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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460



OFFICE OF  
PREVENTION, PESTICIDES  
AND TOXIC SUBSTANCES

**MEMORANDUM**

**DATE:** June 7, 2007

**SUBJECT:** Transmission of Background Materials and Charge to the Panel for the July 17-19, 2007 FIFRA Scientific Advisory Panel (SAP) Session Entitled "Guidance on Test Methods for Determining the Efficacy of Antimicrobial Products for Inactivating *Bacillus anthracis* Spores on Inanimate Surfaces"

**TO:** Joe Bailey, Designated Federal Official  
Office of Science Coordination and Policy  
Scientific Advisory Panel (7201M)

**FROM:** Frank Sanders  
Director, Antimicrobials Division (7510C)  
Office of Pesticide Programs

A handwritten signature in black ink, appearing to read "Frank Sanders", written over the "FROM:" section of the memorandum.

Attached are compact discs and two paper copies of all background documents and the charge to the panel for the July 17-19, 2007 FIFRA SAP session: Guidance on Test Methods for Determining the Efficacy of Antimicrobial Products for Inactivating *Bacillus anthracis* Spores on Environmental Surfaces. These materials neither contain any information protected under statute as Confidential Business Information (CBI) nor do they contain information protected from disclosure to foreign and multi-national pesticide producers under FIFRA Section 10(g). These materials include some information protected by copyright. The Biological and Economic Analysis Division (BEAD) has obtained permission from the publishers to reproduce these copyrighted materials for purposes of the FIFRA SAP review and in the form (electronic and/or paper) attached to this memorandum. A list of these documents is attached and is divided into primary references that support the Agency's position, and secondary references provided as supplementary information that may be useful.

Attachments

## Charge to the Panel

### **Issue 1: Whether a sterilant or sporicide product may claim that it inactivates *B. anthracis* spores on inanimate surfaces.**

EPA's existing efficacy testing guidance specifies that a product that passes the AOAC Sporicidal Activity of Disinfectants test (AOAC Official Method 966.04) may be registered as a sterilant/sporicide. The Agency is now proposing that a sterilant/sporicide may also bear a claim that it inactivates *B. anthracis* spores if it passes confirmatory testing using the AOAC 966.04 with virulent *B. anthracis* spores on carriers made of porcelain penicylinders and silk loops, which represent nonporous and porous surfaces, respectively.

The rationale for EPA's position is that the AOAC Method and associated EPA performance criteria (e.g., no growth from any carriers tested) have been required historically by EPA for evaluating the performance of sporicidal chemicals for regulatory purposes. The AOAC Method specifies the use of two spore-forming microbes, *B. subtilis* and *Clostridium sporogenes*; however, the Agency believes that the method is also suitable for testing spores of other spore-forming bacteria such as *B. anthracis*. The Agency has recognized deficiencies in the AOAC 966.04 Method and has improved the procedure through the official AOAC modification process – the modifications appear in AOAC 966.04 Method II. The Agency strongly prefers the use of the Method II to support the registration of sterilants/sporicides and for confirmatory testing of *B. anthracis*. In addition, the Agency has successfully revised the method editorially (see Method II), thus providing a more standardized protocol for use by stakeholders. The modifications are presented in AOAC 966.04 Method II. See Reference 1 for the entire method; see References 2 and 3 for experimental details.

**Charge Question 1: Please comment on the scientific basis that confirmatory testing of a sporicide/sterilant using AOAC Method 966.04 with virulent *B. anthracis* spores demonstrates that a product inactivates *B. anthracis* spores on inanimate surfaces.**

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**Issue 2: Whether a sporicidal decontaminant product may claim that it inactivates *B. anthracis* spores on inanimate surfaces, when tested solely with AOAC Method 966.04 using virulent *B. anthracis* spores.**

The Agency is proposing that an antimicrobial product may be registered as

a "sporicidal decontaminant" if it is tested with the AOAC Method 966.04 using virulent *Bacillus anthracis* spores (instead of *B. subtilis* or *C. sporogenes*), or using a surrogate acceptable to EPA, on porcelain penicylinders and/or silk loops, which represent nonporous and porous surfaces, respectively). The Agency's rationale is consistent with the use of the AOAC 966.04 method for sterilant/sporicidal agents; however, the Agency will not require registrants to conduct the entire AOAC Method 966.04 to support a sporicidal decontaminant claim. The Agency believes that product efficacy against spores of *C. sporogenes*, an anaerobic spore-forming species relevant to clinical environments, has limited applicability to decontamination scenarios involving spores of *B. anthracis*, and thus testing against *C. sporogenes* will not be required. Furthermore, the registrant will be allowed to test against porcelain and/or silk loops (which represent nonporous and porous surfaces, respectively) depending on the proposed claims. Continued use of EPA product performance criterion (e.g., no growth from any carriers tested) is appropriate for testing the efficacy of sporicidal decontaminants against spores of *Bacillus anthracis*.

**Charge Question 2: Please comment on the scientific basis that use of the AOAC Method 966.04 with virulent *B. anthracis* spores demonstrates that a sporicidal decontaminant product inactivates *B. anthracis* spores on inanimate surfaces.**

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**Issue 3: Whether a six (6) log ( $\log_{10}$ ) reduction is an adequate measure of success when employing a well developed, quantitative sporicidal efficacy test.**

The Agency is proposing that an antimicrobial product may be registered as a "sporicidal decontaminant" if it is tested using a well developed, quantitative sporicidal test method acceptable to EPA using virulent *Bacillus anthracis* spores (or a surrogate acceptable to EPA) on nonporous and/or porous inanimate surfaces and the testing of the product achieves at least a six (6) log reduction (or a minimum  $1 \times 10^6$  spores per carrier) of virulent *B. anthracis* spores (or a surrogate acceptable to EPA). The use and adoption of standardized quantitative methods for testing the performance of sporicidal decontaminants for regulatory purposes is supported by EPA. The AOAC Method 966.04 is a qualitative procedure (i.e., provides only positive/negative or pass/fail results). Quantitative procedures provide an estimate of actual spore kill, usually based on the  $\log_{10}$  scale, and can be adapted for multiple product formulations and carrier materials. Several well-developed quantitative procedures are available for use. The Agency believes that a performance standard for quantitative laboratory-based

assays is essential to establishing consistent product efficacy under actual decontamination scenarios in the field. The proposed 6 log reduction performance standard is a scientifically valid and rigorous standard. The standard will give the Agency reassurance that sporicidal decontaminants when applied per the product's label claims are effective against spores of *B. anthracis*.

The technical basis of the Agency's selection of a minimum 6 log performance standard includes the following:

(1) the target spore titer currently allowed in AOAC method 966.04 (Method II) is a minimum of  $1 \times 10^5$  to approximately  $1 \times 10^6$  spores per carrier) (Reference 1);

(2) the quantitative methods currently available and published can reliably generate control carrier spore titers necessary to measure a 6 log reduction. For examples of quantitative methods, Please see the following:

ASTM E 2111-05 (Reference 4): Standard Quantitative Disk Carrier Test Method, ASTM E 2414-05: Standard Test Method for Quantitative Sporidical Three-Step Method (Reference 5);

Standard Quantitative Carrier Test Method, ASTM E 2197-02 (Reference 6):

Also see References 7 and 8;

(3) a minimum 6 log reduction in viable spores has been measured for commercially available sporicidal agents and technologies designed for treating sites contaminated with *B. anthracis* (see References 9-13); and

(4) environmental sampling pre- and post-application of the sporicidal decontaminant will determine the need for re-treatment.

**Charge Question 3:** Please comment on the scientific basis that achieving a six (6) log reduction using a well developed, quantitative sporicidal test method demonstrates that a product inactivates *B. anthracis* spores on inanimate surfaces.

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**Issue 3.1:** What criteria should be used when selecting coupon materials for quantitative sporicidal tests.

The Agency is proposing to allow only certain nonporous and porous materials to be used in the quantitative sporicidal tests based on specific criteria. The rationale for EPA's position is that in order to achieve reproducible results across laboratories, and to ensure that test materials are suitable to support a particular claim (i.e., material type to be treated), basic criteria should be established. The EPA also recognizes that the nature of the test material may impact product performance. The criteria that EPA intends to establish for the selection of carriers and carrier materials include the use of standardized materials (e.g., quality, grade and consistency), relevancy of materials to the use site, material availability, data on spore recovery, ability to clean and sterilize prior to inoculation, and potential for interaction with the product's active ingredients.

**Charge Question 3.1: Please comment on the EPA's criteria for selecting coupon materials to represent nonporous and porous surfaces in quantitative sporicidal efficacy tests.**

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**Issue 4: Whether a surrogate *Bacillus* species of spores may be used in place of *Bacillus anthracis* spores in sporicidal efficacy tests.**

The Agency is proposing to allow certain surrogate, avirulent *Bacillus* species to be used in place of virulent *Bacillus anthracis* spores for either qualitative or quantitative sporicidal efficacy tests based on specific criteria. Surrogate spores should have certain desirable attributes and be acceptable to EPA. The use of safe-to-handle surrogates of virulent *B. anthracis* spores is supported by the EPA. Surrogates are frequently used as models or representatives for virulent strains of pathogens such as *B. anthracis* Ames. Federal restrictions and bio-safety issues limit the number of labs capable of testing select agents. Cost, time and resources required for managing studies on virulent *B. anthracis* spores are also limiting factors. Certain criteria should be met in order for a surrogate to be utilized in the efficacy testing of sporicidal decontaminants. To be an acceptable surrogate, a *Bacillus* spore species should generally be as resistant or more resistant to inactivation by a particular chemical on a particular surface than *B. anthracis* spores.

To demonstrate equivalent resistance of the surrogate spore type to the virulent agent, a comparative efficacy study should be performed using a well-developed/validated quantitative methodology appropriate for the test chemical and microbe to measure resistance. Testing should be conducted in accordance with the potential product claim. Replicated studies with adequate controls and with side-by-side, parallel test designs are desirable.

It is also desirable to compare carriers with comparable spore populations. The same sporulation media should be utilized for all test microbes. Percent recovery of spores from carriers should be determined in advance. The strain of *B. anthracis* used in the study should be verified as a pathogenic strain. Examples of acceptable and relevant surrogate studies are provided in References 7 and 8. Pre-existing data may be appropriate to support the use of a surrogate as well.

**Charge Question 4: Please comment on the desirable attributes for selecting surrogate *Bacillus* species for *Bacillus anthracis* in either qualitative or quantitative sporicidal efficacy tests.**

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**Issue 5: Whether gas or vapor products should be subjected to a "simulated use test."**

The Agency is proposing that gas or vapor sterilants, sporicides and sporicidal decontaminants be subjected to a "simulated use test" for gas or vapor products intended for use in large, enclosed spaces. The rationale for EPA's position is that efficacy testing performed in the laboratory does not necessarily demonstrate that a product will perform satisfactorily when applied in a large, enclosed space. Many factors can reduce the effectiveness of a gas or vapor product, such as inadequate distribution, breakdown by light, and absorption/breakdown by porous or reactive surfaces. Accordingly, EPA believes that a simulated use test is needed to demonstrate that a gas or vapor product will perform successfully in a large volume of space (e.g, a typical office). In addition, such a test should include monitoring to assure that key parameters (e.g., temperature, relative humidity, concentration) for an effective fumigation will be met.

**Charge Question 5: Please comment on the scientific basis for conducting a "simulated use test" for a gas or vapor product intended for use in large, enclosed spaces.**

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## REFERENCES

### PRIMARY REFERENCES

1. AOAC Method 966.04 (2006) 18th ED., AOAC INTERNATIONAL Official Methods of Analysis, Gaithersburg, MD
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### SECONDARY REFERENCES (provided for additional information that may be useful)

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24. AOAC INTERNATIONAL Official Methods of Analysis – Appendix D: Guidelines for Collaborative Study Procedures to Validate Characteristics of a Method of Analysis
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