

1 EPA-HSRB-08-04

2  
3 George Gray, Ph.D.  
4 Science Advisor  
5 Office of the Science Advisor  
6 1200 Pennsylvania Avenue, NW  
7 Washington, DC 20460

8  
9 Subject: October 21-22, 2008 EPA Human Studies Review Board Meeting Report

10  
11 Dear Dr. Gray:

12  
13 The United States Environmental Protection Agency (EPA or Agency) requested the  
14 Human Studies Review Board (HSRB) to review scientific and ethical issues addressing: (1)  
15 Agricultural Handlers Exposure Task Force (AHETF) pesticide handler protocols: closed-cab  
16 airblast scenario, with addition of chlorothalonil, (2) AHETF pesticide handler protocols: open-  
17 cab airblast scenario and (3) completed Carroll-Loye Biological Research picaridin-based  
18 mosquito repellent efficacy study LNX-001. In addition, the Board also provided comments on  
19 the Guidelines for Product Performance Testing of Skin-Applied Insect Repellents. The Board  
20 also addressed procedural issues that surfaced as points of concern at the meeting.

21  
22 **Consideration to Add Sulfur and Copper as Surrogate Chemical for AHETF Airblast**  
23 **Studies**

24  
25 Prior to the Human Studies Review Board meeting in October, the AHETF submitted to  
26 the Agency a request to support the addition of copper and sulfur as surrogate pesticides for the  
27 open and closed cab scenario designs. Specifically, background information and sample product  
28 risk statements were submitted to the EPA on October 10<sup>th</sup> and transmitted to the HSRB on  
29 October 17<sup>th</sup>, but a revised and IRB-approved protocol reflecting the addition of these two  
30 compounds was not available for Agency or Board review.

31  
32 The Board recommended that copper and sulfur not be used as surrogate chemicals for  
33 airblast applications based on concerns regarding exposure measurements and the applicability  
34 of data produced by such studies for the generic database under development. The Board also  
35 noted that it was not provided with a specific proposal describing the rationale and procedures  
36 for using these two chemicals. The Board affirmed its understanding that regulations governing  
37 HSRB review of third-party pesticide intentional exposure studies precludes the Board from  
38 reviewing a protocol unless the Agency (a) provides the Board with explicit information  
39 regarding scientific design and human subject protections and (b) evidence that the protocol has  
40 been submitted to an IRB for approval.

41  
42 Following the Board's statement to this effect, the EPA stated that copper and sulfur  
43 would not be used as surrogates in the protocols under review and the Board proceeded to review  
44 the original protocols.

45  
46 **1. AHETF Pesticide Handler Protocols: Closed-Cab Airblast Scenario, with Addition of**

1 **Chlorothalonil**

2  
3 Science

4  
5 If the proposed closed-cab airblast application field study protocols are revised as  
6 suggested in the EPA review, and data collection and design weaknesses are modified as detailed  
7 by the HSRB in this report, then the research is likely to generate scientifically reliable data,  
8 useful for assessing the exposure of handlers who apply liquid pesticides using airblast  
9 equipment drawn by vehicles with closed cabs. However, due to the limitations posed by the use  
10 of purposive sampling, small sample size, reduced range of exposures and representativeness of  
11 participating growers noted in previous Board reports, the data will not meet the assumptions of  
12 most statistical analyses that rely on mean scores or continuous data. Conclusions drawn from  
13 these data must recognize these limitations.

14  
15 Ethics

16  
17 If revised as suggested by the Board, the research described in these three protocols is  
18 likely to meet the applicable requirements of 40 CFR part 26, subparts K and L.

19  
20 **2. AHETF Pesticide Handler Protocols: Open-Cab Airblast Scenario**

21  
22 Science

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24 For the open-cab airblast protocols the Board reiterated its recommendations already put  
25 forward for the closed-cab protocols. In addition, the Board recommended that a careful  
26 evaluation be conducted before combining old and new open cab datasets. Finally, the Board  
27 concluded that a more even distribution of monitoring units across the five proposed categories  
28 of active ingredient handled might strengthen the design and provide greater insight into the  
29 question of proportionality.

30  
31 Ethics

32  
33 If revised as suggested by the Board in its review, the research described in these three  
34 protocols is likely to meet the applicable requirements of 40 CFR part 26, subparts K and L.

35  
36  
37 **3. Completed Carroll-Loye Biological Research Picaridin-Based Mosquito Repellent**  
38 **Efficacy Study LNX-001**

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40 Science

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42 The Carroll-Loye Biological Research study LNX-100 is sufficiently sound, from a  
43 scientific perspective, to be used to assess the repellent efficacy of the tested formulations  
44 against mosquitoes. However, the calculation of Mean “Complete Protection Time” is  
45 inappropriate for censored data and the Agency should not rely on this aspect of the data analysis  
46 to assess the repellent efficacy of the tested formulations.

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Ethics

The Board concurred with the Agency’s assessment that the study submitted for review was conducted in substantial compliance with subparts K and L of 40 CFR 26.

**Guidelines for Product Performance Testing of Skin-Applied Insect Repellents**

While the Board was not provided a charge for consideration of the guidelines, it did have several comments to enhance the utility of the document. The Board noted that improvements in insect repellent protocols would be derived from portions of the guidelines and that the document was well written and clear. The Board appreciated the inclusion of landings as well as bites as an endpoint and encouraged the Agency to consider landings as the preferred endpoint.

The Board expressed serious concerns that if the erroneous assumptions and inconsistent statements regarding the statistical analysis plan are not corrected prior to publication of the Guidelines, investigators following the guideline recommendations would develop scientifically unreliable protocols. The Board underscored that it would continue to evaluate protocols submitted for review to the HSRB based on appropriate statistical assumptions and analytic plans and on that basis might recommend rejection of a protocol that followed those elements of the Guidelines that were incorrect.

**Clarification of Board Report Process**

Prior to the posting of and public meeting to finalize the June 2008 report, the Agency wrote a memo to the Board stating that the Agency had approved the implementation of AHETF studies based in part on their interpretation of Board discussion at the June meeting and the Chair’s minutes. The Board recognized the need for a more rapid turn around of its final report to avoid future confusion. The Board clarified its process for approving final recommendations and adopted a new report schedule and format.

Sincerely,

Celia Fisher, Ph.D., Chair  
EPA Human Studies Review Board

**NOTICE**

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This report has been written as part of the activities of the EPA Human Studies Review Board, a Federal advisory committee providing advice, information and recommendations on issues related to scientific and ethical aspects of human subjects research. This report has not been reviewed for approval by the Agency and, hence, the contents of this report do not necessarily represent the view and policies of the Environmental Protection Agency, nor of other agencies in the Executive Branch of the Federal government, nor does the mention of trade names or commercial products constitute a recommendation for use. Further information about the EPA Human Studies Review Board can be obtained from its website at <http://www.epa.gov/osa/hsrb/>. Interested persons are invited to contact Paul Lewis, Designated Federal Officer, via e-mail at [lewis.paul@epa.gov](mailto:lewis.paul@epa.gov).

In preparing this document, the Board carefully considered all information provided and presented by the Agency presenters, as well as information presented by public commenters. This document addresses the information provided and presented within the structure of the charge by the Agency.



1 Lois D. Lehman-Mckeeman, Ph.D., Distinguished Research Fellow, Discovery Toxicology,  
2 Bristol-Myers Squibb Company, Princeton, NJ

3  
4 Jerry A. Menikoff, M.D., Director, Office of Human Subjects Research, Office of the Director,  
5 National Institutes of Health, Bethesda, MD

6  
7 Rebecca Parkin, Ph.D., MPH, Associate Dean for Research and Public Health Practice, School  
8 of Public Health and Human Services, The George Washington University, Washington, DC\*

9  
10 Sean Philpott, Ph.D., MS Bioethics, Science and Ethics Officer, Global Campaign for  
11 Microbiocides, PATH, Washington, DC

12  
13 Ernest D. Prentice, Ph.D., Associate Vice Chancellor for Academic Affairs, University of  
14 Nebraska Medical Center, Omaha, NE

15  
16 Richard Sharp, Ph.D., Director of Bioethics Research, Department of Bioethics, Cleveland  
17 Clinic, Cleveland, OH \*\*

18  
19 Linda J. Young, Ph.D., Professor, Department of Statistics, Institute of Food and Agricultural  
20 Sciences, University of Florida, Gainesville, FL

21  
22  
23 Human Studies Review Board Staff

24  
25 Paul I. Lewis, Ph.D., Executive Director, Human Studies Review Board Staff, Office of the  
26 Science Advisor, United States Environmental Protection Agency, Washington, DC

27  
28 \* Resigned from the HSRB at the end of October 21-22, 2008 Public Meeting

29  
30 \*\* Not in attendance at the October 21-22, 2008 Public Meeting

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1 **INTRODUCTION**

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3 On October 21-22, 2008, the United States Environmental Protection Agency’s (EPA or  
4 Agency) Human Studies Review Board (HSRB) met to address scientific and ethical issues  
5 concerning: (1) Agricultural Handlers Exposure Task Force (AHETF) pesticide handler  
6 protocols: closed-cab airblast scenario, with addition of chlorothalonil, (2) AHETF pesticide  
7 handler protocols: open-cab airblast scenario, and (3) completed Carroll-Loye Biological  
8 Research picaridin-based mosquito repellent efficacy study LNX-001. The Board also provided  
9 comments on the Agency’s draft guidelines for product performance testing of skin-applied  
10 insect repellents. In addition, the Board addressed procedural issues that surfaced as points of  
11 concern at the meeting. Each of these topics is discussed more fully below.

12  
13 Regulations Relevant to Studies Submitted for Review

14  
15 EPA’s regulation, 40 CFR §26.1125, requires a sponsor or investigator to submit to EPA,  
16 before conducting a study involving intentional exposure of human subjects, materials describing  
17 the proposed human research in order to allow EPA to conduct scientific and ethics reviews. In  
18 addition, EPA’s regulation, 40 CFR §26.1601, requires EPA to seek HSRB review of the  
19 proposed research. Because the two AHETF proposed studies involves scripted exposure, it  
20 meets the regulatory definition of “research involving intentional exposure of a human subject”  
21 and thus these cited provisions of regulation apply to it.

22  
23 The Agency’s regulation, 40 CFR §26.1602, requires EPA to seek HSRB review of an  
24 EPA decision to rely on the results of these studies. The Carroll-Loye Biological Research has  
25 submitted data to support continued registration of two test materials. EPA has reviewed the  
26 research, applying the standard in 40 CFR §26.1705, which states: Except as provided in  
27 §26.1706, in actions within the scope of §26.1701, EPA shall not rely on data from any research  
28 initiated after April 7, 2006, unless EPA has adequate information to determine that the research  
29 was conducted in substantial compliance with subparts A through L of this part... This  
30 prohibition is in addition to the prohibition in §26.1703.

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32 **REVIEW PROCESS**

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34 On October 21-22, 2008, the Board had a public face-to-face meeting in Arlington,  
35 Virginia. Advance notice of the meeting was published in the Federal Register “Human Studies  
36 Review Board: Notice of Public Meeting” (73 Federal Register 73, 53422). At the public  
37 meeting, following welcoming remarks from Agency officials, the Board heard presentations  
38 from the Agency on the following topics: (1) Agricultural Handlers Exposure Task Force  
39 (AHETF) pesticide handler protocols: closed-cab airblast scenario, with addition of  
40 Chlorothalonil, (2) AHETF pesticide handler protocols: open-cab airblast scenario, (3)  
41 completed Carroll-Loye Biological Research picaridin-based mosquito repellent efficacy study  
42 LNX-001, and (4) Agency Guidelines for Product Performance Testing of Skin-Applied Insect  
43 Repellents.

44  
45 **Oral comments**

1 The following oral comments were presented at the meeting:

2  
3 Agricultural Handlers Exposure Task Force (AHETF) Pesticide Handler Protocols: Closed-Cab  
4 Airblast Scenario, with Addition of Chlorothalonil

5  
6 Victor Canez, Ph.D. from BASF on behalf of the AHETF

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8 AHETF Pesticide Handler Protocols: Open-Cab Airblast Scenario

9  
10 Victor Canez from BASF on behalf of the AHETF

11  
12 Completed Carroll-Loye Biological Research picaridin-based mosquito repellent efficacy study  
13 LNX-001

14  
15 Scott Carroll, Ph.D., on behalf of Carroll-Loye Biological Research

16  
17 Guidelines for Product Performance Testing of Skin-Applied Insect Repellents

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19 Tom Osimitz, Ph.D. of Science Strategies LLC on behalf of the DEET Task Force

20 Scott Carroll, Ph.D., on behalf of Carroll-Loye Biological Research

21 Mr. Nick Spero and Robin Todd, Ph.D. on behalf of ICR

22  
23 **Written comments**

24 Written comments were received from:

25 B. Sachau, a public citizen

26  
27 For their deliberations, the Board considered the materials presented at the meeting,  
28 written public comments and Agency background documents (e.g., the published literature,  
29 Agency data evaluation record, weight of evidence review, ethics review, pesticide human study  
30 protocols and Agency evaluation of the protocol or study). For a comprehensive list of  
31 background documents visit the [www.regulations.gov](http://www.regulations.gov), or EPA's HSRB website at  
32 <http://www.epa.gov/osa/hsrb/>  
33

34 **CHARGE TO THE BOARD AND BOARD RESPONSE**

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36 **Board Response to Request to Add Sulfur and Copper as Surrogate Chemicals for Closed**  
37 **and Open Cab Airblast Studies**

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39 HSRB Recommendation

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41 The Board decided not to consider the addition of copper and sulfur as surrogate  
42 pesticides for open and closed cab protocols based on concerns that the lack of a detailed and  
43 IRB approved protocol prevented adequate Board review regarding exposure measurements, the

1 applicability of data produced by such studies for the generic database under development and  
2 human subjects protections.

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4  
5 HSRB Detailed Recommendations and Rationale  
6

7 Prior to the Human Studies Review Board meeting in October, the AHETF submitted to  
8 the Agency a request to support the addition of copper and sulfur as surrogate pesticides for the  
9 open and closed Cab scenario designs discussed previously. Specifically, background  
10 information and sample product information were submitted to the EPA on October 10<sup>th</sup> and  
11 transmitted to the HSRB on October 17<sup>th</sup>, but a revised and IRB-approved protocol reflecting the  
12 addition of these two compounds was not available for Agency or Board review.  
13

14 The Board recognized the practical considerations underlying the request, but expressed a  
15 number of scientific concerns. It was not clear to the Board that these compounds would be  
16 applied in the same manner as the current surrogate pesticides; e.g., nozzle size, droplet size. It  
17 was thought that the replacement of organic, semi-volatile pesticides with inorganic, non-volatile  
18 compounds would present significant challenges in regard to air sampling measurements. It was  
19 noted that the sampling methods typically used for these two categories of chemicals were  
20 substantially different. The Board was not convinced that measurement of copper or sulfur in air  
21 samples would properly represent inhalation exposures to the insecticides. It was also not clear to  
22 the Board that the current dermal sampling methods would be adequate to assess exposures to  
23 copper or sulfur. It was noted that copper and sulfur are present at much higher concentrations in  
24 their formulated products than are insecticides, and that they may be applied at much higher  
25 rates. It was not clear if the potential for breakthrough of the dermal sampling garments or the  
26 removal efficiency of hand wash and wipe procedures would be comparable.  
27

28 Based on an internal review of the toxicological profiles of these two compounds, the Agency  
29 concluded that copper and sulfur did not pose significant additional safety concerns and thus  
30 supported their use as surrogate pesticides in the protocols AHE57, AHE58, and AHE59 pending  
31 protocol amendment and IRB review. The Board expressed concern that lack of revised and  
32 IRB-approved protocols and supporting documentation prevented careful consideration of the  
33 risks that the addition of these two compounds posed to study participants and that the Final  
34 Human Studies rule precluded the HSRB from reviewing the protocols before it if the AHETF  
35 intended to amend the three submitted protocols to include the two compounds after the October  
36 2008 HSRB meeting was over. The Board affirmed its understanding that regulations governing  
37 HSRB review of third-party pesticide intentional exposure studies precludes the Board from  
38 reviewing a protocol unless the Agency (a) provides the Board with explicit information  
39 regarding scientific design and human subject protections and (b) evidence that the protocol has  
40 been submitted to an IRB for approval. Specifically, 40 CFR 26.1125 states that:

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42 Any person or institution who intends to conduct or sponsor human research covered by  
43 Sec. 26.1101(a) shall, after receiving approval from all appropriate IRBs, submit to EPA  
44 prior to initiating such research all information relevant to the proposed research  
45 specified by Sec. 26.1115(a).  
46

1 At the time of the October 2008 HSRB meeting, the IRB of record, Independent  
2 Institutional Review Board, Inc. of Plantation, FL (IIRB) had not received an application,  
3 reviewed or approved the addition of copper and sulfur to these three protocols, so the regulatory  
4 requirements of 40 CFR 26.1125 were not met.

5  
6 The Board thus declined to consider the addition of copper and sulfur as surrogate  
7 pesticides for open and closed cab protocols. Following the Board's statement to this effect, the  
8 EPA stated that the copper and sulfur would not be used as surrogates in the protocols under  
9 review and the Board proceeded to review the original protocols.

## 10 11 12 **1. Assessment of AHETF Pesticide Handler Protocols: Closed-Cab Airblast Scenario, with** 13 **Addition of Chlorothalonil**

### 14 15 Overview

16  
17 The HSRB has previously considered the design and conduct of research to measure the  
18 levels of exposure received by workers when handling (i.e., mixing, loading, or applying)  
19 pesticides. Two industry Task Forces, the Antimicrobials Exposure Assessment Task Force II  
20 (AEATF) and the AHETF, have previously submitted materials for HSRB review. The Board  
21 has addressed this kind of research in its meetings in June 2006, June 2007, April 2008, and June  
22 2008.

23  
24 At its June 2008 meeting the Board reviewed and provided recommendations for enhancing  
25 the scientific validity and usefulness of two AHETF field studies on the exposure of workers  
26 applying liquid pesticides using closed-cab airblast equipment. At the October 2008 meeting  
27 EPA presented proposals from the AHETF for the three additional field studies required to fulfill  
28 this scenario design. These protocols are very similar to those reviewed by the Board in June, but  
29 involve monitoring workers making pesticide applications to different crops in different regions.  
30 In addition, these protocols incorporated numerous refinements agreed to by EPA and the  
31 AHETF shortly after the June HSRB meeting.

32  
33 The three new protocols involve monitoring applications of surrogate pesticides to Michigan  
34 cherry orchards (AHE57), California vineyards (AHE 58), and Washington apple orchards  
35 (AHE59). Together with the data generated under the two field study protocols reviewed by the  
36 Board in June 2008, these will fulfill the design of the closed-cab air blast application scenario.

37  
38 Because of the widespread use of chlorothalonil on Michigan cherries, the Agency requested  
39 that the Board consider a revision to the scenario design to add several formulations of this active  
40 ingredient to the list of permissible surrogate pesticides.

### 41 42 **Charge To The Board**

#### 43 44 Science

1           If the proposed closed-cab airblast application field study protocols AHE57, AHE58, and  
2 AHE59 are revised as suggested in EPA’s reviews and if the research is performed as described:  
3 Is the research likely to generate scientifically reliable data, useful for assessing the exposure of  
4 handlers who apply liquid pesticides using airblast equipment drawn by vehicles with closed  
5 cabs?  
6

7 **Board Response to the Charge**

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9 HSRB Recommendation

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11           If the proposed closed-cab airblast application field study is revised as suggested in the  
12 EPA review and data collection and design weaknesses are modified as detailed below, then the  
13 research is likely to generate scientifically reliable data, useful for assessing the exposure of  
14 handlers who apply liquid pesticides using airblast equipment drawn by vehicles with closed  
15 cabs. However, due to the limitations posed by the use of purposive sampling, small sample size,  
16 reduced range of exposures and representativeness of participating growers, the data will not  
17 meet the assumptions of most statistical analyses that rely on mean scores or continuous data.  
18 Conclusions drawn from these data must recognize these limitations.  
19

20 HSRB Detailed Recommendations and Rationale

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22           The Board learned at the October meeting that, following the June 2008 HSRB meeting,  
23 the Agency had instructed the AHETF to move forward with airblast application studies. Since  
24 the Board’s report for the June meeting was not finalized until the October meeting, the protocols  
25 that will be used for airblast studies will not necessarily incorporate some of the Board’s  
26 recommendations from the June meeting. Thus, the primary concerns raised by the Board at this  
27 meeting were similar to those presented in the HSRB June meeting report. The Board  
28 recommended that the Agency consider the concerns listed below when it provides its final  
29 response to AHETF regarding these protocols. In particular, the Board viewed the selection of  
30 monitoring units from separate farms to be a modification needed to ensure that the design and  
31 analyses are scientifically sound.  
32

- 33 1. The Board again noted that selecting 5 monitoring units in a scenario, each from a different  
34 farm is needed to ensure that the design and analyses are scientifically sound.  
35  
36 2. The Board reiterated its observation that many aspects of the proposed studies were likely to  
37 reduce the range of exposures that would be measured with applicators under real-world  
38 conditions. While a reduction in the range of exposures may be unavoidable due to practical  
39 considerations, it should be considered by the Agency when evaluating the usefulness of the data  
40 produced by these studies.  
41  
42 3. The Board once again advised the Agency to require collection of information on growers who  
43 do not respond or who decline to participate, such that the representativeness of participating  
44 growers can be evaluated. The usefulness of the data will be enhanced by statistical comparisons  
45 between characteristics of participating growers and those that decline. The Board expressed  
46 concern regarding the inadequacies of a master list for which 43% of growers were listed as

1 “unreachable.” The inadequacy of the list makes the design vulnerable to selection bias that can  
2 seriously compromise the usefulness of the data. If the master list cannot be improved then these  
3 limitations need to be considered in data analysis and interpretation of results and should be  
4 explicitly described whenever the EPA refers to these studies.

5  
6 4. The Board also continued to recommend the selection of Local Site Coordinators with  
7 demonstrable training and expertise in survey implementation to ensure optimal recruiting and  
8 thereby enhance the usefulness of the data.

9  
10 Ethics

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12 **Charge to the Board**

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14 Is the research likely to meet the applicable requirements of 40 CFR part 26, subparts K  
15 and L?

16  
17 **Board Response to the Charge**

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19 HSRB Recommendation

20  
21 If revised as suggested in the EPA review and as detailed in the specific points below, the  
22 research described in these three protocols is likely to meet the applicable requirements of 40  
23 CFR part 26, subparts K and L.

24  
25 HSRB Detailed Recommendations and Rationale

26  
27 A. Clarifications Required (such clarifications would also be subject to IRB review).

- 28  
29 1. *The Local Site Coordinator, the Principal Field Investigator, the Field Facility, the*  
30 *Analytical Facility, and the Principal Analytical Investigator must be identified in the*  
31 *protocol. Any key members of the research team who will have contact with the research*  
32 *subjects or their identifiable data must receive and document their recent (not expired)*  
33 *training in human subjects protection.*

34  
35 Many training programs in human subjects protection issue certificates of completion  
36 indicating the date of issuance. Depending on the program, and the requirements of the relevant  
37 IRB, there may be policies relating to the frequency of training. Many certificates “expire” after  
38 two or three years, and in the U.S., the “best practice” standard is to require continual training or  
39 retraining at least every three years. It is important for the certifications of all key research  
40 personnel to be current.

41  
42 The specific identities of key research personnel have an impact on the assessment of the  
43 scientific validity of the research, which in turn relates to an ethical and regulatory assessment of  
44 the reasonableness of risks in relation to the potential benefits of research.

- 1        2. *Revise protocols to remove the inconsistencies in listing all three surrogate chemicals*  
2        *that have been reviewed.* Evaluation of risk-benefit must be informed by information on  
3        all surrogate chemicals involved.  
4
- 5        3. *Revise subject recruitment plan to specifically address the probability that subjects may*  
6        *also be growers.* Based on data from initial studies by AHETF, subjects can be workers  
7        or growers. The recruitment plan is directed toward recruitment of workers. Information  
8        should be provided on whether any additional considerations must be given to ethical  
9        recruitment of growers.  
10
- 11       4. *Remove risks of agricultural work from the listing of risks related to the research.* The  
12       agricultural work itself is not part of the research. Thus the risks associated with that  
13       work are unrelated to research and should be removed from this and all future discussions  
14       of research risks or risk-benefit relationship.  
15
- 16       5. *Identify risks of pesticide products that are due to scripting.* Working with the pesticide  
17       products is not part of the research. However the scripting that is done for the purpose of  
18       the research may produce exposures to higher concentrations or longer durations, which  
19       are incremental risks of the research. These are the risks associated with the research.  
20
- 21       6. *Revise the IRB application to indicate expected ethnic/racial distribution specific to the*  
22       *location in which the study will be conducted.* The ethnic/racial distribution indicated on  
23       all IRB applications is identical for all studies submitted. This is unlikely as the research  
24       will take place at sites in California, New York, and Oklahoma.  
25
- 26       7. *Answer question 17 in the IRB application, and submit a Data Safety Monitoring Plan*  
27       *Form as required by IIRB.* Question 17 asks if risk is minimal or greater than minimal.  
28       This question is not completed on any of the applications. If greater than minimal, the  
29       IRB application requires attachment of “a Data Safety Monitoring Plan Form that  
30       includes procedures for monitoring the progress of the trial and the safety of the subjects,  
31       reporting adverse events (AEs) and ensuring data accuracy and protocol compliance.”  
32       Because this study is greater than minimal risk (the major risk being heat exposure due to  
33       the long underwear), such form should be submitted to the IIRB, even if all of the items  
34       requested in the form are found elsewhere in the study protocols.  
35
- 36       8. *Revise the description of the consent process to indicate how bilingual witnesses are*  
37       *going to be recruited and the amount of remuneration, as referenced in the recruitment*  
38       *standard operating procedures.* This information is critical to assess whether or not the  
39       consent process is conducted in a manner to minimize potential coercion or undue  
40       influence of Spanish-speaking subjects. One suggestion is to recruit a bi-lingual farm  
41       worker advocate or other community representative to serve in this role.  
42
- 43       9. *Revise the section of the recruitment SOP that relates to recruitment and enrollment of*  
44       *illiterate or low literacy subjects.*  
45

1 While an excellent attempt to address this issue has been made, there are aspects with which the  
2 HSRB is uncomfortable. The Board recommended that AHETF consult with farm worker  
3 advocacy groups on this issue. The SOP states that “reading ability ... will be ascertained by the  
4 person obtaining consent by asking the potential subject to read a portion of the consent form out  
5 loud.” This can lead to embarrassment of a low literacy or illiterate person. In addition, subjects  
6 are asked to identify if they cannot read. Subjects may be hesitant to disclose illiteracy, and may  
7 feel shame at their condition. By relying more on the consent *process* than the *form*, the ability to  
8 read competently becomes less important, and then embarrassment and shame do not become  
9 risks associated with the research.

10  
11 Also, the recruitment SOP states that if the researcher is not comfortable with the  
12 potential subject’s level of literacy then “the Study Director will also verify that the worker has  
13 apparently understood the materials read to and discussed with them by asking specific questions  
14 to assess comprehension (see Sec. 7.10.a).” The Board recommended clarify how the test of  
15 comprehension will be used for those who are judged literate and non-literate. Sec. 7.10.a  
16 suggests that all participants will undergo tests of comprehension but earlier sections are unclear  
17 (e.g., Sec. 6.5a and 6.5c)

18  
19 B. Clarifications needed prior to study implementation

- 20  
21 1. *Explain why the IRB review of one protocol out of three was in a table, and why*  
22 *communication from IIRB to the investigator was not in writing.* IRB communication  
23 includes a “note to file” from the principal investigator that IRB review of AHE57 was  
24 initially tabled, but not AHE58 or AHE59. The Board requested that the IRB provide  
25 this communication in writing.  
26  
27 2. *Describe how individual level data will be presented to the subject upon request.*

28  
29 Several issues are raised with this point. How will the data be framed or translated to the  
30 worker? As an example, how will the AHETF work to prevent workers from changing future  
31 behavior to their own detriment if their individual risk levels are lower than the average of all  
32 workers. The HSRB felt that consideration must be given to the ways in which data could be  
33 used or misused by the individual subjects. For example, a worker who finds out simply that  
34 his/her individual exposure levels were less than the group average may feel that s/he can be less  
35 cautious in the future (i.e. behavioral disinhibition), thereby putting him/herself at greater risk.

36  
37 C. Modifications to informed consent form prior to study implementation (and subject to IRB  
38 review)

- 39  
40 1. *Harmonize enrollment criteria (inclusion, exclusion) between the protocol and consent*  
41 *form.* Providing potential subjects with the most accurate and informative information  
42 allows them to make the best decision about participation.  
43 2. *In the consent form, replace “regular working hours” with the specific hours for the time*  
44 *zone in which the research will take place.* Since the research is being conducted in  
45 locations that may be in different time zones than the IIRB, the term “regular working  
46 hours” is not informative to the subjects.

- 1 3. *Revise the consent form with the underlined word: “you may refuse medical treatment.*  
2 *However, you cannot refuse medical treatment if you get sick from too much exposure to*  
3 *pesticides.....”* As is, these two sentences appear contradictory. Adding “however”  
4 corrects the apparent contradiction.
- 5 4. *Revise the forms (consent forms, product risk statements, recruitment materials) that have*  
6 *been translated into Spanish.* Spanish translations should be written in common, correct,  
7 simple Spanish.
- 8 5. *Revise the consent form to identify who makes the determination that an injury is study-*  
9 *related.* Providing potential subjects with the most accurate and informative information  
10 allows them to make the best decision about participation.
- 11 6. *Revise attestation statement for witness on consent form to eliminate subject’s*  
12 *understanding or accuracy of the consent process.* A witness cannot honestly attest to  
13 subject’s understanding or accuracy of the consent process. The witness can only attest  
14 that the consent process was consistent with consent form.
- 15 7. *Revise consent form’s attestation statement of person obtaining consent: to “I conducted*  
16 *the private consent meeting with the worker named above and confirm that consent was*  
17 *given voluntarily after the participant was fully informed of all of the information stated*  
18 *above, including the procedures, risks, and benefits of the research.”* There is more that  
19 the researcher should have discussed with the potential subject than benefits, risks and  
20 procedures. In addition, the procedures and risks should precede the benefits in the  
21 discussion.
- 22 8. *Confirm and clarify in informed consent that compensation for research-related injury*  
23 *includes any co-pay.* Subjects in this type of study should not have to assume any out-of-  
24 pocket expenses related to treatment for research-related injury.

#### 26 D. Points to Consider

- 27
- 28 1. *Consider revising Product Risk Statements to indicate which sign and symptoms are due*  
29 *to use that follows the product label, and which are due to overdose or massive spills or*  
30 *excessive exposure beyond what is expected to occur in the research.*

31  
32 There was not consensus among HSRB members as to whether or not signs and  
33 symptoms of overdose or massive spills or excessive exposure beyond what is expected to occur  
34 in the research need to be included in the Product Risk Statements. Some members felt that since  
35 these risks are part of the risks of the agricultural work rather than the research, they should not  
36 be included. Others felt that the additional information would be helpful to potential subjects,  
37 and that education about pesticides and their exposure risks could be considered a benefit for  
38 individual study participants.

39  
40 The Board agreed with EPA’s proposal to use generic product information sheets based  
41 on the active chemical(s) rather than specific products. This would simplify paperwork and  
42 decrease the probability of error.

- 43
- 44 2. *Define the term “sufficient” when used in the inclusion criterion “sufficient*  
45 *experience”.* Use of a subjective term in the protocol increases the probability of  
46 inconsistent subject populations.

- 1  
2 3. *Revise wording of eligibility criterion that states “Confirm that you normally wear the*  
3 *personal protective equipment (PPE) listed on the Product Risk Statement. Confirm that*  
4 *you will follow label directions.”*  
5

6 By asking potential subjects to “confirm”, it is unlikely that the subject will say that they  
7 do not normally wear PPE or follow label directions. The inclusion criterion could be worded by  
8 deleting “confirm that you” and begin that criterion with “usually”. Likewise number 3 should  
9 delete “confirm you do”. Then in the screening process, potential subjects should be asked an  
10 open-ended question like “what types of protective gear do you usually wear.”  
11

12 On page 45 of the OCAB protocols, there are clearly articulated program requirements for  
13 use of minimal PPE. The OCAB protocol, for example, states:  
14

15 AHETF will employ patches inside and outside the hat so potential exposure determinations can  
16 be made for products not requiring a hat. Therefore, the desired PPE and clothing situation for  
17 this scenario is:  
18

- 19 ▪ Long pants and long-sleeved shirt
- 20 ▪ Chemical-resistant gloves (new, provided by AHETF)
- 21 ▪ Any footwear that are required by the label or that the workers choose to wear (as
- 22 ▪ long as they are consistent with the WPS)
- 23 ▪ Any eyewear required by the label or desired by the worker (except full face
- 24 ▪ shields that would prevent face exposure)
- 25 ▪ Any respiratory protection required by the label or desired by the worker (except
- 26 ▪ full face respirators which would prevent face exposure)
- 27 ▪ Any Chemical-resistant hats (new, provided by AHETF)
- 28

29 As these are exclusionary criteria, in order to collect exposure data for workers using  
30 minimal PPE, Task Force researchers should be careful that they are not recruiting participants  
31 who agree to use less PPE than normal in order to receive payment. By asking open-ended  
32 questions such as “what types of protective gear do you normally wear,” researchers will be able  
33 to obtain an unbiased assessment of potential participant’s normal practices and exclude those  
34 who use PPE that would potentially bias the exposure data collected.  
35

- 36 4. *Add to the protocol some provisions for counting and reporting the number of potentially*  
37 *eligible workers linked to each grower, the number of potential subjects attending initial*  
38 *group meetings, number attending individual consent interviews, number consenting to*  
39 *participation, number subsequently withdrawing or being withdrawn (with the reason for*  
40 *withdrawal) and number completing the study.*  
41

42 These data can provide evidence of equitable subject selection, a regulatory and ethical  
43 requirement. In addition, it is only through these numbers that any assessment can be made as to  
44 the representativeness of the study population, and to the generalizability of the data.  
45

## 46 **2. Assessment of AHETF Pesticide Handler Protocols: Open-Cab Airblast Scenario**

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Overview

The three proposed field study protocols are similar to those the Board reviewed for the closed cab airblast scenario, modified to monitor additional exposure, especially to the head, resulting from use of open cab equipment. The Agency has concluded that a previous AHETF study, AHE-07A, conducted before promulgation of EPA’s human research rule, provided 15 monitoring units that met contemporary standards of scientific validity and then-prevailing standards of ethical conduct. The Agency proposes to use the data from this earlier study in its generic database, and to supplement it with 15 more monitoring units, obtained through three additional field studies. The HSRB has not been provided with details or data from this prior study.

**Charge to the Board**

Science

If proposed open-cab airblast application field study protocols AHE62, AHE63, and AHE64 are revised as suggested in EPA’s reviews, and if the research is performed as described: Is the research likely to generate scientifically reliable data, useful for assessing the exposure of handlers who apply liquid pesticides using airblast equipment drawn by vehicles with open cabs?

**Board Response to the Charge**

HSRB Recommendation

If the proposed open-cab airblast application field study protocols are revised as suggested in EPA’s reviews, and data collection and design weaknesses are modified as detailed below, then the research is likely to generate scientifically reliable data, useful for assessing the exposure of handlers who apply liquid pesticides using airblast equipment drawn by vehicles with open cabs. However, the Board has not reviewed the procedures used for the pre-rule existing data and cannot evaluate whether combining these studies and existing data is scientifically justified. The Board concluded that a more even distribution of monitoring units across the five proposed categories of active ingredient handled would strengthen the design and provide greater insight into the question of proportionality. The Board recommended that once the study is completed the Agency formally evaluate whether combining the datasets is appropriate. Finally, as the Board has stated throughout its review of these types of protocols, due to the limitations posed by the use of purposive sampling, small sample sizes, reduced range of exposures and representativeness of participating growers, the data will not meet the assumptions of most statistical analyses that rely on mean scores or continuous data. Interpretations of the usefulness of the data should recognize these limitations.

HSRB Detailed Recommendations and Rationale

For the open-cab airblast protocols the Board reiterated its recommendations already put forward for the closed-cab protocols. The Board had two additional concerns.

1  
2 1. The first concern focused on the intention to add the new data to existing data. The Board has  
3 not seen the pre-Rule open-cab airblast data that have already been collected, nor has it seen the  
4 protocols used to generate these data. The Board recommended that once the proposed protocols  
5 are completed, the data from the older and new studies should be evaluated to ensure that  
6 combining the datasets is appropriate. There may be unforeseen reasons why these data cannot  
7 be combined. If this were the case, the AHETF would need to collect additional open-cab  
8 airblast data to meet the sample size objective.

9  
10 2. The second concern focused on the AHETF plan to distribute the 15 new monitoring units  
11 evenly across five categories of pounds of active ingredient handled (5-9; 10-17; 18-30; 31-55;  
12 56-100). The existing open-cab dataset consists of 15 monitoring units: one in the middle  
13 category, and seven in each of the top two categories. The current plan will result in a monitoring  
14 unit distribution of 3, 3, 4, 10, and 10 across the five categories. The Board was not able to  
15 ascertain the rationale for this distribution. The Board concluded that to gain greater insight into  
16 the question of proportionality the final number of such units per scenario should be similar, and  
17 that sufficient numbers of new MUs in each scenario be collected to compare old and new.

#### 18 Ethics

#### 19 **Charge to the Board**

20  
21  
22  
23 Is the research likely to meet the applicable requirements of 40 CFR part 26, subparts K  
24 and L?

#### 25 **Board Response to the Charge**

#### 26 HSRB Recommendation

27  
28  
29  
30 If revised as suggested by the Agency review and Board suggestions, the research  
31 described in these three protocols is likely to meet the applicable requirements of 40 CFR part  
32 26, subparts K and L.

#### 33 HSRB Rationale

34  
35  
36 The Board considered the comments and concerns that had been provided for the closed  
37 cab protocols highlighted earlier to be applicable to the open cab protocols as well.

### 38 39 40 **3. Assessment of Completed Carroll-Love Biological Research Picaridin-Based Mosquito** 41 **Repellant Efficacy Study LNX-001**

#### 42 Overview of the Study

43  
44  
45 LNX-001 was a field-based study of repellency to mosquitoes of two conditionally  
46 registered products (one lotion and one pump spray) containing 20% picaridin; these two

1 formulations are KBR 3023 All-Family Insect Repellent Cream (EPA Reg. No. 39967-50) and  
2 KBR 3023 All-Family Insect Repellent Spray (EPA Reg. No. 39967-53). It was conducted by  
3 Carroll-Loye Biological Research of Davis, CA between May 14th and June 15th, 2008. The  
4 study was sponsored by LANXESS, Inc. of Pittsburgh, PA. The study was required by EPA to  
5 support registration of these two products.  
6

7 As submitted to the EPA, the completed study consisted of two interdependent analyses:  
8 1) a dosimetry study designed to determine the amount of lotion or spray that typical users would  
9 typically apply; and 2) an efficacy study designed to measure the effectiveness of each  
10 compound as repellent for those species of mosquitoes likely to be vectors for West Nile Virus  
11 (WNV) in the United States. The efficacy study was conducted at two environmentally distinct  
12 field sites in Butte and Glenn Counties, CA. Each phase included 10 participants (5 female and 5  
13 male). Two experienced participants (1 male and 1 female) served as untreated controls to  
14 measure ambient mosquito pressure. Based on the findings of the dosimetry phase, it was  
15 determined that the margin of exposure (MOE) for dermal toxicity at the highest dose level (seen  
16 with use application of lotion on the arms) was about 266.  
17

18 The efficacy of each formulation as a mosquito repellent was determined by measuring  
19 the ability of the formulations to prevent mosquito landings (defined as “Lite with Intent to  
20 Bite”; LIBe). During the field study, treated participants and untreated controls exposed their  
21 limbs to mosquitoes for one minute at fifteen-minute intervals, for 10 hours (40 exposure  
22 periods) post-treatment or until failure of efficacy, whichever occurred first. Failure of efficacy  
23 was defined as the two confirmed LIBes within a single exposure period, or a single LIBe within  
24 each of two consecutive exposure periods. Participants worked in pairs to facilitate identification  
25 of LIBe and to aspirate mosquitoes during exposure periods. No actual bites were reported, and  
26 aspirated mosquitoes were stored for later identification and arboviral testing.  
27

28 Statistical analyses performed included: Mean “Complete Protection Time” (CPT) for  
29 the pump spray formulation was 11.6 h at both field sites; Mean CPT for the lotion was  $\geq 14$   
30 hours at the Butte County site and 13.5 hours at the Glenn County site.  
31

## 32 Science

### 34 **Charge to the Board**

35  
36 Is the CLBR study LNX-001 sufficiently sound, from a scientific perspective, to be used  
37 to assess the repellent efficacy of the tested formulations against mosquitoes?  
38

### 39 **Board Response to the Charge**

#### 41 HSRB Recommendation

42  
43 The data collected in the Carroll-Loye Research study LNX-100 is sufficiently sound,  
44 from a scientific perspective, to be used to assess the repellent efficacy of the tested formulations  
45 against mosquitoes. However, the calculation of Mean “Complete Protection Time” is

1 inappropriate for censored data and the Agency should not rely on this aspect of the data analysis  
2 to assess the repellent efficacy of the tested formulations.

#### 3 4 HSRB Detailed Recommendations and Rationale

- 5  
6 1. Overall the study was conducted according to the approved protocol. There were some  
7 minor deviations, but these did not affect the quality or validity of the scientific findings.

8  
9 One deviation was the use of historical limb measurement data (within the past 2 years)  
10 instead of taking new measurements on subjects who had previously participated in similar  
11 studies with Carroll-Loye Biological Research; since it is unlikely that limb measurements would  
12 have changed significantly in this period of time for those participants who indicated that they  
13 had not changed weight appreciably during the interval since the previous measurements, the  
14 historical measurements would have been accurate.

15  
16 The second deviation was the recording of an average start time instead of a precise start time  
17 for each individual participant in half of the study; because the range of start times was such a  
18 small fraction of the total protection time, this average would not have affected the results  
19 substantively.

- 20  
21 2. Improvements to the statistical analysis would enhance the value of the results.

22  
23 When the data are heavily censored, as is often the case in arthropod repellent studies, the  
24 use of the Kaplan-Meier method is problematic. If censored values are replaced by the time of  
25 censoring, the estimated mean is biased downward, and the standard deviation is under-  
26 estimated. The downward bias of the mean tends toward a more conservative result, but under-  
27 estimating the standard deviation may lead one to assume more confidence in the results than  
28 should be given. It is not appropriate to return to the power analysis conducted prior to the study  
29 as a foundation for drawing conclusions.

30  
31 In its use of the data the Agency should consider the potential use of either maximum  
32 likelihood methods for estimation of the mean and variance in the presence of heavy censoring  
33 or estimation of the proportion of the population having protection times of at least a pre-  
34 specified number of hours should be considered as alternatives to those currently used to analyze  
35 the data. The suggestions for statistical analysis provided in the June 2008 HSRB report would  
36 enhance the value of the results.

#### 37 38 Ethics

#### 39 40 **Charge to the Board**

41  
42 Does available information support a determination that study LNX-001 was conducted  
43 in substantial compliance with subparts K and L 40 CFR Part 26?

#### 44 45 **Board Response to the Charge**

1 HSRB Recommendation  
2

3 The Board concurred with the Agency’s assessment that the study submitted for review  
4 was conducted in substantial compliance with subparts K and L of 40 CFR 26.  
5

6 HSRB Detailed Recommendations and Rationale  
7

8 The documents provided by Carroll-Loye (Carroll 2008a, 2008b) state that each study  
9 was conducted in compliance the requirements of the US EPA Good Laboratory Practice  
10 Regulations for Pesticide Programs (40 CFR 160). Additional regulations – 40 CFR 26 subparts  
11 K and L; FIFRA § 12(a)(2)(P); and the California Code of Regulations Title 3, Section 6710 –  
12 are also applicable. The study was reviewed and approved by a commercial human subjects  
13 review committee, IIRB, Inc.. Documentation provided to the EPA by IIRB, Inc. indicates that it  
14 reviewed these studies pursuant to the standards of the Common Rule (45 CFR Part 46, Subpart  
15 A) and found them in compliance.  
16

- 17 1. The Board concurred with the conclusions and factual observations of the ethical  
18 strengths and weaknesses of the study, as detailed in the EPA’s Science and Ethics  
19 Review (Carley 2008).  
20
- 21 2. The Board concluded that this study met all applicable ethical requirements for research  
22 involving human participants, in accordance to the following criteria:  
23
  - 24 a. *Acceptable risk-benefit ratio.* The risks to study participants were minimized  
25 appropriately and were justified by the potential societal benefits, particularly data on the  
26 efficacy of these new formulations as personal insect repellents.  
27
    - 28 i. Minors and pregnant or lactating women were excluded from participation, with  
29 pregnancy confirmed by self-administered pregnancy testing on each “day of  
30 study”. The potential of stigma resulting from study exclusion was minimized by  
31 enrolling three ‘alternate’ participants, allowing volunteers to withdraw or be  
32 excluded without compromising confidentiality.  
33
    - 34 ii. Based on toxicological data currently available for picaridin, study participants  
35 were unlikely to be at risk of adverse side effects with exposure. One 28-year-old  
36 male study participant reported severe itching around the face and neck during a  
37 field efficacy trials, but this was a localized reaction distance from the site of  
38 repellent application, immediately treated, and later determined by the researchers  
39 and IIRB, Inc. as likely unrelated to product use.  
40
    - 41 iii. The study was designed to minimize the likelihood of insect bites, but when they  
42 occur are usually mild and readily treated with steroidal creams. The study  
43 excluded individuals with a history of severe reactions to bites  
44
    - 45 iv. Finally, the field-based trials were conducted only in areas where known vector-  
46 borne diseases like WNV had not been detected by county and state health or

1 vector/mosquito control agencies for at least one month. Mosquitoes collected  
2 during the field studies also were subjected to molecular analyses to confirm that  
3 they were free of known pathogens.  
4

5 *b. Voluntary and informed consent of all participants*  
6

- 7 • The study protocol included several mechanisms designed to minimize coercive  
8 recruitment and enrollment. Monetary compensation was not so high as to unduly  
9 influence participation.  
10
- 11 • Several minor protocol deviations occurred. As reported to IIRB, Inc. and to the  
12 Agency, these appear to have been unintentional and are unlikely to have placed  
13 study participants at risk or to have compromised significantly the informed  
14 consent process. For example, Carroll-Loye researchers failed to countersign  
15 promptly two informed consent documents. In both cases, participants  
16 appropriately were listed as screen failures and then re-screened, re-consented,  
17 and re-enrolled.  
18
- 19 • Contrary to the HSRB-reviewed (EPA HSRB 2007) and IIRB-approved protocol,  
20 Carroll-Loye researchers also used previously recorded limb measurements,  
21 rather than collect physical data from all trial participants. This deviation occurred  
22 inadvertently when a Carroll-Loye researcher, acting upon an EPA suggestion  
23 that use of archival limb measurements was scientifically valid and would  
24 minimize study procedure invasiveness, implemented this protocol change  
25 without consulting Carroll-Loye management or IIRB, Inc. The likely result of an  
26 error in communication, this deviation again did not place study participants at  
27 increased risk or compromise the informed consent process.  
28

29 **Comments on Guidelines for Product Performance Testing of Skin-Applied Insect**  
30 **Repellents**

31  
32 Overview  
33

34 In order to improve the quality and reliability of data submitted to the Agency, EPA  
35 issues non-binding guidance documents, referred to as “Test Guidelines,” describing the  
36 scientific methodology recommended by EPA to develop data required to support applications to  
37 register pesticide products. EPA’s test guidelines typically contain detailed information about  
38 many aspects of the study design – for example, the test material, the use of control groups, the  
39 nature and number of data points, and the content of study reports.  
40

41 The Agency has been working to revise its Product Performance Test Guidelines OPPTS  
42 810.3700: Insect Repellents for Human Skin and Outdoor Premises since it was published as a  
43 “public draft” in December 1999. A revised draft addressing only repellents for human skin was  
44 presented to and discussed by the HSRB in June, 2006. Since then the HSRB has reviewed and  
45 commented on numerous proposals for insect repellent efficacy studies and several reports of  
46 completed studies. Over the course of these reviews the Board has made many suggestions for

1 strengthening the scientific and ethical conduct of this kind of research, and has encouraged EPA  
2 to further revise and publish its guidelines for researchers considering this type of study.

3  
4 EPA has extensively revised its insect repellent efficacy test guideline in response to  
5 many helpful suggestions from the HSRB and others. This new guideline of September 23, 2008  
6 contains many new sections addressing the ethical considerations affecting the design and  
7 conduct of repellent efficacy studies. EPA has also expanded and revised the sections dealing  
8 with scientific aspects of this kind of study.

9  
10 EPA will soon announce in the Federal Register the availability of the new draft of the  
11 guideline. The Agency plans to designate the new version as an “interim guideline” for  
12 immediate use by investigators, but subject to further refinement in light of future comments  
13 from the HSRB and the public.

#### 14 15 16 HSRB Evaluation

17  
18 While the Board was not provided a charge for consideration on the guidelines, it did  
19 have several comments to enhance the utility of the document. The Board noted that  
20 improvements in insect repellent protocols would be derived from portions of the guidelines that  
21 the document well written and clear. The Board appreciated the inclusion of landings as well as  
22 bites as an endpoint. However, as noted in previously by the Board, it encourages the Agency to  
23 consider landings as the preferred endpoint.

24  
25 The Board expressed serious concerns that if the erroneous assumptions and inconsistent  
26 statements regarding the statistical analysis plan are not corrected, investigators following the  
27 guideline recommendations would develop scientifically unreliable protocols. The Board  
28 underscored that it would evaluate protocols submitted for review to the HSRB based on  
29 appropriate statistical assumptions and analytic plans and on that basis might recommend  
30 rejection of a protocol that followed those elements of the Guidelines that were incorrect.

31  
32 Below sections relevant to protocol design and statistical analysis that the Board  
33 recommends should be revised prior to publication are highlighted:

- 34  
35 a. On page 9, it was stated that “standard deviations around point estimates of  
36 relative protection (based on percent reduction in number of bites) are likely to  
37 follow a Poisson model.” The number of bites may be a Poisson distributed  
38 random variable, but neither the standard deviations nor the percent reduction in  
39 number of bites would be anticipated to have that distribution.
- 40  
41 b. Also on page 9, it is stated that the best manner to randomize is by use of a  
42 random number table. Although this is an acceptable method, it is not necessarily  
43 best. Random numbers can be generated on a calculator or computer. Some  
44 programs do this randomization. It would be better to stress the need for  
45 randomization without dictating the method.
- 46

- 1 c. The statistical analysis plan section as presented on page 10 raised a question by  
2 the Board. If the response is the complete protection time, the distribution is  
3 unlikely to be normal. Although a transformation is one possible approach of  
4 accounting for non-normality, generalized linear mixed models could also be  
5 applied appropriately in this setting and should be included as a potential method  
6 of analysis.  
7
- 8 d. On page 27, it is first stated that field tests should be conducted in two distinct  
9 habitats where the predominant mosquito species are different. Then it was noted  
10 that the study could be “repeated in different locations within the same habitat, or  
11 in the same location more than once, on different days, using the same subjects to  
12 minimize variability.” It should be clarified that repeating in the same location  
13 does not remove the need to use two distinct habitats.  
14
- 15 e. In these studies, a large proportion of the observations are censored, making the  
16 statistical analysis more challenging, and some guidance on appropriate methods  
17 should be given. If censored values are replaced by the time of censoring, the  
18 estimated mean is biased downward, and the standard deviation is under-  
19 estimated. The downward bias of the mean tends toward a more conservative  
20 result, but under estimating the standard deviation may lead one to assume more  
21 confidence in the results than should be given. Thus, it is not appropriate to set a  
22 confidence interval that uses the time at censoring to represent all censored  
23 responses, ignoring the censored nature of the data. The use of maximum  
24 likelihood methods that account for the censoring of the values to obtain estimates  
25 for the mean and standard deviation is appropriate. These are iterative methods  
26 that must converge to obtain the estimates of mean and variance. Convergence  
27 will not be obtained if none of the study participants have a confirmed bite before  
28 the study’s end. If one or two confirmed bites are observed, convergence may be  
29 obtained, but the estimates may still be unreliable. An alternative to estimating the  
30 mean is to estimate the proportion of the population for which the complete  
31 protection time exceeds the study duration. Some thought should be given to  
32 exactly what measure is most appropriate; mean protection time is unlikely to be  
33 the quantity that is of greatest interest.  
34
- 35 f. “Round Robin designs” were also suggested by the Board as a potential design  
36 when testing more than one product. The Round Robin designs may have all  
37 subjects having the same order of treatments, which would not be an appropriate  
38 design. Replicated Latin squares or similar designs might be useful ones to  
39 mention by name.  
40
- 41 g. Although differences in location and date should be accounted for in an analysis,  
42 this should not be referred to as blocking as occurred several times in the  
43 document. These may be referred to as stratifying variables. If the same subject  
44 is used in different habitats, locations, dates, or treatments, then the appropriate  
45 blocking variable is the subject. Because the efficacy for more than one mosquito

1 species is to be evaluated, the potential differential effects of the repellent should  
2 be considered.

- 3
- 4 h. Finally, in the field study guidance, it is suggested that the subjects work in pairs.  
5 Further, the subjects may engage in normal outdoor activities during testing. Is it  
6 possible for the subjects to engage in normal outdoor activities during testing and  
7 to still be able to accurately identify landings? Before this is accepted as part of  
8 the protocol, the effect of such pairings and activities on observation should be  
9 studied.

10

11 The Board also made recommendations regarding improvement of sections relevant to  
12 human subjects protections.

- 13
- 14 a. To improve the consistency and clarity of terms associated with bioethical principles  
15 articulated in the *Belmont Report*, the Agency should consider reframing those portions  
16 of the document appropriately with three headings: respect for persons, beneficence, and  
17 justice.
- 18
- 19 b. On page 11, the Agency downplays the importance of alternatives to research with  
20 human subjects by stating, “In general, the efficacy of skin-applied repellents can only be  
21 tested in research involving human subjects.” The human subjects protection importance  
22 and scientific value of methods that do not require intentional dosing of human subjects  
23 with appropriate examples should be equally emphasized.
- 24
- 25 c. The Agency should consider placing more emphasis on risk minimization for example:  
26 To minimize the risks posed by biting arthropods, the Agency may wish to require that  
27 any proposal to use bites as an endpoint in either field or laboratory studies be justified.  
28 On page 12, the list of proposed minimization procedures should read “and have a  
29 physician on call during testing.” Also, the document should set aside and/or emphasize  
30 the need for stopping rules, monitoring, medical management and post-study follow-up to  
31 monitor for delayed adverse events, particularly for studies that involved potential  
32 exposure to arthropod-borne illnesses.
- 33
- 34 d. On page 13 “The target population to which the results of repellent testing should ideally  
35 be *as generalizable as possible* to the population of repellent users”, the Agency should  
36 consider recommending that sponsors include an explanation and justification  
37 recruitment strategies that will not include appropriate representation of adults of various  
38 ages, sexes and ethnicities. Convenience sampling, recruiting difficulties, etc. should not  
39 be considered valid justifications.
- 40
- 41 e. Consider changing the text on page 14 to read, “If it is proposed, study protocols should  
42 clearly justify transporting study, participants to distant locations *and include a clear*  
43 *description of mechanisms to both prevent undue influence (i.e. offers of travel) and*  
44 *coercion (i.e. reluctance of participants to withdrawal once they have traveled to a*  
45 *distant site).*”
- 46

- 1 f. On page 15, when discussing the issue of language translation, it is important to use  
2 qualified translators and also ensure translations are at an appropriate reading level  
3
- 4 g. On page 21, the Agency should be explicit that any unanticipated adverse event should be  
5 reported, even if it is eventually determined that it is not related to product exposure or  
6 study participation.  
7  
8

### 9 **Clarification of Board Report Process**

10  
11 *Precipitating factor.* At the June 2008 public meeting the Board discussed a series of  
12 recommendations for improving the scientific value of the AHETF closed and open cab studies.  
13 Prior to the posting of and public meeting to finalize the June 2008 report, the Office of Pesticide  
14 Programs (OPP) wrote a memo to the Board stating that the Agency had approved the  
15 implementation of the studies based in part on their interpretation of Board discussion at the June  
16 meeting and interpretation of the Chair's minutes. The Board recognized the need for a more  
17 rapid turn around of its final report to avoid future confusion. The Board clarified its process for  
18 approving final recommendations and adopted a new report schedule and format.  
19

20 *Clarification of Board Report Process.* Since its inception, the HSRB DFO has stated that  
21 recommendations of the HSRB are not finalized until formal Board approval of a final report is  
22 completed at a public face- to- face or teleconference meeting. While Board discussion at each  
23 meeting serves as an important foundation for final recommendations, no formal consensus is  
24 taken at the meeting. The Chair's minutes reflect a summary of meeting discussions, but it is not  
25 approved by the Board nor is it a substitute for Board final consensus. Board members write the  
26 report after each meeting and take responsibility for integrating meeting materials and Board  
27 discussion into a summary of issues and recommendations. The draft report is then posted for  
28 public review. Additions, deletions, corrections and modifications to the final report are finalized  
29 at a public meeting that includes further opportunity for public comments and Board discussion,  
30 review and approval of the document.  
31

32 *Improving Report Format.* At the October 2008 meeting the Board adopted steps to  
33 complete its reports in more expeditious period of time while proving greater clarity of its  
34 recommendations. In its deliberations and subsequent report, whenever possible the Board will  
35 clarify which recommendations are directed to: (a) modifications that would enhance a  
36 scientifically sound design and analysis; (b) limitations that need to be considered in data  
37 analysis and interpretation of a scientifically sound design and; (c) modifications that are needed  
38 to ensure that the design and analyses are scientifically sound. The Board also agreed to make  
39 efforts to adopt similarly clarifying language for its ethics reviews.

1 **REFERENCES**

2

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8 Personal Insect Repellents (20% Cream and 20% Spray) with Mosquitoes under Field  
9 Conditions. MRID 47506401. Dated August 5, 2008. Unpublished study prepared by Carroll-  
10 Loye Biological Research.

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12 Carroll, S. 2008b. Supplementary Information for Mosquito Repellent Efficacy Report (Protocol  
13 LNX-001). Letter to John M. Carley transmitting supplemental correspondence between Carroll-  
14 Loye Biological Research and Independent Investigations Review Board, Inc., concerning LNX-  
15 001, with enclosures. Dated September 26, 2008. Unpublished letter prepared by Carroll-Loye  
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