UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

May 20, 2013

MEMORANDUM

Subject: Efficacy Review for Secondary Data Supporting EPA File Symbol 84542-RN, Cupron Anti-Fungal Fibers and Fabrics II
DP Barcode: 411167

From: Marcus Rindal, Microbiologist 5.21.13
Efficacy Evaluation Team
Product Science Branch
Antimicrobials Division (7510P)

Thru: Emily Mitchell, Chief MJP
Product Science Branch
Antimicrobials Division (7510P)

To: Jacqueline Campbell-McFarlane PM34/Stacey Grigsby
Regulatory Management Branch II
Antimicrobials Division (7510P)

Applicant: Cupron Scientific
800 East Leigh Street
Richmond, VA 23219

Formulations from Label

Active Ingredient(s)	% by wt.
Copper (I) oxide	2.6%
Other Ingredients (Garment)	97.4%
Total	100.0%

I BACKGROUND

The product, Cupron Anti-Fungal Fibers and Fabrics II (EAP File Symbol 84542-RN) is a new treated textile product (socks, footwear, shoe inserts, and bathmats) designed to reduce *Trichophyton mentagrophytes* that contacts the article. The initial efficacy review conducted in February 2013 concluded that the submitted study (MRID 489447-02) did not support the registrant's residual self-sanitizing efficacy claim. The registrant and their consultant met with the Agency on February 14th and March 7th of 2013 to discuss the 3 Log_{10} reduction standard in treated test organism over controls. The initial study (MRID 489447-02) was conducted with an acceptance criterion of a 1 Log_{10} reduction in treated test organism over controls. The meetings resulted in revisions to the protocol for retesting the product efficacy that were agreed upon by all parties. The modified re-test resulted in efficacy study MRID 490907-02 that is the subject of this review.

Cupron antibacterial fibers/fabrics consist of copper impregnated into materials to impart antibacterial properties. Cupron copper oxide is approved for use in textiles and the end use garments listed on the product label. No new uses are proposed in this end product labeling. The registrant proposes to make public health claims against *Trichophyton mentagrophytes* (the causative agent for Athlete's Foot) in this product's labeling. The protocol noted in the GLP efficacy study is consistent with one the Agency approved on November 16, 2011 for the specific claims requested on its labeling. Efficacy data were generated at MicroBioTest located at 105 Carpenter Drive in Sterling, VA, 20164.

The current data package contained one GLP compliant efficacy study supplementing the original registration application. The study contained an unsigned Statement of No Confidentially and an unsigned Compliance Statement.

II USE DIRECTIONS

The product is proposed to support claims to assist in reducing the spread of *Trichophyton mentagrophytes* by over 90% after 4 hours of contact with the garment. The product claims to remain efficacious up to 20 machine washings (wash temperature up to 176°F, tumble dry up to 347°F for up to 30 minutes, may use Clorox or similar bleach, no fabric softeners). The product is not compatible with silvercare machines or dry cleaning.

The product may be used in hospitals, other healthcare facilities, and various public, commercial and residential buildings for use in textiles to make socks, footwear, shoe inserts, and bathmats.

III AGENCY STANDARDS FOR PROPOSED CLAIMS

The Agency has not developed standards for the proposed claims. The following is excerpted from the US EPA Science Advisory Panel on Treated Articles:
[http://www.epa.gov/scipoly/sap/meetings/1997/september/1097trtd.htm]

b. **Treated (Residual, Self-Sanitizing Claims): Impregnated Fabrics and Textiles;**

Treated (impregnated) fabrics and textiles typically are treated during the manufacturing process to provide durable residual self-sanitizing activity (e.g., significant reduction in numbers of infectious microorganisms which may be subsequently deposited on the finished item) in the

presence of moist or wet contamination. The recommended Test Method is a **Simulated In-Use Study**. The Performance Standard for this Test Method is as follows: **EPA concludes efficacy is demonstrated when the number of test microorganisms on the test surface is reduced by 99.9% over that of the parallel control surface(s)**. However, note that the recommended Test Methods include the following elements:

(1) The test microorganisms employed in the study must be pathogens that are likely to be encountered in the environment in which the product is to be used;

(2) The residue on the treated surfaces must be activated by the addition of moisture in a manner and over an exposure period identical to the use pattern for which the product is intended;

(3) The same type(s) of surfaces without the treatment must be employed in the test and inoculated in a manner and over an exposure period identical to the use pattern for which the product is intended;

(4) The environmental conditions employed in the test (e.g., relative humidity and temperature) must be reported. These conditions must be the same as those likely to be encountered under normal conditions of product use. Tests should also include those environmental conditions that would act to reduce the effective concentration of the product on the inanimate surface (e.g., rinsing, abrasion, organic load, repeated challenges by microorganisms, etc.); and,

(5) The length of time the residual activity can be expected to exist under the expected use conditions must be documented.

Specific Test Acceptance Criteria developed in association with the approved protocol include:

- Neutralizer must be proven to be effective whereas the difference between the confirmed CFU added is within 0.3 Log of the recovered CFU for the treated fabric samples.
- The untreated control fabric counts must average $\geq 1.0 \times 10^4$ CFU/carrier
- All sterility controls must be negative for growth.

To meet the proposed effectiveness requirements, a three log reduction in viable microorganisms over the untreated control fabric is required.

IV. BRIEF DESCRIPTION OF THE DATA

MRID 490907-02: "Assessment of Fungicidal Efficacy of Copper Oxide Impregnated Fabric After Twelve Hours of Exposure," Test Organism: *Trichophyton mentagrophytes* (ATCC 9533), for 100% Cupron Polyester (EPA File Symbol 84542-RN), by Angela L. Hollingsworth. Study conducted at Microbiotest. Study completion date – March 26, 2013. Project Number 619-134.

This study was conducted against *Trichophyton mentagrophytes* (ATCC 9533). Three lots (Lot Nos. 101, 102, and 103) of the product were tested using Microbiotest Labs protocol # 619.1.02.26.13. Each test lot was tested under two conditions, 0 washings and 20 times washings/dryings. For the 0 wash condition, the test and control fabrics were evaluated for fungicidal efficacy under ideal conditions (no exposure to wash/drying or simulated environmental stressing). For the 20 times wash/drying condition, the test and control fabrics were exposed to a regimen to simulate consumer use conditions. The regimen mimicked in use conditions via simulated environmental stressing. The procedures included exposure to high humidity under incubation followed by exposure to ultraviolet irradiation. In addition the fabric carriers were inoculated with low levels of fungi to mimic recontamination of fabric during its life

of use before exposure to a specified wash and drying procedure. A high-level fungal inoculum preparation was used for the efficacy conditions (0 and 20 wash/drying) and a low level fungal inoculum preparation was used for the 20 times wash/drying simulated use procedures. All fungal inoculum preparations (high and low-level) were suspended in synthetic sweat to mimic a simulated use biological challenge. For the efficacy evaluations, the fabric carriers were inoculated with a high-level inoculum preparation and incubated at 36±2°C under humid conditions (85-100% relative humidity) for the duration of the twelve hour contact time. At the conclusion of the contact time, each fabric carrier was transferred to neutralizer and processed using stomaching procedures to extract any remaining survivors. Samples of the neutralizer recovery broth were cultured and enumerated after incubation.

V. RESULTS

Efficacy Results – Twelve Hour Contact Time Against *Trichophyton mentagrophytes*

Treatment	Results – CFU/Carrier Recovered			
		Lot 101	Lot 102	Lot 103
0-Wash Condition	Average CFU/Carrier Recovered*	$<5.0\times10^0$	$<5.0\times10^0$	$<5.0\times10^0$
	Average Log_{10} Reduction	>3.38 Log_{10}	>3.38 Log_{10}	>3.38 Log_{10}
	Average % Reduction	>99.9%	>99.9%	>99.9%
	Average CFU/Carrier Lot 100- Control	1.2×10^4		
20-Wash/Dry Condition	Average CFU/Carrier Recovered	$<5.0\times10^0$	$<5.0\times10^0$	$<5.0\times10^0$
	Average Log_{10} Reduction	>3.38 Log_{10}	>3.38 Log_{10}	>3.38 Log_{10}
	Average % Reduction	>99.9%	>99.9%	>99.9%
	Average CFU/Carrier Lot 100- Control	1.2×10^4		

* Note: No recovery reported as $<5.0\times10^0$

VI. CONCLUSIONS

The submitted efficacy data (MRID 490907-02) **do support** the use of the product, Cupron Anti-Fungal Fibers and Fabrics II, as a fungicide against *Trichophyton mentagrophytes* on impregnated fabric. When tested as described, 100% Cupron Polyester achieved greater than a three-log (99.9%) reduction over the untreated control fabric for the 0-Wash Condition and for the 20-Wash Condition. Neutralization and sterility controls met the criteria established for a valid test. The untreated control fabric counts averaged $\geq1.0\times10^4$ CFU/carrier.

VII. RECOMMENDATIONS

1. The proposed label claims that the product, Cupron Anti-Fungal Fibers and Fabrics II, is effective as a fungicide against *Trichophyton mentagrophytes* on impregnated fabric in the presence of 5% simulated sweat organic soil load for a 12 hour contact time at 36-37°C and 86-92% RH. These claims **are supported** by the applicant's data.

2. The following *LABEL COMMENTS* are based on the proposed claims outlined in the March 6, 2013 letter (Note: The 3-6-13 set of claims are different from the original list submitted 2 weeks prior and are in context to use sites approved in the protocol not specific to the pending end-use product.)

    a. PAGE 1: Revise all the claims to indicate "athlete's foot fungus" not "jock itch." The indicated use sites are limited to socks, shoe inserts, and bathmats. To support additional use sites that are appropriate for jock itch, Agency evaluation/consideration is required.
    b. PAGE 1: Revise the 2nd, 4th, 6th, and 12th claims by deleting the terms "sanitizes" or "self-sanitizes" and "jock itch fungus" and state "[reduces][inhibits][suppresses][kills] *T. mentagrophytes* (athlete's foot fungus) after 12 hours of contact with [socks][bathmats][shoe inserts]."
    c. PAGE 1: Revise the 5th and 10th claims by indicating "on the [sock][bathmat][shoe inserts]."
    d. PAGE 2: Revise the 1st, 4th, 6th, 7th, 13th and 18th claims by indicating "on the [sock][bathmat][shoe inserts]."
    e. PAGE 2: Revise the 10th, 12th, 14th, and 20th claims by deleting the terms or "self-sanitizes" jock itch and state "[reduces][inhibits][suppresses][kills] *T. mentagrophytes* (athlete's foot fungus) after 12 hours of contact with [socks][bathmats][shoe inserts]."
    f. PAGE 2: Revise the 21st claim by deleting "jock itch fungus" and state "Athlete's foot fungus."