective Water Repellents

Based on test results, all of the treatments can be recommended for job-site testing on all of the cast stone submitted by Mountain Stone, Bowling Green, KY. Recommendations are based on the treatment that proved most effective and can provide water repellency on all types submitted.

Sample	Water Repellent
"Quickstack Limestone"	Sure Klean® Custom Masonry Sealer OR Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
"Archstone"	
"Keystone White"	Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
"Beveled Keystone"	
"Ozark Fieldstone"	Sure Klean® Custom Masonry Sealer OR Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
"Sul. Springs Stackstone"	
"Adobe Ledgestone"	Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
"Thinline Brick Concord"	Sure Klean® Custom Masonry Sealer OR Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
""Wallcap Dark Slate"	Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
"Hearth Adobe"	Sure Klean® Custom Masonry Sealer OR Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)
"Moss Ledgestone"	Sure Klean® Weather Seal Siloxane WB (1:9) or (1:14)

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate water-repellent product and procedures for a particular project. See product literature for additional application and product information.

Courtney A. Williams
Project Testing Coordinator
CAW/

Laboratory Report

Pallet Tag Program Evaluation

Mountain Stone
Bowling Green, KY

Project No. **0207-20 PTP**

Prepared For:

Kirk Patton
Mountain Stone
4301 Industrial Dr.
Bowling Green, KY 42101

Prepared By:

PROSOCO, Inc.
December 2002