EFFICACY TEST OF KBR 3023 (PICARIDIN; ICARIDIN) - BASED PERSONAL INSECT REPELLENTS (20% CREAM AND 20% SPRAY) WITH TICKS UNDER LABORATORY CONDITIONS

Data Requirement:	OPPTS 810.3700 US EPA
Author:	Scott P. Carroll, Ph.D.
Study Initiation Date:	26 July 2009
Experimental Start Date:	15 January 2010
Experimental End Date:	24 January 2010
Study Completion Date:	5 April 2010
Performing Laboratory:	Carroll-Loye Biological Research 711 Oak Avenue Davis, CA 95616
Laboratory Project ID:	LNX-003
Standards Applied:	U. S. EPA Good Laboratory Practice Regulations (40 CFR 160); 40 CFR 26 subparts K, L and M; FIFRA § 12(a)(2)(P); California State EPA Department of Pesticide Regulation study monitoring (California Code of Regulations Title 3, Section 6710).

Statement of No Data Confidentiality Claims
No claim of confidentiality is made for any information contained in this study on the basis of its falling within the scope of FIFRA 10(d) (1) (A), (B), or (C).

Company: LANXESS Corporation

Company Agent: Heather F. Collins

Title: Senior Regulatory Affairs Specialist

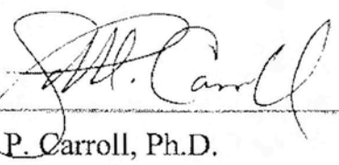
Date: 4/5/10

Signature: Heather F Collins

GOOD LABORATORY PRACTICE COMPLIANCE STATEMENT

Study Compliance for the final Carroll-Loye Biological Research Report for LANXESS Corporation entitled: EFFICACY TEST OF KBR 3023 (PICARIDIN; ICARIDIN) - BASED PERSONAL INSECT REPELLENTS (20% CREAM AND 20% SPRAY) WITH TICKS UNDER LABORATORY CONDITIONS

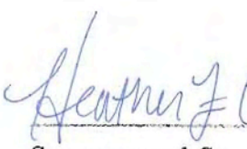
This study meets the requirements of U.S. EPA Good Laboratory Practice Regulations, Pesticide Programs (40 CFR 160), with the exception that individual human study subjects were not labeled as a means of identifying the Test System.



5 April 200

Scott P. Carroll, Ph.D.
Study Director

Date



4/5/10

Sponsor and Study Submitter
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Carroll-Loye Biological Research Personnel for Study LNX-003:

Scott Carroll, Ph.D.
Study Director – Oversight of the study, data analysis and interpretation, report authoring.

William K. Johnson, M.S.
Laboratory Director – Managing the application and observation technicians, preparing Test Materials for application, application of test materials, data recording and entry.

Shawn B. King, M.S.
Director of Operations – Managing and assisting other staff, logistics, communicating with QAU, application of test materials, guiding and observing subjects' tick handling, observing tick crossing events, report editing and production.

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Field and Logistics Manager – Logistics, environmental control, application of test materials, guiding and observing subjects' tick handling, observing tick crossing events.

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William Donahue, Ph.D.
Quality Assurance Unit.

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QUALITY ASSURANCE STATEMENT

Carroll-Loye Biological Research, GLP study for LANXESS Corporation, Protocol Number LNX-003 Entitled "Efficacy Test of KBR 3023 (Picaridin;Icaridin) – Based Personal Insect Repellents (20% Cream and 20% Spray) with Ticks under Laboratory Conditions" was inspected during various stages of the study. The data presented in the final report represent an accurate record of the raw data and the experimental findings. Records of results of facility inspections, study and final report audits are kept on file at Sierra Research Laboratories. The phases of the study inspected, dates and the findings were reported to the study director and management is as follows:

Phase Inspected	Date	Description
Protocol Review	20 January 2010	Protocol Review
Raw Data Audit (Dosemitry)	20-22 Jan, 2010	Partial Raw Data Audit
In-Life Inspection and Audit	23 January 2010	Test Day O – Test Substance Application and Efficacy Evaluations in the Lab – Data Collection
Letter to Management & Study Director	01 March 2010	Letter to C-LBR Management & Study Director
Raw Data Audit	25-28 March, 2010	Audit of Raw Data
Final Report Audit	25 Mar - 03 Apr, 2010	Final Report Audit and QAU Statement

William A. Donahue Jr. 03 April 2010

William A. Donahue, Jr., Ph.D. **Date**
Quality Assurance Unit

Information Summary for Final Report

This tick repellent study was commissioned by LANXESS Corporation to provide efficacy data for purposes of US/EPA registration. The test materials, based on the active ingredient Picaridin, were KBR 3023 All-Family Insect Repellent Cream (20% Cream) and KBR 3023 All-Family Insect Repellent Spray (20% Pump Spray).

KBR 3023 (Icaridin; Picaridin) is a synthetic repellent developed by the Bayer Corporation using molecular modeling techniques. From more than 800 substances, KBR 3023 showed the best repellent efficacy against a variety of arthropods (Boeckh, et al., 1996), along with desirable attributes regarding safety, low skin penetration, and compatibility with skin and plastic materials. It is now owned by Saltigo GmbH (LANXESS Group) and is managed in the USA by LANXESS Corporation (previously a Division of Bayer Corporation).

Nomenclature. Icaridin (US EPA Registration Name Picaridin, the current common name), was developed under the Code Name KBR 3023 and the registered trade name Saltidin™ (formerly Bayrepel™) and was sold under the Brand name Autan. The chemical name for Icaridin is 1-PIPERIDINECARBOXYLIC ACID, 2- (HYDROXY-ETHYL), 1-METHYLPROPYLESTER. However, the International Nomenclature of Cosmetic Ingredients (INCI) name was given as HYDROXY METHYL ISOBUTYL PIPERIDINE CARB. The product was submitted to US EPA under the common name Picaridin. However, the common name Picaridin was rejected by International Organization for Standards (ISO) as it was not considered a pesticide. The common name Picaridin was also rejected by World Health Organization/International Non-proprietary Name (WHO/INN), but the common name, Icaridin, was accepted by WHO/INN.

The study Protocol was reviewed and approved by Independent Investigational Review Board, Inc., and reviewed favorably by the US Environmental Protection Agency and its Human Studies Review Board, and by the California Environmental Protection Agency.

The KBR 3023 All-Family Insect Repellent Spray (20% Pump Spray) dosage rate of 0.97 μl/cm^2 on arms was taken from the related study LNX-001 (MRID 47506401). The KBR 3023 All-Family Insect Repellent Cream (20% Cream) dosage rate of 1.94 μl/cm^2 on arms was determined by pooling

dosimetry data from studies LNX-001 and LNX-002. Estimated dosing, relative to acute dermal toxicity limit dose in Picaridin (>2000 mg/kg, see MSDS), resulted in Margin of Exposure (MOE) values of 741 for the repellent cream and 1429 for the repellent spray. Both MOE values were deemed sufficient to permit prolonged dermal exposure of the subjects to the test materials during efficacy testing.

Efficacy was measured in a laboratory setting. For each of the two Test Materials, 5 female and 5 male subjects each exposed one treated arm to individual ticks of two species (*Dermacentor variabilis*, the American dog tick, and *Ixodes scapularis*, the deer tick) for one minute every 15 minutes until the Test Material failed or until cessation of the test. All individual ticks crossed on subjects' untreated arms immediately prior to exposure to their treated arms, indicating that the ticks were active and suitably challenging for the efficacy trial.

Under laboratory conditions, the repellent formulations provided substantial and prolonged protection against the two species of ticks. The mean Complete Protection Time (CPT)(±sd) for KBR 3023 All-Family Insect Repellent Cream (20% Cream) was 15.3±0.3 hours (range 14.5 to 15.5 hours) against *Dermacentor variabilis* and 12.6±4.3 hours (range 3.4 to 15.5 hours) against *Ixodes scapularis*. The mean CPT for KBR 3023 All-Family Insect Repellent Spray (20% Pump Spray) was 14.0±1.6 hours (range 11.4 to 15.5 hours) against *Dermacentor variabilis* and 14.1±1.8 hours (range 10.3 to 15.5 hours) against *Ixodes scapularis*.

In summary, the data indicate that LANXESS Corporation KBR 3023 All-Family Insect Repellents at 20% Picaridin concentration provided unusually long periods of Complete Protection against American dog ticks and deer ticks, and may therefore assist in reducing personal risk from the diseases they vector, including Rocky Mountain Spotted Fever and Lyme Disease, respectively.

1) Objective

The objective is to determine the duration and efficacy of the picaridin-based LANXESS Corporation insect repellent products KBR 3023 All-Family Insect Repellent Cream (20% Cream) and KBR 3023 All-Family Insect Repellent Spray (20% Pump Spray) when applied at a typical consumer dose, in repelling deer ticks (*Ixodes scapularis*) and American dog ticks (*Dermacentor variabilis*).

2) Protocol Reference

- Carroll-Loye protocol ID number and title: LNX-003, 'Efficacy test of KBR 3023 (Picaridin; Icaridin)-based Personal Insect Repellents (20% Cream and 20% Spray) with Ticks under Laboratory Conditions.'
- IRB: Independent Investigational Review Board Inc., Plantation, FL.
- IRB Approval date for protocol/Informed Consent Form: 2 Nov 2009.
- Human Studies Review Board review date for protocol: 21 Oct 2009.
- California Environmental Protection Agency approval: 16 Nov 2009.
- Amendment 1 30 October 2010, clarifies how the described experimental procedures apply to or include one, both, or either of the two tick species to be used in the test, how subjects are screened for attractiveness to the target tick species, and how stopping rules apply to the cessation of tick foraging activity. The Amendment is given in Appendix 8.
- Deviations from the protocol and their consequences are given in Appendix 8.

3) Test Materials

Hereinafter, the Cream 20% picaridin repellent product is referred to as 'Cream' and the Spray 20% picaridin repellent product is referred to as 'Spray'. Table 1 summarizes information about the test material(s) relevant to this study.

Table 1: Test Materials as referred to in this Protocol:

	Cream 20%	Spray 20%
Test Material name (Picaridin conc.)	KBR 3023 All-Family Insect Repellent Cream (20%)	KBR 3023 All-Family Insect Repellent Spray (20%)
Manufacturer	LANXESS Corporation	LANXESS Corporation
Lot Number/Batch ID	XKOC 00736	XKOC 00738
Manufacturing Standards Applied	Good Manufacturing Practice standards, with records available to EPA.	Good Manufacturing Practice standards, with records available to EPA.
Transport	Commercial Courier, express, insulated container	Commercial Courier, express, insulated container
Chain of Custody	Documented	Documented
Specific gravity	0.98	0.96
Delivery system	Lotion	Pump Spray
Active ingredient(s) (%)	Picaridin 20%	Picaridin 20%
Inert ingredients	Proprietary, available to US EPA	Proprietary, available to US EPA
Stability	Stable	Stable
Storage conditions specified	Room temperature, max 30° C (86° F)	Room temperature, max 30° C (86° F)
Storage conditions applied	Locking, closed cabinet at room temperature (19-23°C) protected from light and moisture sources	Locking, closed cabinet at room temperature (19-23°C) protected from light and moisture sources
Cosmetic properties	White cream	Clear solution
NOAELs for Picaridin	NOAEL = 200 mg/kg (dermal); 308 mg/kg (oral)	NOAEL = 200 mg/kg (dermal); 308 mg/kg (oral)
Irritation and sensitization class	(Picaridin) No irritant or sensitizing potential	(Picaridin) No irritant or sensitizing potential
Hazard label requirements	Substantial but temporary eye injury. Do not get in eyes. Wash thoroughly with soap & water after handling, returning indoors, and before eating, drinking, chewing gum, or using tobacco. Discontinue use and consult a doctor if irritation or rash occurs; Flammable.	Moderate eye irritation, avoid contact with eyes or clothing, wash thoroughly with soap & water after handling, returning indoors, and before eating, drinking, chewing gum, or using tobacco. Flammable.
Reference materials	Sample labels, Safety Data Sheets and Toxicology documents are given in Appendix 7, page 72-93	

4) Methods

a) Test Sites and Dates

Laboratory tests of repellent efficacy were conducted at Arthropod Behavior Laboratory at Carroll-Loye Biological Research on January 23 and 24, 2010.

b) Environmental Conditions

Ambient temperature (°C), relative humidity, and light intensity (lux) were measured at approximately 1-hr intervals in the laboratory where the efficacy study took place. Test Material storage temperature and humidity range were noted, as were temperature and humidity during handling for the test.

c) Human Study Subjects

A total of 23 subjects (20 Treated, 3 Alternates) participated in the study. They were selected randomly from a pool of 119 subjects. Their demographics are described in table 2.

Table 2. Demography of test subjects

	Pool	Participated (excluding Alternates)	Participated (including Alternates)
Male	*52%*	50%	48%
Female	*48%*	50%	52%
Caucasian	*72%*	55%	52%
Asian	*11%*	10%	9%
Hispanic	*9%*	10%	17%
African-American	*3%*	10%	9%
Middle-Eastern	*5%*	15%	13%

For each of the two Test Materials used for the repellent efficacy study, each of ten human subjects (5 female and 5 male for Cream; 5 female and 5 male for Spray) exposed a treated arm to ticks for repellent efficacy evaluation in the laboratory. A sample size of ten subjects was chosen to give a reasonably large statistical population size while avoiding exposing too many individuals to the minor but present risks associated with exposure to biting

arthropods. The subjects had the following attributes: they were18-55 years old, reported themselves to be in good physical condition, were not students or employees of the Study Director, did not believe themselves to be hypersensitive to tick bites or phobic of ticks, completed the consenting process including signing the IRB-approved Informed Consent Form, had not used repellents within 1 day prior to the repellency study, and refrained from using alcoholic beverages or perfumed products or smoking beginning at 9 PM the night before, and during, the test. Females were negative in pregnancy tests conducted immediately before they participated in efficacy testing, and stated that they were not lactating.

d) Ticks

Nymphal deer ticks (*Ixodes scapularis*) and nymphal American dog ticks (*Dermacentor variabilis*) are appropriate study animals because they are common and geographically widespread human pests, and are important vectors of pathogens causing such maladies as Lyme Disease and Rocky Mountain Spotted Fever in humans. These ticks may obtain the pathogens during larval feeding on wildlife, and then readily pass them to a human during the succeeding nymphal stage because their small size makes them difficult to detect while they are feeding.

This study did not test tick biting, and the risk of disease transmission during its conduct is judged to be extremely low. Nonetheless, to preclude the possibility of having infected ticks present in the laboratory, laboratory-reared, disease-free ticks were used. Nymphal ticks were obtained from the Centers for Disease Control and Prevention in Atlanta, Georgia. They were reared in all life stages on uninfected New Zealand white rabbits. Sera from those rabbits are routinely tested for antibodies against a number of rickettsial and bacterial agents after infestation with colony ticks, and representative samples of tick colonies are tested by PCR to ensure their uninfected status. Ticks were received on 7 January 2010 (used in subject training and screening for attractiveness to ticks) and 20 January 2010 (used in the repellent efficacy test) from CDC-Atlanta. The ticks were identified by the Laboratory Manager using keys and illustrations found in Durden and Keirans (1996) and Yunker et. al. (1986). Tick chain of custody, holding conditions, and identification are described in Appendix 7. Tick disease-free certification is given in Appendix 6.

e) Dosage determination and margin of exposure

The Spray dosage rate of 0.97 μl/cm^2 on arms was taken from dosimetry data and analysis reported in related study LNX-001 (MRID 47506401). The Cream dosage rate of 1.94 μl/cm^2 was determined by pooling data from study LNX-001 with additional dosimetry data collected as part of the related study LNX-002. Estimated dosing relative to the acute dermal toxicity limit dose of Picaridin (>2000 mg/kg, MSDS) resulted in Margin of Exposure (MOE) values that were deemed sufficient to permit prolonged dermal exposure of the subjects to the test materials during efficacy testing.

Despite the individual variation in dosing rate inevitable in actual consumer use, we used the same, average dosing rate in all subjects. The chief advantage of this approach is that it may guard against early failures in subjects who might otherwise "under-dose" for the test conditions. In consumer use, those who under-dose might be expected to re-apply repellent when protection fails, and to perhaps learn about adequate dosing from experience. That process cannot take place in standard repellent efficacy trials. Consequently, the average values from dosimetry studies were chosen as a reasonable approximation of sensible dosing behavior. However, a consequence of employing values from dosimetry is that the dosing rate differed between the products.

f) Test Materials and their application (see also Appendix 3 and Appendix 7)

Test Materials were received at CLBR on 1 October 2009, with Chain-of-Custody documented. They were stored at the Carroll-Loye Offices in a closed cabinet at room temperature (19-23°C, see Appendix 7) within specifications provided by the sponsor. Test Material custody and storage condition data, sample labels, Test Material container labels, Certificates of Analysis, Safety Data Sheets, and the toxicology profile for KBR 3023 are given in Appendix 7.

For blinding, the two Test Materials were coded 'A' and 'B' by a designated technician, who was then prohibited from judging crossing and repulsion events. Sealed physical and password-protected electronic keys to the Test Material identities were maintained for the duration of the repellency trial, to be opened by the Study Director only after the completion of the test or if needed for medical or legal reasons. This moderate level of blinding security

is deemed appropriate for a test in which the performances of the test materials are not specifically being compared with each other.

Treatments were stratified by gender and allocated at random within each gender excepting minor adjustments needed to constrain the number of subjects treated with each Test Material to 10. Individual doses were prepared for each subject on the basis of the surface area of their forearm skin. Before repellent was applied, subjects washed their forearms carefully with a fragrance-free cleanser in tap water, rinsed them with tap water and then rinsed them again with 35% ethanol in water, and then dried them with clean cotton towels. Repellent was then applied by CLBR technicians and staff, using 1 ml syringes (0.01 ml measurement increment) and one fingertip in a surgical glove, to spread the material as evenly as possible. For subjects with arms large enough to require doses exceeding 1 ml, the total dose was measured into, and dispensed from, two syringes.

The treatment allocation and dosing are given in Appendix 3.

g) Subjects' Exposure to ticks

- Exposure interval: 15 min.
- Exposure duration per interval: Approximately 3 min per tick species and per limb.
- Time between application and first exposure: up to 15 minutes
- 10 female subjects, numbers 4, 33, 37, 45, 47, 53, 60, 92, 99, 105
- 10 male subjects, numbers 14, 24, 41, 42, 52, 64, 67, 71, 104, 117

Ticks were held in plastic vials with a moist paper substrate. Vials with ticks had their lids removed and were placed in small trays from which ticks could not escape. Each vile was provided with a paper "tower" that extended beyond the top of the vial vertically, allowing ticks to move upward to the tip and extend hooked forelegs, typical host-seeking behavior. Subjects exploited that behavior by picking ticks up on small artist's paintbrushes and moving the ticks to their arms. Subjects had practiced procuring ticks in this way before the test.

In each exposure period ticks were first tested on the untreated arm to determine if they were sufficiently active in questing. To assist subjects in positioning ticks and in determining how far ticks walked, after application

of the Test Material, each subject was marked on the skin with three black dots from a Sharpie® permanent marker. On each arm, one dot was placed at the inner wrist (i.e., at the margin of the treated area), a second dot was placed 3 cm into the treated area in a line toward the elbow, and a third was placed in the opposite direction, 3 cm onto the palm.

Subjects worked in groups of 3-4, and initiated exposures together. To initiate an exposure, a subject used a paintbrush to lift a tick onto the palm dot of the untreated arm. To be included in subsequent repellent challenge during that exposure interval, each tick needed to be active in locomotion and to travel at least as far as the third (elbow-most) dot within 3 min of placement on the untreated arm. Ticks usually began walking shortly after they were placed on the palm. While the ticks were still on the palm and when necessary, the brush was then used very gently to guide, but not push or force, them in the direction of the elbow. They were allowed to remain on the hand or arm for three minutes after moving in the direction of the elbow. Ticks meeting that criterion (all did) were scored as 'crossing' on the untreated arm, and were immediately tested on the treated arm in like manner. Ticks that walked away from or parallel to the treated area, after having approached it or crossed into it less than 3 cm distance, were occasionally repositioned with the brush near the treatment a second or third time within an exposure period in order to clearly satisfy the scoring criterion for repulsion. Ticks that crossed into the material for a distance of at least 3 cm towards the elbow were scored as 'crossing' the treated arm.

Technical personnel monitored tick behavior during each exposure in each subject group and verified suspected crossings using the criteria above. Subjects and laboratory personnel used a large, highly visible wall clock to measure time. Each tick was employed in only a single exposure period, on a single subject. Discarded ticks were placed in vials in trays labeled 'Used' and periodically removed from the lab test area by technicians. Brushes that might have inadvertently contacted a Test Material during tick handling were replaced with new or cleaned ones. Brushes were cleaned in 50% ethanol in water and air-dried before re-use.

A stopping rule for exposures was invoked when a subject experienced a crossing following another in either of the two prior exposure periods. Subjects were withdrawn from further exposure to the crossing tick species when such an event occurred.

h) Data recording

Upon verification by an observing technician, a tick's apparent crossing of the plane bisecting the arm at the point indicated by the proximal dot within three minutes of placement on the treated limb was scored as a crossing. Ticks that did not cross were scored as repelled. Because most observations were unequivocal repulsions in which ticks sharply altered their direction of travel upon approaching within a few cm or mm of the Test Material or experiencing brief contact with the first few (less than 3 cm) of the treated area, there was little ambiguity regarding scoring in almost all cases. The verified scores were then recorded by the Laboratory Manager. Data from first exposures were recorded as taking place at 15 minutes after application.

i) Data Analysis

Data were entered into an Excel 2004 (Macintosh) spreadsheet for calculations of surface area and dosing means. Those means were double-checked with a handheld calculator. All descriptive statistics were generated with the software 'SAS JMP' Version 5.0.1.2 (SAS Institute, Cary NC).

We calculated Complete Protection Time (CPT) as the interval between application and the First Confirmed Crossing. The First Confirmed Crossing was defined as the first crossing that was followed by another crossing within one-half hour, i.e., within either of the subsequent two exposure periods. This measure is analogous to that of First Confirmed Landing, which is commonly used in measures of repellency to blood-feeding flies including mosquitoes. CPT measured in this way gives a single time value for each subject. The mean CPTs were calculated across all 10 subjects for each tick species and Test Material, and are presented herein with standard deviations and 95% confidence interval information. Kaplan-Meier CPT survival plots were also generated. Kaplan-Meier median CPT values were calculated only for Spray, due to a majority of right-censoring of Cream data against both tick species. In addition, we estimated the time until 25% failure for each test product against each tick species.

Data were pooled among test days within treatment. Test day was ignored as a variable because it was not of *a priori* interest; testing was conducted on

two days for logistical reasons and to better monitor individual subjects. Based upon environmental variables, the test days were similar.

5) Results

Margins of Exposure (MOEs) relative to the acute dermal toxicity limit dose of Picaridin (>2000 mg/kg, see MSDS) were estimated for the chosen dosage rates (Table 3). The model target subject was a 70 kg adult. The resulting MOE values were deemed sufficient to permit risking prolonged dermal exposure of subjects to the test materials during efficacy testing.

Table 3. Margin of exposure estimation for the Test Materials: mean grams of Test Material and active ingredient to be applied based on efficacy test subject limb surface areas, and the resulting exposure values.

Test material	Test Material applied (g)	Picaridin applied (mg)	Rate in 70 kg human (mg/kg)	Margin of exposure
KBR 3023 All-Family Insect Repellent Cream (20%)	0.96	192	2.7	741
KBR 3023 All-Family Insect Repellent Spray (20%)	0.50	100	1.4	1429

b) Environmental Conditions

Efficacy data were collected under suitable environmental conditions. Environmental conditions during laboratory exposures are summarized in Table 4. Environmental data are detailed in Appendix 5.

Table 4. Summary of laboratory temperature, relative humidity and light conditions on the two test days.

Date	Variable	Range
23 January 2010	Temperature	21-25°C
	Relative humidity	46-52%
	Light intensity	122-650 lux
24 January 2010	Temperature	22-24°C
	Relative humidity	47-53%
	Light intensity	57-260 lux

Test Materials were stored as specified, with measured minima and maxima of 19°C and 23°C temperature, and 30% and 50% relative humidity (RH). Conditions during handling for preparation of dosages were approximately 21°C / 46%RH on 23 January 2010 and 22°C / 52%RH on 24 January 2010. Additional details are given in Appendix 7.

c) Crossing Rate on Untreated Arms

All 2274 ticks used by subjects for testing the repellents were active in locomotion and met the questing criterion by traveling at least 6 cm toward the elbow on the untreated arm within 3 min.

d) Efficacy: Influence of Test Material on Probability of Tick Crossing

To better understand the results presented in this section, note that no statistical comparisons between results for the two tick species or the two Test Materials, are made or inferred in this report.

Subjects collected data until a Test Material failed against both tick species, or the test was formally concluded at 15.25 hours after the first exposure interval (on both test days) to avoid any safety and data quality risks associated with subjects becoming fatigued. The exception was one subject who chose to withdraw for reasons of tiredness on Test Day 1 at 14.75 hours after her repellent application.

In every case, ticks were strongly affected by the Test Materials, crossing in only a minority of cases (Tables 5-8; raw data are given in temporal sequence in Appendix 4). Repelled ticks changed their trajectory upon approach to a Test Material, either reversing direction, or sometimes circumambulating the wrist on untreated skin near the material, or, having walked onto the margins of treated skin, freezing in place, revolving in tight loops, or walking up a hair, before falling off the arm. Ticks that unambiguously reached or passed the three cm mark inside the treated area were scored as crossing even if they failed to traverse to the elbow, or ultimately reversed course or fell from the arm onto the lab bench.

Despite the comparatively long duration of exposure after application in this study, only a minority of subjects recorded failures, principally in the case of Spray.

Cream Efficacy

Cream protected subjects from crossings by *Dermacentor variabilis* for at least 14.5 hours. In testing against *Ixodes scapularis*, one subject experienced a confirmed crossing by 3.4 hours, but as with *Dermacentor*, most individual CPTs equaled the test's full duration. The average total number of crossings per subject was 2.0 or less.

Cream performance statistics are given in Table 5, with individual subject results detailed in Table 6.

Table 5. KBR 3023 All-Family Insect Repellent Cream (20%) efficacy against the tick species *Dermacentor variabilis* and *Ixodes scapularis*: Mean CPTs (hrs)(± sd), CPT 95% confidence intervals, times (*t*) to 25% failure, and mean number of crossings per subject.

Tick species	CPT mean (±sd)	95% CI	*t* to 25% failure	Mean crossings
D. variabilis	15.3±0.3	15.0-15.5	>15.4	1.6±2.0
I. scapularis	12.6±4.3	9.5-15.7	9.7	2.0±1.2

Table 6. KBR 3023 All-Family Insect Repellent Cream (20%) efficacy against the tick species *Dermacentor variabilis* and *Ixodes scapularis*: Complete Protection Times (CPTs) in hr (in descending order), whether a confirmed crossing (CC) occurred, and number of crossings, by subject.

Subject number	CPT	CC?	Total Crossings
Dermacentor variabilis			
60	15.5	No	0
14	15.5	No	0
45	15.5	No	0
53	15.4	No	1
67	15.4	No	4
99	15.4	No	0
92	15.4	No	0
52	15.4	No	2
42	14.8	Yes	5
64	14.5	Yes	4
Ixodes scapularis			
60	15.5	No	0
14	15.5	No	1
99	15.4	No	1
92	15.4	No	1
52	15.4	No	3
42	15.3	No	2
45	13.2	Yes	4
53	9.7	Yes	3
64	7.5	Yes	3
67	3.4	Yes	2

Kaplan-Meier survival plots for the repellency of KBR 3023 All-Family Insect Repellent Cream (20%) against *Dermacentor variabilis* and *Ixodes scapularis* are shown in Figure 1. Just two subjects received confirmed crossings by *D. variabilis*, and four did so by *I. scapularis*.

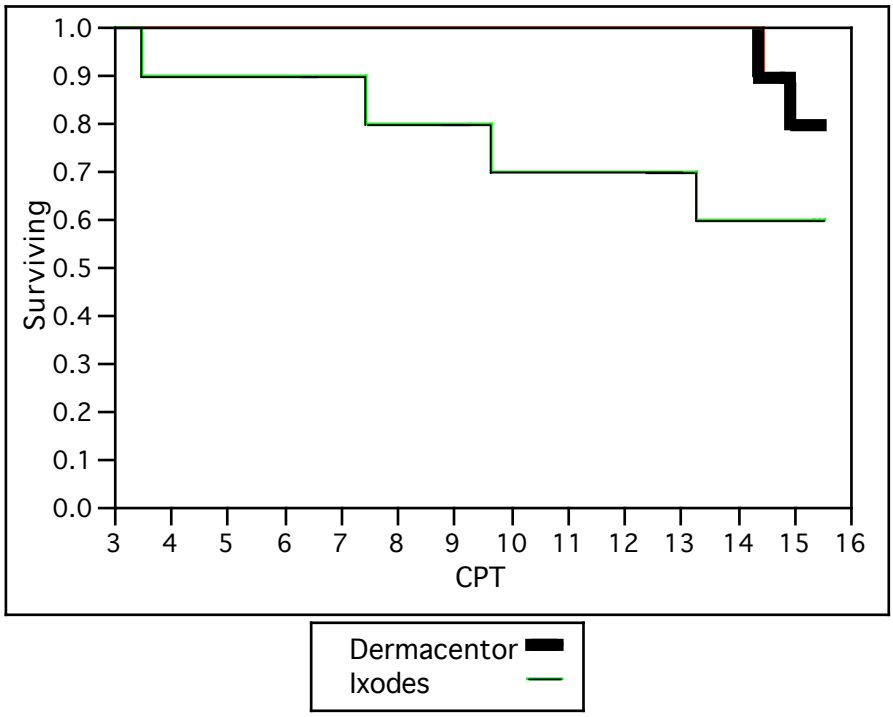

Figure 1. Survival plot of Complete Protection Time (CPT) for KBR 3023 All-Family Insect Repellent Cream (20%) against the tick species *Dermacentor variabilis* and *Ixodes scapularis*.

Spray Efficacy

Spray protected subjects from crossings by *Dermacentor variabilis* for a minimum of 11.4 hours and *Ixodes scapularis* for a minimum of 10.2 hours. KBR 3023 All-Family Insect Repellent Spray (20%) performance statistics are given in Table 7, with individual subject results detailed in Table 8.

Table 7. KBR 3023 All-Family Insect Repellent Spray (20%) efficacy against the tick species *Dermacentor variabilis* and *Ixodes scapularis*: Mean CPTs (hrs)(± sd), CPT 95% confidence intervals, Kaplan-Meier (K-M) median CPTs, times (*t*) to 25% failure, and mean number of crossings per subject.

Tick species	CPT mean (±sd)	95% CI	K-M median	*t* to 25% failure	Mean crossings
D. variabilis	14.0±1.6	12.8-15.2	14.1	12.0	1.2±1.4
I. scapularis	14.1±1.8	12.7-15.4	15.0	13.1	2.4±2.2

Table 8. KBR 3023 All-Family Insect Repellent Spray (20%) efficacy against the tick species *Dermacentor variabilis* and *Ixodes scapularis*: Complete Protection Times (CPTs) in hr (in descending order), whether a confirmed crossing (CC) occurred, and number of crossings, by subject.

Subject number	CPT	CC?	Total Crossings
Dermacentor variabilis			
47	15.5	No	0
105	15.4	No	0
37	15.4	No	0
104	15.3	No	0
33*	14.8	No	0
4	14.2	Yes	4
41	14.1	Yes	2
24	12.0	Yes	2
117	11.9	Yes	2
71	11.4	Yes	2
Ixodes scapularis			
47	15.5	No	0
105	15.4	No	0
37	15.4	No	1
104	15.3	No	0
4	14.9	Yes	4
33*	14.8	No	1
71	14.4	Yes	5
41	13.1	Yes	3
117	11.7	Yes	5
24	10.2	Yes	5

**Subject 33 withdrew 45 minutes before the trial was concluded.*

Kaplan-Meier survival plots for the repellency of KBR 3023 All-Family Insect Repellent Spray (20%) against *Dermacentor variabilis* and *Ixodes scapularis* are shown in Figure 2. Five subjects received confirmed crossings by each tick species.

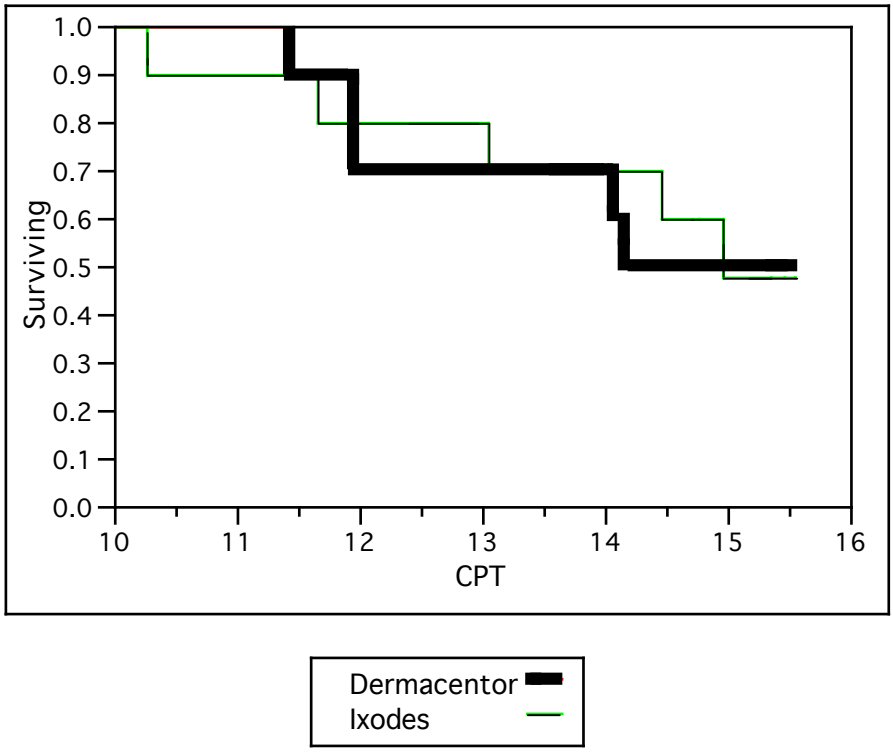

Figure 2. Survival plot of Complete Protection Time (CPT) for KBR 3023 All-Family Insect Repellent Spray (20%) against the tick species *Dermacentor variabilis* and *Ixodes scapularis*.

Spray protected absolutely from crossings by either tick species for more than 10 hours.

Conclusions

Under the test conditions, the repellent formulations provided substantial and prolonged protection against two species of ticks. The mean CPT for KBR 3023 All-Family Insect Repellent Cream (20% Cream) was 15.3 hours (range 14.5 to 15.5 hours) against *Dermacentor variabilis* and 12.6 hours (range 3.4 to 15.5 hours) against *Ixodes scapularis*. The mean CPT for KBR 3023 All-Family Insect Repellent Spray (20% Pump Spray) was 14.0 hours (range 11.4 to 15.5 hours) against *Dermacentor variabilis* and 14.1 hours (range 10.2 to 15.5 hours) against *Ixodes scapularis*.

In summary, the data indicate that LANXESS Corporation Picaridin insect repellents at 20% concentration provided unusually long periods of Complete Protection against the American dog tick and the deer tick, and may therefore assist in reducing personal risk from the diseases they vector, including Rocky Mountain Spotted Fever and Lyme Disease, respectively.

References Cited:

Durden, L.A. and Keirans, J.E. (1996) Nymphs of the Genus *Ixodes* (Acari: Ixodidae) of the United States: Taxonomy, Identification Key, Distribution, Hosts, and Medical/Veterinary Importance. Lanham, Maryland: Entomological Society of America.

Yunker, C.E., Keirans, J.E., Clifford, C.M., and Easton, E.R. (1986) *Dermacentor* Ticks (Acari: Ixodoidea: Ixodidae) of the New World: A Scanning Electron Microscope Atlas. *Proc. Entomol. Soc. Wash.*, 88 (4), 609-627.

Research Subject Tracking Form

Study: LNX-003

Legend:

1 = January 15, 2010
2 = January 16, 2010
3 = January 17, 2010
4 = January 18, 2010
5 = January 19, 2010
6 = January 20, 2010
7 = January 21, 2010
8 = January 22, 2010
9 = January 23, 2010
10 = January 24, 2010

na = Not Applicable
* = Measured in previous study
Alt. Subj. = Alternate Subject

Subject Number	4	6	14	24	33	37	41	42	45	47	52	53	60	64	67	71	92	99	104	105	117	118	119
Subject Gender	F	M	M	M	F	F	M	M	F	F	M	F	F	M	M	M	F	F	M	F	M	F	F
MSD Sheet(s) Provided	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Study Synopsis Provided	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Experimental Subject Bill of Rights Completed	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Pregnancy Test Advisory (Females)	6	na	na	na	2	5	na	na	8	4	na	9	6	na	na	na	5	5	na	1	na	6	6
Informed Consent Form Completed	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Limb Measurements Completed	*	8	7	1	*	5	*	*	*	*	9	9	6	3	8	1	*	*	*	*	1	6	6
Arthropod Training Orientation Completed	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Positive *Ixodes* Attractiveness	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Positive *Dermacentor* Attractiveness	6	8	7	1	2	5	4	5	8	4	9	9	6	3	8	1	5	5	1	1	1	6	6
Pregnancy Test Completed	10	na	na	na	9	10	na	na	9	9	na	10	9	na	na	na	10	9	na	10	na	9	10
Repellent Efficacy Test Day 1	na	Alt. Subj.	na	9	9	na	na	na	9	9	na	na	9	9	9	9	na	9	na	na	9	Alt. Subj.	na
Repellent Efficacy Test Day 2	10	Alt. Subj.	10	na	na	10	10	10	na	na	10	10	na	na	na	na	10	na	10	10	na	na	Alt. Subj.

Limb Measurement Form

Study:

Subject number: 4

Date: September 29, 2009

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	19	6.3	14	17	21	21.5	18.38	349
Right forearm	19	6.3	14	17	21	21.5	18.38	349
Left lower leg	32	10.7	20.5	26.5	32	30	27.25	872
Right lower leg	32	10.7	20.5	26.5	32	30	27.25	872

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 6

Date: January 22, 2010

Data recorder name: W. K. Johnson

Data recorder signature: WK Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	25.5	8.5	18.5	21.5	28.5	30	24.63	628
Right forearm	25.5	8.5	18.5	21.5	29	30.5	24.88	634
Left lower leg	35	11.7	23	28	38.5	36	31.38	1098
Right lower leg	35	11.7	23	28	38.5	36	31.38	1098

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 14

Date: January 21, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	26	8.7	17	19	26.5	27	22.38	582
Right forearm	26	8.7	17	19	27	28	22.75	592
Left lower leg	44	14.7	22	27	36	34.5	29.88	1315
Right lower leg	44	14.7	22	27	36.5	35	30.13	1326

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 24

Date: January 15, 2010

Data recorder name: W.K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	26	8.7	17	20.5	28	28	23.38	608
Right forearm	26	8.7	17	20.5	28	28	23.38	608
Left lower leg	42	14	24.5	29	39	33	31.38	1318
Right lower leg	42	14	24.5	29	39	33	31.38	1318

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 33

Date: March 21, 2008

Data recorder name: W. K. Johnson

Data recorder signature: WK Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	22	7.3	15	18	20.5	22	18.88	415
Right forearm	22	7.3	15	18	21	22	19	418
Left lower leg	33	11	21	26	32	30	27.25	899
Right lower leg	33	11	21	26.5	32.5	30	27.5	908

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 37

Date: January 19, 2010

Data recorder name: W.K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	25	8.3	15.5	18.5	23	23	20	500
Right forearm	25	8.3	15.5	18.5	23.5	23.5	20.25	506
Left lower leg	39	13	22	27	32	30.5	27.88	1087
Right lower leg	39	13	22	27	33	30.5	28.13	1097

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 41

Date: June 10, 2008

Data recorder name: W.K. Johnson

Data recorder signature: William K. Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	23	7.7	16.5	22	28	28.5	23.75	546
Right forearm	23	7.7	17	22.5	28.5	29	24.25	558
Left lower leg	38	12.7	23.5	35	40.5	35.5	33.63	1278
Right lower leg	38	12.7	23.5	35.5	41.	35.5	33.88	1287

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 42

Date: June 11, 2008

Data recorder name: W. K. Johnson

Data recorder signature: W. K. Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	24	8	18	22	28.5	28.5	24.25	582
Right forearm	24	8	18	22.5	28.5	28.5	24.38	585
Left lower leg	40	13.3	24	33	40.5	36	33.38	1335
Right lower leg	40	13.3	24	33	40.5	36	33.38	1335

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 45

Date: March 22, 2008

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	21	7	14	17.5	21.5	22	18.75	394
Right forearm	21	7	14.5	17.5	22	22	19	399
Left lower leg	36	12	21	24	32	30	26.75	963
Right lower leg	36	12	21	24	32.5	30.5	27	972

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 47

Date: March 23, 2008

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	21	7	15	18.5	23.5	24.5	20.38	428
Right forearm	21	7	15	19	24	24.5	20.63	433
Left lower leg	36	12	22	29	37	33.5	30.38	1094
Right lower leg	36	12	22	29	36.5	34	30.38	1094

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 52

Date: January 23, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	26	8.7	18.5	23.5	30	29.5	25.38	660
Right forearm	26	8.7	19	24	30	30	25.75	670
Left lower leg	32	10.7	23	32	41	40	34	1088
Right lower leg	32	10.7	23.5	32	41	40	34.13	1092

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 53

Date: January 23, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	22	7.3	15.5	20	24.5	27	21.75	479
Right forearm	22	7.3	15.5	20	24.5	27	21.75	479
Left lower leg	30.5	10.2	24	31	39	35	32.25	984
Right lower leg	30.5	10.2	24	31	39	35	32.25	984

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 60

Date: January 20, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	21.5	7.2	14	15.5	19	21	17.38	374
Right forearm	21.5	7.2	14	15.5	19.5	21	17.5	376
Left lower leg	34	11.3	20	25	31	30	26.5	901
Right lower leg	34	11.3	20	25.5	31.5	30.5	26.88	914

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 64

Date: January 17, 2010

Data recorder name: W. K. Johnson

Data recorder signature: wk Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	22	7.3	17.5	22.5	29	28	24.25	534
Right forearm	22	7.3	17.5	23	30	29	24.88	547
Left lower leg	37	12.3	22.5	28	38.5	36	31.25	1156
Right lower leg	37	12.3	22.5	28	38.5	36	31.25	1156

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 67

Date: January 22, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	25.5	8.5	15	18	25	25.5	20.88	532
Right forearm	25.5	8.5	15	18.5	25	26	21.13	539
Left lower leg	40	13.3	24	27	36.5	33	30.13	1205
Right lower leg	40	13.3	24	26.5	36	32.5	29.75	1190

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 71

Date: January 15, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	28	9.3	17.5	20	25.5	27	22.5	630
Right forearm	28	9.3	17.5	20	27	28.5	23.25	651
Left lower leg	42	14	26	34	43	37.5	35.13	1475
Right lower leg	42	14	26	34	43	37.5	35.13	1475

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 92

Date: June 3, 2008

Data recorder name: W. K. Johnson

Data recorder signature: [signature]

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	20	6.7	14	16.5	20	22	18.13	363
Right forearm	20	6.7	14	16.5	21	22.5	18.5	370
Left lower leg	34	11.3	21	28.5	32	31	28.13	956
Right lower leg	34	11.3	21	28.5	32	31	28.13	956

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 99

Date: June 4, 2008

Data recorder name: W.K. Johnson

Data recorder signature: W.K. Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	24	8	16.5	18	23.5	25	20.75	498
Right forearm	24	8	16.5	18	23.5	25	20.75	498
Left lower leg	40	13.3	24	31.5	38.5	35	32.25	1290
Right lower leg	40	13.3	24	31.5	38.5	35	32.25	1290

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 104

Date: June 4, 2008

Data recorder name: W.K Johnson

Data recorder signature: WK John

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	24.5	8.2	18.5	23.5	31	31	26	637
Right forearm	24.5	8.2	18.5	25	32	32	26.88	658
Left lower leg	38	12.7	25.5	35	43	42	36.38	1382
Right lower leg	38	12.7	25.5	35	43	42	36.38	1382

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study:

Subject number: 105

Date: June 4, 2008

Data recorder name: WK Johnson

Data recorder signature: WK Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	23	7.7	16	20	25	25.5	21.63	497
Right forearm	23	7.7	16	20	25.5	26	21.88	503
Left lower leg	35	11.7	22.5	30	36.5	32	30.25	1059
Right lower leg	35	11.7	22.5	30	36.5	32	30.25	1059

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 117

Date: January 15, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	28.5	9.5	18.5	23.5	32	31	26.25	748
Right forearm	28.5	9.5	18.5	24	33.5	32	27	770
Left lower leg	42	14	27.5	39	46	39	37.88	1591
Right lower leg	42	14	27.5	39	46	39	37.88	1591

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 118

Date: January 20, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K Johnson

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	21	7	13.5	17	20.5	22	18.25	383
Right forearm	21	7	14	17.5	21	22.5	18.75	394
Left lower leg	35	11.7	19.5	29	32.5	30	27.75	971
Right lower leg	35	11.7	19.5	29	31.5	29	27.25	954

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Limb Measurement Form

Study: LNX-003

Subject number: 119

Date: January 20, 2010

Data recorder name: W. K. Johnson

Data recorder signature: W K J

Note: all measurements in cm

			Circumference					
Limb	**Length**	**Length/3[1]**	**Lower (A)**	**Lower-mid (B)**	**Upper-mid (C)**	**Upper (D)**	**Mean circumference[2]**	**Surface area[3]**
Left forearm	24	8	16.5	19	24.5	25	21.25	510
Right forearm	24	8	16.5	20	25.5	26	22	528
Left lower leg	39	13	23	32	39	36	32.5	1268
Right lower leg	39	13	23	32	39	36	32.5	1268

[1] For placing dosimeters in pump spray & aerosol studies. 'B' is 1/3 Length from 'A' (wrist/ankle), 'C' is 1/3 Length from 'B' & 'D' (elbow/knee crease).

[2] Sum of the four circumferences measured per limb, divided by 4.

[3] Product of mean circumference and length

Randomized Treatment Allocation Table*

Study: LNX-003 **Allocated by: W.K. Johnson** **Test Date: January 23, 2010**

Subject Number	Gender	Treated Limb (R or L)	Treatment A	Treatment B
24	M	R		X
33	F	L		X
45	F	L	X	
47	F	R		X
60	F	R	X	
64	M	L	X	
67	M	R	X	
71	M	R		X
99	F	L	X	
117	M	L		X

* Stratified by Gender

Allocator signature and date: William K. Johnson January 22, 2010

RandomTreatAllocLNX-003(1-23).xls

Repellent Applications

Study: LNX-003 **Test Location: CLBR Laboratory** **Date: January 23, 2010**

Subject Number	Sex	Arm (R or L)	Forearm Surface Area (square cm)	Repellent Applied (A or B)	Application Rate (mL of Repellent / square cm of skin)	mL of Repellent Applied	Time of Application	Initials of Applicator
24	M	R	608	B	0.00097	0.59	07:47	SBK
33	F	L	415	B	0.00097	0.40	07:45 (WO) ~~07:45~~ CVP 1/23/10	CVP
45	F	L	394	A	0.00194	0.76	07:47	AGR
47	F	R	433	B	0.00097	0.42	07:45	SBK
60	F	R	376	A	0.00194	0.73	07:45	WKJ
64	M	L	534	A	0.00194	1.04	07:47	WKJ
67	M	R	539	A	0.00194	1.05	07:50	WKJ
71	M	R	651	B	0.00097	0.63	07:50	SBK
99	F	L	498	A	0.00194	0.97	07:50	AGR
117	M	L	748	B	0.00097	0.73	07:50	CVP

Technician signature and date: William K. Johnson January 23, 2010

Randomized Treatment Allocation Table*

Study: LNX-003 **Allocated by: W.K. Johnson** **Test Date: January 24, 2010**

Subject Number	Gender	Treated Limb (R or L)	Treatment A	Treatment B
4	F	L		X
14	M	R	X	
37	F	R		X
41	M	R		X
42	M	L	X	
52	M	R	X	
53	F	R	X	
92	F	L	X	
104	M	L		X
105	F	L		X

* Stratified by Gender

Allocator signature and date: William K. Johnson January 22, 2010

RandomTreatAllocLNX-003(1-24).xls

Repellent Applications

Study: LNX-003 **Test Location: CLBR Laboratory** **Date: January 24, 2010**

Subject Number	Sex	Arm (R or L)	Forearm Surface Area (square cm)	Repellent Applied (A or B)	Application Rate (mL of Repellent / square cm of skin)	mL of Repellent Applied	Time of Application	Initials of Applicator
4	F	L	349	B	0.00097	0.34	07:35	SBK
14	M	R	592	A	0.00194	1.15	07:32	AGP
37	F	R	506	B	0.00097	0.49	07:38	SBK
41	M	R	558	B	0.00097	0.54	07:40	CWP
42	M	L	582	A	0.00194	1.13	07:40	AGP
52	M	R	670	A	0.00194	1.30	07:39	WKJ
53	F	R	479	A	0.00194	0.93	07:35	WKJ
92	F	L	363	A	0.00194	0.70	07:37	WKJ
104	M	L	637	B	0.00097	0.62	07:40	CWP
105	F	L	497	B	0.00097	0.48	07:35	CWP

Technician signature and date: William K. Johnson January 24, 2010

Study LNX-003: Efficacy Test of KBR 3023 (Picaridin, Icaridin) - Based Personal Insect Repellents (20% Cream and 20% Spray) with Ticks Under Laboratory Conditions

LANXESS Corporation

LNX-003 Tick Crossing Data

Day	Date	Subject	Sex	Product	Application Time	Tick	Hours since first exposure: 1							2					3				4					5					6					7		
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	January 23, 2010	24	M	B	07:47	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	33	F	B	07:45	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	45	F	A	07:47	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	47	F	B	07:45	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	60	F	A	07:45	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	64	M	A	07:47	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	67	M	A	07:50	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	71	M	B	07:50	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	99	F	A	07:50	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	117	M	B	07:50	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	4	F	B	07:35	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	14	M	A	07:32	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	37	F	B	07:38	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	41	M	B	07:40	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	42	M	A	07:40	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	52	M	A	07:39	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2	January 24, 2010	53	F	A	07:35	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	92	F	A	07:37	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	104	M	B	07:40	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	105	F	B	07:35	*Dermacentor*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	24	M	B	07:47	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	33	F	B	07:45	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	45	F	A	07:47	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
1	January 23, 2010	47	F	B	07:45	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	60	F	A	07:45	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	64	M	A	07:47	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
1	January 23, 2010	67	M	A	07:50	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	January 23, 2010	71	M	B	07:50	*Ixodes*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	99	F	A	07:50	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	January 23, 2010	117	M	B	07:50	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2	January 24, 2010	4	F	B	07:35	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	14	M	A	07:32	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	37	F	B	07:38	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2	January 24, 2010	41	M	B	07:40	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	42	M	A	07:40	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	52	M	A	07:39	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	53	F	A	07:35	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	92	F	A	07:37	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	104	M	B	07:40	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	January 24, 2010	105	F	B	07:35	*Ixodes*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
							1							2					3				4					5					6					7		
Day	Date	Subject	Sex	Product	Application Time	Tick	Hours since first exposure																																		
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

			First Time Interval
1	January 23, 2010		08:00
2	January 24, 2010		07:45

Study LNX-003: Efficacy Test of KBR 3023 (Picaridin, Icaridin) - Based Personal Insect Repellents (20% Cream and 20% Spray) with Ticks Under Laboratory Conditions

LANXESS Corporation

LNX-003 Tick Crossing Data

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	CPT (hours)	Total Crossings	Confirmed Crossing	Subject	Product
8					9				10				11				12			13					14				15								
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	-	-	-	-	-	-	-	-	-	-	-	11.97	2	1	24	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wthdr	-	-	14.75	0	0	33	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.47	0	0	45	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.5	0	0	47	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.5	0	0	60	A
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	-	-	-	14.47	4	1	64	A
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	15.42	4	0	67	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.42	2	1	71	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.42	0	0	99	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	-	-	-	-	-	-	-	-	-	-	-	11.92	2	1	117	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	-	-	-	-	14.17	4	1	4	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.47	0	0	14	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.37	0	0	37	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	-	-	14.08	2	1	41	B
1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	14.83	5	1	42	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.35	2	0	52	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	15.42	1	0	53	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.38	0	0	92	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.33	0	0	104	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.42	0	0	105	B
0	1	0	0	0	1	0	0	0	0	1	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.22	5	1	24	B
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wthdr	-	-	14.75	1	0	33	B
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	-	-	-	-	-	-	13.22	4	1	45	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.5	0	0	47	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.5	0	0	60	A
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.47	3	1	64	A
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.42	2	1	67	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	-	-	-	-	14.42	5	1	71	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	15.42	1	0	99	A
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.67	5	1	117	B
0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	14.92	4	1	4	B
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.47	1	0	14	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.37	1	0	37	B
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	-	-	-	-	-	-	-	13.08	3	1	41	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15.33	2	0	42	A
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	15.35	3	0	52	A
0	0	0	0	0	0	0	0	1	0	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.67	3	1	53	A
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.38	1	0	92	A
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.33	0	0	104	B
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.42	0	0	105	B
8					9				10				11				12			13					14				15								
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	CPT (hours)	Total Crossings	Confirmed Crossing	Subject	Product

Wthdr = Subject withdrew before trial ended.

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Dermacentor variabilis*

Study: LNX-003 **Application Time(s):** 07:45 - 07:50

Date: January 23, 2010 **Time of First Exposure:** 08:00

Time:	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00	13:15
15 Minute Interval:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Subject Number																						
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W.K. Johnson William K. Johnson January 23, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Dermacentor variabilis*

Study: LNX-003

Date: January 23, 2010

Application Time(s): 07:45 - 07:50

Time of First Exposure: 08:00

Time:	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30	18:45
15 Minute Interval:	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Subject Number																						
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 23, 2010

TickDermDataLNX-003.xls

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Dermacentor variabilis*

Study: LNX-003

Date: January 23, 2010

Application Time(s): 07:45-07:50

Time of First Exposure: 08:00

Time:	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	21:30	21:45	22:00	22:15	22:30	22:45	23:00	23:15				
15 Minute Interval:	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Subject Number																						
24	0	0	0	1	0	1	—	—	—	—	—	—	—	—	—	—	—	—				
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	—	—				
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
64	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	—	—	—				
67	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0				
71	0	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
117	0	0	0	1	0	1	—	—	—	—	—	—	—	—	—	—	—	—				

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 23, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Ixodes scapularis*

Study: LNX-003 **Application Time(s):** 07:45 - 07:50

Date: January 23, 2010 **Time of First Exposure:** 08:00

Time:	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00	13:15
15 Minute Interval:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Subject Number																						
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
67	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	—	—	—	—	—	—	—
71	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 23, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Ixodes scapularis*

Study: LNX-003

Date: January 23, 2010

Application Time(s): 07:45 - 07:50

Time of First Exposure: 08:00

Time:	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30	18:45
15 Minute Interval:	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Subject Number																						
24	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	1	—
33	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—
67	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 23, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Ixodes scapularis*

Study: LNX-003
Date: January 23, 2010

Application Time(s): 07:45-07:50
Time of First Exposure: 08:00

Time:	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	21:30	21:45	22:00	22:15	22:30	22:45	23:00	23:15				
15 Minute Interval:	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Subject Number																						
24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	—	—	—				
45	0	0	0	0	0	0	0	0	1	0	1	—	—	—	—	—	—	—				
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
67	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
71	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	—	—	—				
99	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0				
117	0	0	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—				

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W.K. Johnson January 23, 2010

TickIxodDataLNX-003.xls

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Dermacentor variabilis*

Study: LNX-003

Date: January 24, 2010

Application Time(s): 07:32 - 07:40

Time of First Exposure: 07:45

Time:	07:45	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00
15 Minute Interval:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Subject Number																						
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W.K. Johnson William K. Johnson January 24, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Dermacentor variabilis*

Study: LNX-003

Date: January 24, 2010

Application Time(s): 07:32 - 07:40

Time of First Exposure: 07:45

Time:	13:15	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30
15 Minute Interval:	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Subject Number																						
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0
52	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 24, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Dermacentor variabilis*

Study: LNX-003

Date: January 24, 2010

Application Time(s): 07:32 - 07:40

Time of First Exposure: 07:45

Time:	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	21:30	21:45	22:00	22:15	22:30	22:45	23:00				
15 Minute Interval:	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Subject Number																						
4	0	0	0	0	0	0	1	0	0	0	0	0	1	1	—	—	—	—				
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
41	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	—	—	—				
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	—				
52	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
53	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0				
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 24, 2010

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Ixodes scapularis*

Study: LNX-003

Date: January 24, 2010

Application Time(s): 07:32 – 07:40

Time of First Exposure: 07:45

Time:	07:45	08:00	08:15	08:30	08:45	09:00	09:15	09:30	09:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30	12:45	13:00
15 Minute Interval:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Subject Number																						
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson William K. Johnson January 24, 2010

TickIxodDataLNX-003.xls

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Ixodes scapularis*

Study: LNX-003

Date: January 24, 2010

Application Time(s): 07:32 - 07:40

Time of First Exposure: 07:45

Time:	13:15	13:30	13:45	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45	18:00	18:15	18:30
15 Minute Interval:	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Subject Number																						
4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	—	—	—
92	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W. K. Johnson January 24, 2010

TickIxodDataLNX-003.xls

Tick Crossings or Repulsions at 15 Minute Intervals

Tick species: *Ixodes scapularis*

Study: LNX-003
Date: January 24, 2010

Application Time(s): 07:32 - 07:40
Time of First Exposure: 07:45

Time:	18:45	19:00	19:15	19:30	19:45	20:00	20:15	20:30	20:45	21:00	21:15	21:30	21:45	22:00	22:15	22:30	22:45	23:00				
15 Minute Interval:	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Subject Number																						
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1				
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
41	0	0	0	0	0	0	0	0	1	1	—	—	—	—	—	—	—	—				
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1				
52	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0				
53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—				
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

Key: 0 = Repulsion, 1 = Crossing

Data Recorder Name and Signature: W.K. Johnson William K. Johnson January 24, 2010

Laboratory Environmental Conditions

Study: LNX-003 **Location:** CLBR Laboratory

Date: January 23, 2010 **Observer:** W.K. Johnson

Time	Air Temperature (degrees C)	Relative Humidity (%)	Light Intensity (lux)
07:00	21	46	162
08:00	22	49	236
09:00	22	50	359
10:00	22	51	584
11:00	23	52	586
12:00	23	51	577
13:00	24	51	650
14:00	25	52	620
15:00	24	46	623
16:00	24	48	564
17:00	25	51	282
18:00	24	46	131
19:00	24	50	130
20:00	24	51	123
21:00	24	50	127
22:00	24	48	122
23:00	23	46	127

Additional Comments:

Observer Signature: William K. Johnson January 23, 2010

Laboratory Environmental Conditions

Study: LNX-003 **Location:** CLBR Laboratory

Date: January 24, 2010 **Observer:** W.K. Johnson

Time	Air Temperature (degrees C)	Relative Humidity (%)	Light Intensity (lux)
07:00	22	52	88
08:00	22	52	122
09:00	23	53	150
10:00	23	52	189
11:00	24	50	222
12:00	24	51	260
13:00	24	51	239
14:00	24	52	177
15:00	24	53	164
16:00	24	52	113
17:00	24	52	75
18:00	24	51	60
19:00	24	49	61
20:00	24	50	57
21:00	24	50	64
22:00	24	50	60
23:00	23	47	64

Additional Comments:

Observer Signature: W.K. Johnson January 24, 2010

Subject: RE: Tick shipment date; pathogen question
Date: Fri, 29 Feb 2008 10:29:40 -0500
Thread-Topic: Tick shipment date; pathogen question
From: "Levin, Michael L. (CDC/CCID/NCZVED)"
To: "Scott P Carroll" <spcarroll@ucdavis.edu>

Scott,
We always send ticks by Priority Overnight service for delivery in the morning of the next business day. We will try and send ticks on March 10-11 and will provide you with a Tracking Number.

All our uninfected colonies are "routinely" screened for the presence of the following human pathogens:

Borrelia burgdorferi
Borrelia lonestari
Anaplasma phagocytophilum
Ehrlichia chaffeensis
Ehrlichia ewingii
Rickettsia conorii
Rickettsia amblyommii
Rickettsia rickettsii

"Routinely" means:
1) Females that have laid eggs are tested by PCR for the presence of bacterial DNA in every generation – 1/generation;
2) Rabbits used for feeding of each life-stage in every tick colony, in every generation are tested for the presence of antibodies to the above-listed pathogens – 3/generation.

Let me know if I can be of more help.
Thank you
Michael L. Levin, Ph.D.

_____
Medical Entomology Laboratory
Rickettsial Zoonoses Branch
Centers for Disease Control and Prevention
1600 Clifton Road, MS G-13, Atlanta, GA 30333
Phone: (404) 639-3639
Cell: (404) 542-6608
Fax: (404) 639-4436
E-mail: MLevin@cdc.gov

Gmail by Google

Confirming disease-free documentation for tick shipment

2 messages

Shawn King <sbkingster@gmail.com> **Thu, Jan 21, 2010 at 2:21 PM**
To: "Levin, Michael L. (CDC/CCID/NCZVED)" <msl3@cdc.gov>
Cc: Scott P Carroll <spcarroll@ucdavis.edu>

Hi Michael,

One last detail - we would like to confirm that the details for disease free management of source tick colony have not changed since 2008 when we last checked. At that time, you provided the following description:

All our uninfected colonies are “routinely” screened for the presence of the following human pathogens:

- Borrelia burgdorferi
- Borrelia lonestari
- Anaplasma phagocytophilum
- Ehrlichia chaffeensis
- Ehrlichia ewingii
- Rickettsia conorii
- Rickettsia amblyommii
- Rickettsia rickettsii

“Routinely” means:
1) Females that have laid eggs are tested by PCR for the presence of bacterial DNA in every generation – 1/generation;
2) Rabbits used for feeding of each life-stage in every tick colony, in every generation are tested for the presence of antibodies to the above-listed pathogens – 3/generation.

Are there any changes to this description? If so, please let us know, for our records.

Thanks again for all your assistance in providing the ticks. The study will be conducted this weekend.

Best, Shawn King
Director of Operations
Carroll-Loye Biological Research

Levin, Michael L. (CDC/CCID/NCZVED) <msl3@cdc.gov> **Thu, Jan 21, 2010 at 2:24 PM**
To: Shawn King <sbkingster@gmail.com>
Cc: Scott P Carroll <spcarroll@ucdavis.edu>

Yes, our routine procedures for maintenance of uninfected ticks colonies remain unchanged.

Thank you
Michael L. Levin, Ph.D.

Medical Entomology Laboratory
Rickettsial Zoonoses Branch
Centers for Disease Control and Prevention
1600 Clifton Road, MS G-13, Atlanta, GA 30333
Phone: (404) 639-3639
Cell: (404) 542-6608
Fax: (404) 639-4436
E-mail: MLevin@cdc.gov

[Quoted text hidden]

KBR 3023 Insect Repellent Cream

Contains Bayrepel™. Long-lasting, effective protection from mosquitoes ticks, biting flies, and fleas. Not oily, greasy or sticky. It smells great, too. Repels insects for up to 8 hours.

ACTIVE INGREDIENT: Picaridin, 1-Methylpropyl-2-(2-hydroxyethyl)-1-piperidine carboxylate	20%
INERT INGREDIENTS**	80%
TOTAL	100.0%

**Other Ingredients: Purified water, glycerin, denatured alcohol, thickener, emollient, fragrance

KEEP OUT OF REACH OF CHILDREN

WARNING

STOP – Read This Entire Label Before Use

PRECAUTIONARY STATEMENTS

WARNING. HAZARDS TO HUMANS.

Causes substantial but temporary eye injury. Do not get in eyes. Wash thoroughly with soap and water after handling, returning indoors, and before eating, drinking, chewing gum, or using tobacco. Discontinue use and consult a doctor if irritation or rash occurs.

The information below describes the first aid procedures for incidents involving KBR 3023 Insect Repellent Cream:

FIRST AID

IF IN EYES:

- Hold eye open and rinse gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first five minutes, then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:

- Call a physician or poison control center immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by a Poison Control Center or a doctor.
- Do not give anything to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-410-3063 for emergency medical information.

The LANXESS Pittsburgh Emergency Response Telephone Number is 800-410-3063

PHYSICAL HAZARDS

Flammable. Do not use or store near heat sources, sparks or open flame. Do not smoke while applying.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For best results, read and follow all label directions.

Follow these guidelines when applying KBR 3023 Insect Repellent:

- Apply evenly to skin in a thin layer
- Excessive amounts or more frequent reapplication should be unnecessary. Do not apply more than 2 times a day.
- Repels insects and ticks for up to eight hours.
- Reapply every 8 hours. Do not exceed two applications per day.
- Do not spray directly on face.
- Avoid contact with lips, cuts, wounds, or irritated skin.
- Do not apply to excessively sunburned skin.
- Do not apply under clothing.
- Apply sparingly around ears.

STORAGE AND DISPOSAL

STORAGE: Store in a cool, dry place out of the reach of children. Keep away from heat, sparks and open flame.
DISPOSAL: Do not reuse empty container. Discard in trash.
IF EMPTY: Do not reuse this container. Place in trash or offer for recycling if available.
IF PARTLY FILLED: Call your local solid waste agency or 1-800-526-9377 for disposal instructions. Never place unused product down any indoor or outdoor drain.

IN CASE OF EMERGENCY, CALL: CHEMTREC 800-424-9300
EPA REGISTRATION NUMBER: 39967-50
EPA ESTABLISHMENT NUMBER:

INTERNATIONAL 703-527-3887
Net Contents:
Lot No.:

LANXESS

LANXESS Corporation
111 RIDC Park West Drive ● Pittsburgh, PA 15275-1112

LABEL TEXT DATE: 12/19/06

KBR 3023 All-Family Insect Repellent Spray

Long-lasting, effective protection from mosquitoes, ticks, biting flies, gnats, chiggers and fleas. Use with confidence on the whole family. And your family will want to use it, too. Not oily, greasy or sticky. It smells great, too.

ACTIVE INGREDIENT: Picaridin, 1-Methylpropyl-2-(2-hydroxyethyl)-1-piperidine carboxylate	20%
INERT INGREDIENTS	80%
TOTAL	100.0%

KEEP OUT OF REACH OF CHILDREN

CAUTION

STOP – Read This Entire Label Before Use

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS

Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling, returning indoors, and before eating, drinking, chewing gum, or using tobacco.

The information below describes the first aid procedures for incidents involving KBR 3023 Insect Repellent Spray:

FIRST AID

IF IN EYES:

- Hold eye open and rinse gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first five minutes, then continue rinsing.
- Call a poison control center or doctor for treatment advice.

IF SWALLOWED:

- Call a physician or poison control center immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by a Poison Control Center or a doctor.
- Do not give anything to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-410-3063 for emergency medical information.

The LANXESS Pittsburgh Emergency Response Telephone Number is 800-410-3063

IN CASE OF EMERGENCY, CALL: CHEMTREC 800-424-9300

EPA REGISTRATION NUMBER: 39967-53
EPA ESTABLISHMENT NUMBER:

PHYSICAL HAZARDS

Flammable. Do not use or store near heat sources, sparks or open flame. Do not smoke while applying.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Follow these guidelines when applying KBR 3023 Insect Repellent:

- Hold 4 to 6 inches from skin while spraying, keeping nozzle pointed away from face. Slightly moisten skin with a slow sweeping motion.
- Excessive amounts or frequent reapplication is unnecessary.
- Apply on face by first spraying small amounts in palms of hands and spreading on face and neck.
- Do not apply to the hands of small children.
- Repels insects and ticks for up to eight hours.
- Reapply every 8 hours. Do not exceed two applications per day.
- Do not spray directly on face.
- Avoid contact with lips, cuts, wounds, or irritated skin.
- Do not apply to excessively sunburned skin.
- Do not apply under clothing.
- Apply sparingly around ears.

STORAGE AND DISPOSAL

Store in a cool, dry place out of the reach of children. Keep away from heat, sparks and open flame.
IF EMPTY: Do not reuse this container. Place in trash or offer for recycling if available.
IF PARTLY FILLED: Call your local solid waste agency or 1-800-526-9377 for disposal instructions. Never place unused product down any indoor or outdoor drain.

INTERNATIONAL 703-527-3887
Net Contents:
Lot No.:

LANXESS

LANXESS Corporation
111 RIDC Park West Drive ● Pittsburgh, PA 15275-1112

LABEL TEXT DATE: 12/19/06

saltigo
customized competence

Dr. B-Koch
Saltigo GmbH, Leverkusen,
Germany
phone: ++49/214/30-43872

KBR 3023 ALL-FAM.INSECT REPELL.CREAM MUS

Lot.Nr.: XKOC 00736

Auftr.Nr.: 7700011363 / 10 / 1

A company of the LANXESS Group

gross: 168,3g net: 140g tare: 28,3g
Art.Nr.: 56154780

saltigo
customized competenc

Dr. B-Koch
Saltigo GmbH, Leverkusen,
Germany
phone: ++49/214/30-43872

KBR 3023 ALL-FAM.INSECT REPELL.SPRAY MUS

Lot.Nr.: XKOC 00738

Auftr.Nr.: 7700011363/ 20 / 1

company of the ANXESS oup

gross: 121g net: 100g tare: 21g
Art.Nr.: 56115181

Test Substance Information*

LANXESS CORPORATION

Date Shipped: 2009.09.16. Quantity Shipped: 560g

Test Substance: 56154780

Product Name: KBR 3023 All-FAMILY INSECT REPELLENT CREAM

CAS #: of the Active Ingredient 119515-38-7

Source: Saltigo GmbH, Building Q 18, 51369 Leverkusen, Germany

Batch / Lot / Reference No.: XKOC 00736

Secondary Reference No.:

Appearance: white cream

% Active Ingredient (COA) / Date of Analysis: mean value:20.5% KBR 3023 / 2009-09-10

Expiration Date: 2011-07-09

Analysis Reference Number: Biogenius Mo 3830

Storage Conditions: store at temperature not more than 30°C

Room Temperature: x Refrigerator: Freezer: Light Sensitive:

Safety Information - Attach copy of MSDS or list known information:

Hazards -

Health & Safety Data -

* This questionnaire should be completed and shipped with all materials to be used for testing. This requested information is needed for implementation of GLP studies and to protect personnel conducting studies. The sponsor is required to maintain this technical information / data in order to comply with the GLP regulations.

Test Substance Information*

LANXESS CORPORATION

Date Shipped: 2009.09.16 Quantity Shipped: 500g

Test Substance: 56115181

Product Name: KBR 3023 All-FAMILY INSECT REPELLENT SPRAY

CAS #: of the Active Ingredient 119515-38-7

Source: Saltigo GmbH, Building Q 18, 51369 Leverkusen, Germany

Batch / Lot / Reference No.: XKOC 00738

Secondary Reference No.:

Appearance: clear solution

% Active Ingredient (COA) / Date of Analysis: mean value:21.5% KBR 3023 / 2009-09-18

Expiration Date: 2010-09-11

Analysis Reference Number: Biogenius Mo3829

Storage Conditions: store at temperature not more than 30°C

Room Temperature: x Refrigerator: Freezer: Light Sensitive:

Safety Information - Attach copy of MSDS or list known information:

Hazards -

Health & Safety Data -

* This questionnaire should be completed and shipped with all materials to be used for testing. This requested information is needed for implementation of GLP studies and to protect personnel conducting studies. The sponsor is required to maintain this technical information / data in order to comply with the GLP regulations.

CONFIDENTIAL

Test Facility :
BioGenius GmbH
TechnologiePark
Building 56
Friedrich-Ebert-Straße
51429 Bergisch Gladbach, Germany

Date : 2009-09-11 No. CoA: Mo3830 - RT - 0 weeks

Certificate of Analysis

Study No. : Mo3830
Sponsor : Saltigo GmbH
Test Item : KBR 3023 All Family Insect Repellent Cream 20 %
Product No. : 56154780
Batch No. : XKOC 00736
Internal Product ID : SGO001/0014#1#1
Production Date : 2009-08-11
Date of Analysis : 2009-09-10
Storage Conditions : room temperature
Test Time : start
Test Method : M01166-01
Retest Date : 2010-09-11

	Test	Requirement [%]	Result [%]
1.	Content (HPLC-ESTD)		
1.1	Saltidin (KBR 3023)	19.0 – 21.0	20.5

This analysis was conducted in compliance with the Principles of Good Laboratory Practice (GLP). A reserve sample of the test item will be retained at the test facility of BioGenius GmbH according to GLP requirements.

Study Director: 2009-09-11 (Date) M. Teresa Garcia (Maria Teresa Garcia)

CONFIDENTIAL

Test Facility :
BioGenius GmbH
TechnologiePark
Building 56
Friedrich-Ebert-Straße
51429 Bergisch Gladbach, Germany

Date : 2009-09-11 No. CoA: Mo3829 - RT - 0 weeks

Certificate of Analysis

Study No. : Mo3829
Sponsor : Saltigo GmbH
Test Item : KBR 3023 All Family Insect Repellent Spray 20 %
Product No. : 56115181
Batch No. : XKOC 00738
Internal Product ID : SGO001/0013#1#1
Production Date : 2009-08-18
Date of Analysis : 2009-09-10
Storage Conditions : room temperature
Test Time : start
Test Method : M01166-01
Retest Date : 2010-09-11

	Test	Requirement [%]	Result [%]
1.	Content (HPLC-ESTD)		
1.1	Saltidin (KBR 3023)	19.0 – 21.0	20.5

This analysis was conducted in compliance with the Principles of Good Laboratory Practice (GLP). A reserve sample of the test item will be retained at the test facility of BioGenius GmbH according to GLP requirements.

Study Director: 2009-09-11 (Date) M. Teresa Garcia (Maria Teresa Garcia)

LANXESS CORPORATION/Saltigo GMBH
Test Material Shipment
Chain-Of-Custody

Sent To: _ Scott P. Carroll. Ph.D. **Date Sent:** 16.09.2009

Address: Carroll-Loye,Biological Research, 711 Oak Avenue, Davis, CA 95616 USA

Signature: _____ **Date:** 2009-09-16

Description Of Shipment

Test Substance	Batch / Lot / Reference No.	Amount	Number of Containers	Container Type
KBR 3023 ALL-FAMILY INSECT REPELLENT CREAM	XKOC00736 (batch Nr) 56154780 (article code)	560ml	4	Plastic container
KBR 3023 ALL-FAMILY INSECT REPELLENT SPRAY	XKOC00738 (batch Nr) 56115181 (article code)	500ml	5	Plastic container

Received By: Shawn B. King **Date:** 1 October 2009

Signature: S B. K

Condition at Receipt: Excellent - as described in table above

Comments: _____

Please return copy of the Chain-of-Custody to:

Stan Oslosky
LANXESS Corporation
Materials Protection Products

Carroll-Loye Biological Research
711 Oak Avenue Davis, California Tel (530) 902-8267 http://www.carroll-loye.com/

CHAIN-OF-CUSTODY, MATERIALS RECEIVED

Sponsor reference (Study #): LNX-003

Date Received: 1 October 2009

Courier: Fed Ex

Courier delivery information: International Priority to door

Vendor/Source: Lanxess Germany

Vendor Shipment ID Number:

☑ Vendor Packing List Received?:
☑ Study Monitor notified by email that materials have been received (if appl.)?: Also By phone

Sight (Label) Inventory of Materials Received:

Name (description):	Code no.	Lot (batch) no.	Quantity
KBR 3023 ALL-FAMILY INSECT REPELLENT CREAM	56154780	XKOC 00736	Total of ≈ 560 ml in 4 plastic containers
KBR 3023 ALL-FAMILY INSECT REPELLENT SPRAY	56115181	XKOC 00738	Total of ≈ 500 ml in 5 plastic containers

Deviations of Sight Inventory from Packing List?:

None Observed

Other (e.g., notes on condition, references to information recorded elsewhere):

Signature of Custodian, date: [signature] 1 October 2009

Management Approval: Signature [signature] Date 19 May 2009

Carroll-Loye Biological Research

711 Oak Avenue Davis, California 95616 Tel (530)902-8267 http://www.carroll-loye.com/

Research Notes

CLBR Project I.D.# LNX-003
Date: 31 March 2010

This note concerns test material accounting and storage conditions.

Test materials were removed from storage from approximately 0500 - 0700 hours on 23 and 24 January 2010, being brought to the CLBR laboratory to prepare individual subject doses for efficacy trials on those two dates. In each case, according to my discussions with our lab manager William Johnson, test materials were returned to storage on the mentioned dates at about 0700. This note, then, constitutes our record of test material check-in and check-out. Laboratory temperatures and relative humidities, measured at 0700 were:

23 Jan — 21°C, RH 46%
24 Jan — 22°C, RH 52%,

Min/max temperature and RH values were not checked for the storage area until 19 March 2010. For the time period between receipt of the test materials, when they were placed into storage, and 19 March 2010, were: 19 - 23°C, RH 30 - 50%.

Signed

Conforms to 91/155/EEC - 2001/58/EC - Europe

SAFETY DATA SHEET

KBR 3023 ALL-FAM.INSECT REPELLENT CREAM

saltigo
customized competence
A company of the LANXESS Group

56154772

1. Identification of the substance/preparation and of the company/undertaking

Identification of the substance or preparation

Product name : KBR 3023 ALL-FAM.INSECT REPELLENT CREAM

Use of the substance/preparation : Repellent

Company/undertaking identification

Supplier/Manufacturer : Saltigo GmbH
51369 Leverkusen, Germany
Phone: +49 214 30 65109
Fax: +49 214 30 55787
E-mail: infosds@lanxess.com

Emergency telephone number : +49 214 30 99300 (Sicherheitszentrale Chemiepark Leverkusen)

2. Composition/information on ingredients

Preparation of
sec-butyl 2-(2-hydroxyethyl)piperidine-1-carboxylate CAS No.: 119515-38-7 ELINCS No.: 423-210-8

Substance/preparation : Preparation

Ingredient name	CAS number	%	EC Number	Classification
Perfume floral 12889G		0.5		N; R51/53

*** Occupational Exposure Limit(s), if available, are listed in Section 8**

3. Hazards identification

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Physical/chemical hazards : Flammable.

See section 11 for more detailed information on health effects and symptoms.

4. First aid measures

First aid measures

Inhalation : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Ingestion : Wash out mouth with water. If affected person is conscious, give a copious amount of water to drink. Seek medical attention.

Skin Contact : Wash skin thoroughly with soap and water or use recognised skin cleanser.

Eye contact : In case of contact with eyes, rinse immediately with a copious amount of water. Seek medical attention.

See section 11 for more detailed information on health effects and symptoms.

5. Fire-fighting measures

Extinguishing media : In case of fire, use water spray (fog), foam, dry chemical or CO_2 extinguisher or spray.

Special exposure hazards : Flammable liquid and vapour. Vapour may cause flash fire. Vapours may accumulate in low or confined areas, travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous thermal decomposition products : These products are carbon oxides (CO, CO_2), nitrogen oxides (NO, NO_2...).

Special protective equipment for fire-fighters : Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal Precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

7. Handling and storage

Handling : Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Storage : Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame) .

Packaging materials

Recommended : Use original container.

8. Exposure controls/personal protection

Exposure limit values : Not available.

Exposure controls

Occupational exposure controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation location.

Respiratory protection : No special measures required.

Hand protection : No special measures required.

Eye protection : No special measures required.

Skin protection : No special measures required.

9. Physical and chemical properties

General information

Appearance

Physical state : Liquid.

Important health, safety and environmental information

Boiling point : >35°C

Flash point : Closed cup: 23 - 61°C

Vapor pressure : <1100 hPa (20°C)

Density : 0.98 - 1 kg/l

Solubility : Soluble in cold water

10. Stability and reactivity

Stability : The product is stable.

Materials to avoid : Flammable liquid and vapour. Vapour may cause flash fire. Vapours may accumulate in low or confined areas, travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

11. Toxicological information

Potential acute health effects

Inhalation : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Skin Contact : No known significant effects or critical hazards.

Eye contact : No known significant effects or critical hazards.

Potential chronic health effects

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Reproductive toxicity : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Inhalation : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Skin : No known significant effects or critical hazards.

Remarks : Ames-test: negative
Micronucleus test: no clastogenic effect. (sec-butyl 2-(2-hydroxyethyl)piperidine-1-carboxylate)

12. Ecological information

Other adverse effects : No known significant effects or critical hazards.

Other adverse effects : Not available.

Special remarks on the products of biodegradation

13. Disposal considerations

Methods of disposal : Examine possibilities for re-utilisation. Product residues and uncleaned empty containers should be packaged, sealed,labelled, and disposed of or recycled according to relevant national and local regulations. Where large quantities are concerned, consult the supplier. When uncleaned empty containers are passed on, the recipient must be warnedof any possible hazard that may be caused by residues. For disposal within the EC, the appropriate code according to the European Waste List (EWL) should be used. It is

among the tasks of the polluter to assign the waste to waste codes specific to industrial sectors and processes according to the European Waste List (EWL).

Hazardous waste : The classification of the product may meet the criteria for a hazardous waste

14. Transport information

Regulation	UN number	Proper shipping name	Class	Packing group	Label	Additional Information
ADR/RID	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Hazard identification number** 30 **Limited quantity** LQ7
GGVSE	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Hazard identification number** 30 **Limited quantity** LQ7
ADNR	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Hazard identification number** 30 **Limited quantity** LQ7
IMDG	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Emergency schedules (EmS)** F-E, _S-E_
IATA	UN1993	Flammable liquid, n.o.s. (CONTAINS ETHANOL)	3	III		**Passenger Aircraft** 309: 60 L **Cargo Aircraft** 310: 220 L

Combustible
Flash point (Closed cup): 23 - 61°C
Keep separated from foodstuffs

15. Regulatory information

EU Regulations

Classification and labelling have been performed according to EU directives 67/548/EEC, 1999/45/EC, including amendments and the intended use.
- Industrial applications.

Risk Phrases : R10- Flammable.

Safety Phrases : S3- Keep in a cool place.

Other EU regulations

16. Other information

Full text of R phrases referred to in sections 2 and 3 - Europe : R10- Flammable.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

History

Date of printing : **7/19/2006**

Date of issue : **7/19/2006**

Date of previous issue : **6/7/2006**

Version : **0.02**

Prepared by : Not available.

Notice to reader

The data given here is based on current knowledge and experience. The purpose of this Safety Data Sheet is to describe the products in terms of their safety requirements. The above details do not imply any guarantee concerning composition, properties or performance.

Conforms to 91/155/EEC - 2001/58/EC - Europe

SAFETY DATA SHEET

KBR 3023 ALL-FAMILY INSECT REPELLENT SPRAY

saltigo
customized competence
A company of the LANXESS Group

56115173

1. Identification of the substance/preparation and of the company/undertaking

Identification of the substance or preparation

Product name : KBR 3023 ALL-FAMILY INSECT REPELLENT SPRAY

Use of the substance/preparation : Repellent

Company/undertaking identification

Supplier/Manufacturer : Saltigo GmbH
51369 Leverkusen, Germany
Phone: +49 214 30 65109
Fax: +49 214 30 55787
E-mail: infosds@lanxess.com

Emergency telephone number : +49 214 30 99300 (Sicherheitszentrale Chemiepark Leverkusen)

2. Composition/information on ingredients

contains
sec-butyl 2-(2-hydroxyethyl)piperidine-1-carboxylate CAS No.: 119515-38-7 ELINCS No.: 423-210-8

Substance/preparation : Preparation

Ingredient name	CAS number	%	EC Number	Classification
Perfume floral 12889G		1		N; R51/53

*** Occupational Exposure Limit(s), if available, are listed in Section 8**

3. Hazards identification

The preparation is classified as dangerous according to Directive 1999/45/EC and its amendments.

Physical/chemical hazards : Flammable.

See section 11 for more detailed information on health effects and symptoms.

4. First aid measures

First aid measures

Inhalation : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Obtain medical attention.

Ingestion : Wash out mouth with water. If affected person is conscious, give a copious amount of water to drink. Seek medical attention.

Skin Contact : Wash skin thoroughly with soap and water or use recognised skin cleanser.

Eye contact : In case of contact with eyes, rinse immediately with a copious amount of water. Seek medical attention.

See section 11 for more detailed information on health effects and symptoms.

5. Fire-fighting measures

Extinguishing media : In case of fire, use water spray (fog), foam, dry chemical or CO_2 extinguisher or spray.

Special exposure hazards : Flammable liquid and vapour. Vapour may cause flash fire. Vapours may accumulate in low or confined areas, travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous thermal decomposition products : These products are carbon oxides (CO, CO_2), nitrogen oxides (NO, NO_2...).

Special protective equipment for fire-fighters : Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal Precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Do not touch or walk through spilled material.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : If emergency personnel are unavailable, contain spilled material. For small spills add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion proof means to transfer material to a sealed, appropriate container for disposal. For large spills dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

7. Handling and storage

Handling : Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Storage : Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame) .

Packaging materials

Recommended : Use original container.

8. Exposure controls/personal protection

Exposure limit values : Not available.

Exposure controls

Occupational exposure controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation location.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hand protection : Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Eye protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

9. Physical and chemical properties

General information

Appearance

Physical state : Liquid.

Important health, safety and environmental information

Boiling point : >35°C

Flash point : Closed cup: 26°C

Density : 0.96 kg/l

Solubility : Easily soluble in cold water

10. Stability and reactivity

Stability : The product is stable.

Materials to avoid : Flammable liquid and vapour. Vapour may cause flash fire. Vapours may accumulate in low or confined areas, travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

11. Toxicological information

Potential acute health effects

Inhalation : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Skin Contact : No known significant effects or critical hazards.

Eye contact : No known significant effects or critical hazards.

Acute toxicity

Product/ingredient name	Test	Result	Route	Species

Potential chronic health effects

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Reproductive toxicity : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Inhalation : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Skin : No known significant effects or critical hazards.

Remarks :

12. Ecological information

Other adverse effects : No known significant effects or critical hazards.

Other adverse effects : Not available.

Special remarks on the products of biodegradation

13. Disposal considerations

Methods of disposal : Examine possibilities for re-utilisation. Product residues and uncleaned empty containers should be packaged, sealed,labelled, and disposed of or recycled according to relevant national and local regulations. Where large quantities are concerned, consult the supplier. When uncleaned empty containers are passed on, the recipient must be warnedof any possible hazard that may be caused by residues. For disposal within the EC, the appropriate code according to the European Waste List (EWL) should be used. It is among the tasks of the polluter to assign the waste to waste codes specific to industrial sectors and processes according to the European Waste List (EWL).

Hazardous waste : The classification of the product may meet the criteria for a hazardous waste

14. Transport information

Regulation	UN number	Proper shipping name	Class	Packing group	Label	Additional Information
ADR/RID	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Hazard identification number** 30 **Limited quantity** LQ7
GGVSE	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Hazard identification number** 30 **Limited quantity** LQ7
ADNR	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Hazard identification number** 30 **Limited quantity** LQ7
IMDG	UN1993	FLAMMABLE LIQUID, N.O.S. (CONTAINS ETHANOL)	3	III		**Emergency schedules (EmS)** F-E, _S-E_
IATA	UN1993	Flammable liquid, n.o.s. (CONTAINS ETHANOL)	3	III		**Passenger Aircraft** 309: 60 L **Cargo Aircraft** 310: 220 L

Combustible
Flash point (Closed cup): 26°C
Keep separated from
foodstuffs

15. Regulatory information

EU Regulations

Classification and labelling have been performed according to EU directives 67/548/EEC, 1999/45/EC, including amendments and the intended use.
- Industrial applications.

Risk Phrases : R10- Flammable.

Safety Phrases : S3- Keep in a cool place.
S60- This material and its container must be disposed of as hazardous waste.

Other EU regulations

16. Other information

Full text of R phrases referred to in sections 2 and 3 - Europe : R10- Flammable.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

History

Date of printing : **8/29/2006**

Date of issue : **8/29/2006**

Date of previous issue : **No Previous Validation**

Version : **2**

Prepared by : Not available.

Notice to reader

The data given here is based on current knowledge and experience. The purpose of this Safety Data Sheet is to describe the products in terms of their safety requirements. The above details do not imply any guarantee concerning composition, properties or performance.

TOXICOLOGY PROFILE OF KBR 3023 (page 1 of 2)

The toxicological profile of KBR 3023 is well characterized. All toxicology data were developed using the dermal route of exposure, the most relevant route based on the use pattern of the product (insect repellent for dermal application). The rationale of product development using the dermal route of exposure was considered at the suggestion of the USEPA and in agreement with USEPA and Bayer/Miles. All study protocols, scientific issues, methodology for dermal dosing for extended periods of time and rationale for dose selection were discussed with the EPA. Agreements regarding use of dermal route of exposure were also made with BGA (German authorities) and Health & Welfare Canada. A complete toxicology package required for the registration of an insecticide including acute and subchronic neurotoxicity and metabolism studies was conducted. Additionally, 14-day, 5-week and 14-week dietary feeding studies were conducted to assess any hazard associated with hand-to-mouth transfer from dermal use of KBR 3023. The highest dermal dose for long-term studies was 200mg/kg/day. Dermal absorption studies were conducted both in rats and human volunteers to assess the human risk on the absorbed dose analysis associated with the consumer use of the product.

KBR 3023 and its formulated products have low acute toxicity by oral, dermal or inhalation routes of exposure. They were not irritating to the skin nor sensitizers in the animal studies. A slight to moderate ocular irritation was observed in the animal studies.

KBR 3023 has no demonstrable neurological or developmental toxicity by dermal route of exposure. KBR 3023 shows no evidence of genotoxicity. Subchronic dermal dosing at 500 mg/kg/day produced no clinical pathology and only slight histopathology changes in the liver, and all changes were reversible after four weeks. Chronic dermal dosing in mice, rat and dogs produced no evidence of adverse toxicity changes and it was not oncogenic in mice or rats. In the oral toxicity studies (14-day, 5-weeks and 14-weeks), only kidney effects were seen in the male rats and were attributed to α_{2u} globulin accumulation. The toxicology profile by oral route of exposure did not reveal any new targets compared to the dermal route. Cumulative effects were not evident in dermal or oral studies. The systemic NOAEL in the subchronic studies by oral route were similar (308mg/kg/day for oral/200mg/kg/day- the highest dose tested).

TOXICOLOGY PROFILE OF KBR 3023 (page 2 of 2)

The safety of KBR 3023 was further established by dermal absorption studies conducted in rats and in human volunteers. The dermal absorption study in human volunteers showed that KBR 3023 is poorly absorbed through the human skin. Only 1.66% of the material (AI) was absorbed compared to 19 – 60% for the rat. A conservative dermal penetration factor of 11.5 was used by the EPA for risk assessment. The excretion half-life in humans was 8.2 hours compared to 23.3 hours in the rat. The qualitative pattern of excretion is similar in humans and rats (primary urinary excretion) with similar metabolites. KBR 3023 has good skin feel and is odorless. No significant complaints have been reported over years of use.

In summary:

KBR 3023 has complete toxicology data supported by State-of-the–Art testing
KBR 3023 showed no foreseeable public health risks, including in children and is alternative to DEET
It has no end points of concern
Low acute toxicity
No irritant or sensitizing potential
No specific effects in rats or dogs in short-term and long-term studies
NOAEL = 200 mg/kg (dermal); NOAEL = 308 mg/kg (oral)
Not mutagenic
Not tumorigenic
No effects on reproduction
No neurotoxicity
No photo-sensitisation or irritation
It is poorly absorbed through the human skin
Does not bio-accumulate and is rapidly excreted

Carroll-Loye Biological Research

711 Oak Avenue Davis, California Tel (530) 902-8267 http://www.carroll-loye.com/

CHAIN-OF-CUSTODY, MATERIALS RECEIVED

Sponsor reference (Study #): LNX-003

Date Received: 7 Jan 2010

Courier: Fed Ex

Courier delivery information: Standard Overnight
Track # 8706 7379 3007

Vendor/Source: CDC

Vendor Shipment ID Number: NA

☐ Vendor Packing List Received?: NA

☐ Study Monitor notified by email that materials have been received (if appl.)?: NO

Sight (Label) Inventory of Materials Received:

Name (description):	Code no.	Lot (batch) no.	Quantity
≈ 100 Ixodes scapularis nymphs			
≈ 100 Dermacentor variabilis nymphs			

Deviations of Sight Inventory from Packing List?:

NA Shipment inspected

Other (e.g., notes on condition, references to information recorded elsewhere): excellent Condition

Signature of Custodian, date: [signature] January 7, 2010

Management Approval: Signature [signature] Date 19 May 2009

Carroll-Loye Biological Research

711 Oak Avenue Davis, California Tel (530) 902-8267 http://www.carroll-loye.com/

CHAIN-OF-CUSTODY, MATERIALS RECEIVED

Sponsor reference (Study #): LNX - 003

Date Received: 20 Jan 2010

Courier: Fed Ex

Courier delivery information: Standard Overnight
Track # 8683 4065 8550

Vendor/Source: CDC

Vendor Shipment ID Number: NA

☐ Vendor Packing List Received?: NA

☑ Study Monitor notified by email that materials have been received (if appl.)?:

Sight (Label) Inventory of Materials Received:

Name (description):	Code no.	Lot (batch) no.	Quantity
≈ 1500 Ixodes scapularis nymphs			
≈ 1500 Dermacentor variabilis nymphs			

Deviations of Sight Inventory from Packing List?:

NA Shipment inspected, excellent condition

Other (e.g., notes on condition, references to information recorded elsewhere): See above

Signature of Custodian, date: [signature] January 20, 2010

Management Approval:
Signature [signature] Date 19 May 2009

Carroll-Loye Biological Research

711 Oak Avenue Davis, California 95616 Tel (530)902-8267 http://www.carroll-loye.com/

Research Notes

CLBR Project I.D.# LNX-003
Date: February 28, 2010

This note describes handling, storage conditions, and identification of ticks received from CDC-Atlanta on January 7 and January 20, 2010.

Ticks were held at laboratory room temperature (ca. 20°C). They were kept in the screen top vials in which they were shipped, in lightly hydrated zip-closure plastic bags (humidity ca. 80-100%).

Ticks were identified with the keys and illustrations in the following two references: Durden and Keirani (199), Yunker et al. (1986)

6 (EE) Rec 31 MARCH 2010

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Signed

EFFICACY TEST PROTOCOL LNX-003

EFFICACY TEST OF KBR 3023 (PICARIDIN; ICARIDIN) - BASED PERSONAL INSECT REPELLENTS (20% CREAM AND 20% SPRAY) WITH TICKS UNDER LABORATORY CONDITIONS

Original Date:	27 July 2009
Initial IRB Approval:	30 July 2009
Federal EPA/HSRB Review:	Pending
California EPA Review:	Pending
Ammendments:	Pending
Final IRB Approval:	Pending
Standards Applied	U. S. EPA Good Laboratory Practice Regulations (40 CFR 160); 40 CFR 26 subparts K, L and M; FIFRA § 12(a)(2)(P); California State EPA Department of Pesticide Regulation study monitoring (California Code of Regulations Title 3, Section 6710).

SYNOPSIS

This tick repellent study was commissioned by the sponsor to provide efficacy data for purposes of US/EPA registration. The test materials, based on the active ingredient Picaridin, consist of KBR 3023 All-family Insect Repellent Cream (20% Cream) and KBR 3023 All-Family Insect Repellent Spray (20% Pump Spray).

KBR 3023 (Icaridin; Picaridin) is a new generation of synthetic repellent developed as an alternative to DEET. It was developed by molecular modeling

techniques. From more than 800 substances, KBR 3023 showed the best performance regarding efficacy against a variety of arthropods (Boeckh, et al., 1996) and had the most desired attributes regarding safety, low skin penetration, and compatibility with skin, and plastic materials. It was developed by Bayer and is now owned by Saltigo GmbH (Lanxess Group) and in the USA it is handled by Lanxess Corporation (previously a Division of Bayer Corporation).

Icaridin (US EPA Registration Name Picaridin), the current common name, was developed under the Code Name KBR 3023 and the registered trade name Saltidin™ (formerly Bayrepel™) and was sold under the Brand name Autan. The chemical name for Icaridin is 1-PIPERIDINECARBOXYLIC ACID, 2-(HYDROXY-ETHYL), 1- METHYLPROPYLESTER. However, the INCI (International Nomenclature of Cosmetic Ingredients) name was given as HYDROXY METHYL ISOBUTYL PIPERIDINE CARB. The product was submitted to US EPA under the common name Picaridin. However, the common name, Picaridin, was rejected by ISO (International Organization for Standards) as it was not considered a pesticide. The common name Picaridin was also rejected by WHO/INN (World Health Organization/International Non-proprietary Name) but the common name, Icaridin, was accepted by WHO/INN

The study pursuant to this insect repellent efficacy protocol is intended to provide data under the Data-Call-In requirements (EPA Reg. No. 3126-LRN0) of United States Environmental Protection Agency Guideline OPPTS 810.3700.

Investigator (Study Director):
Dr. Scott P. Carroll
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Sponsor:
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LANXESS Corporation
111 RIDC Park West Drive
Pittsburgh, PA 15275-1112

Study Monitor:
G. K. Sangha, Ph. D.
Toxicology and Regulatory Affairs Consultant
GKS International, Inc.
11411 Porter Ranch Drive #105
Northridge, CA 91326
913-638-3968

IRB:
Independent Investigational Review Board, INC.
6738 West Sunrise Blvd. Suite 102
Plantation Florida 33313
954-327-0778

Quality Assurance Unit:
Dr. William Donahue
Sierra Research Laboratories
5100 Parker Road
Modesto, CA 95357
209-521-6380
CV on file with Carroll-Loye Biological Research

TABLE OF CONTENTS

1 Justification for Research

1.1 Objective of Research and Endpoints:

The objective is to determine the duration and efficacy of the Test Material(s), when applied at a typical consumer dose, in repelling the following tick species:

Deer tick - *Ixodes scapularis*
American dog tick - *Dermacentor variabilis*

Ticks are certified disease-free laboratory-reared descendents of field caught adults. Methods employed for disease exclusion are described in Appendix 7. Ticks are reared at approximately 25°C under conditions of high humidity and long day length. Laboratory nymphs are active in questing and feeding between approximately 2 weeks and one year post-eclosion (molt). Ticks will typically be between 6 and 12 weeks post-eclosion for testing.

Individual subject dosage will be determined using the standard application rates from the dosimetry completed for related Carroll-Loye Biological Research (CLBR) studies with the Test Material(s).

For both species, efficacy and duration will be measured as Complete Protection Time, or CPT, defined herein as the time between application of test material and the First Confirmed Crossing of an actively foraging tick from the untreated skin surface of a subject's hand 3 cm or more into the treated forearm skin area. A 'First Confirmed Crossing' (FCC) is that which is followed by another within 30 minutes.

Shawn King User 10/20/09 10:20 AM
Deleted: E

The endpoint will be the time of failure expressed as the time of the FCC for each species for each subject.

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The resulting data set will be suitable for submission to US/EPA to comply with the conditions of the registration.

1.2 Importance of the Research

Insect repellents are commonly used in the United State to reduce both nuisance biting and disease risk. Traditional DEET-based repellents are highly effective, but are cosmetically inferior and relatively more likely to produce mild to serious side

effects. Picaridin-based repellents are cosmetically superior and have a better safety profile. They have been marketed around the world for a decade, but only recently in the US, where they were introduced in 2005. The US Centers for Disease Control (CDC) has acknowledged the existence of substantial consumer interest in new and effective insect repellent products, including the choice of a variety of formulations, delivery systems, and concentrations of active ingredient. Of the three DEET-alternatives currently considered by CDC to have public health value, Picaridin probably has the highest broad-spectrum efficacy. However, few Picaridin products are currently available to US consumers. US EPA has requested new, US-based efficacy data as condition of registration for the test products. The purpose of this study is to provide those efficacy data. The information will also be used in product labeling.

Human subjects are required because they represent the target system for the test material, and sufficiently reliable models for repellency testing have not been developed. Repellent efficacy can only be measured in the presence of biting arthropods. Prevention of tick bites and the reduction of the risks of contracting tick-borne diseases are of substantial interest to U.S. consumers and public health professionals. Thus, there is substantial merit in its further study and the development of new repellent products toward unconditional registration by the U.S. EPA.

1.3 Balance of Risks and Benefits:

The study-associated risks are of five types: exposure to the test materials themselves, exposure to biting arthropods, possible exposure to vectors of arthropod-borne diseases, physical stress from test conditions, and psychological stress associated with a breach in confidentiality concerning pregnancy test results. As described below, subject health and safety are unlikely to be impacted by any study-associated risks during or after the study. Subject health and safety are also safeguarded by medical monitoring, assistance, and management.

1.3.1 Risks from Exposure to Test Material(s)

The repellent active ingredient has a low acute and chronic risk profile (§2), established both through experimentation and through a history of consumer use. EPA regulates use of inert ingredients (also termed “other” ingredients) by toxicology profiles in animal tests and by their inclusion in EPA lists of “approved” other ingredients. The insect-repellent products proposed for testing have been tested on animals for potential oral and dermal toxicity (§2).

The active ingredient (Picaridin) has an extensive toxicity data file, has been previously registered by EPA and has a positive safety record in consumer use.

Subjects with known allergic reactions to insect repellents and common cosmetics are excluded from participating (§3.3.2). Risks associated with inhalation and ingestion would only ensue from serious mishandling by subjects, a scenario that the study methods preclude.

1.3.2 Risks from Exposure to Biting Arthropods

The risk of skin reactions to a bite is reduced by excluding candidate subjects who are aware of having a history of such reaction (§3.3.2). In addition, subjects will be trained to quickly remove any tick that attempts to bite them, before penetration or injection of saliva. Stopping Rules (§4.7.6) and Medical Management practices (§1.3.6) specify removing any subject from the study when that subject has received confirming crossings for both tick species or the subject shows signs of reacting to a bite or to contact with ticks. Subjects will be teamed with others in a group for mutual observation and experienced technical personnel will be present at all times for assistance.

Within 30 days before repellent efficacy testing, subjects will be trained by technical personnel in handling ticks in the laboratory (Appendix 3). Subjects will learn how to manipulate ticks with fine paintbrushes, place them on their own forearms, observe and quantify tick movement on their arms, and dispose of used ticks. This training will be documented. This 'hands-on' experience will assist subjects in collecting data accurately and handling ticks safely during the repellent efficacy trial.

The training procedure also serves to verify the subject's attractiveness to ticks in the study. If during subject training any qualifying tick (as defined in §4.7.3) per five exposures of each species fails to cross on the subject, the subject will be asked to withdraw.

1.3.3 Risks from Exposure to Disease Vectors

Our laboratory-reared tick populations are certified disease free (Appendix 7). There is no risk of tick-vectored diseases for subjects in our laboratory tests.

1.3.4 Physical Stress in the Test Environment

Physical stresses on subjects are minimized by careful preparation and provisioning. Lab testing environments are temperature and humidity controlled to remain well within human comfort zones. The testing area is maintained free of tripping hazards, and an adjacent rest area is stocked with

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food, water, and beverages. Seating is provided for all subjects. Private bathroom facilities are also provided on site.

1.3.5 Maintaining Privacy of Pregnancy Test Results

Section 3.3.2 lists the exclusion criterion detailing pregnancy test procedures. Results of a subject's test are only observed by one female CLBR staff technician and never recorded to minimize stress on a female subject testing positive, and minimize the possibility that other staff or subjects may become aware of the results of that test.

1.3.6 Medical Monitoring, Assistance, and Management

Subjects are clearly and repeatedly informed that they may remove themselves for any reason from the study at any time, without penalty to their compensation. All subjects are asked to contact the Study Director and a physician of their own choice at any time should they develop a rash (a delayed hypersensitivity reaction) within 7 days of the conclusion of the test day.

On the test day, staff will immediately communicate all subject concerns about health, safety, or comfort to the Study Director for assessment. The Study Director will also assess skin condition of affected subjects should any bites inadvertently occur during efficacy testing, or any subject reports any discomfort in treated areas. Subjects are instructed to inform the Study Director (i.e., the 'Principal Investigator'), or any other staff member if at any time during the study a subject suffers a skin reaction, such as redness, edema, itching or pain, or feels ill. Such subjects will be immediately withdrawn from testing and tick exposure, and medical management will be implemented. When a subject completes the study or is removed for any reason, treated skin areas will be gently washed with clean water and mild soap, rinsed with a 35% ethanol in water solution, then gently dried with a towel to remove test materials.

When medical management is implemented, the Study Director will contact the On-Call physician for the study and comply with the physician's instructions. On the day of testing, a physician who has read the protocol and discussed the research with the Study Director will be on call. Contact information for the nearest medical facilities and maps from the test site to the facilities will be prepared and on file before the day of testing. In unlikely event of a Type 1 allergic reaction (anaphylaxis), we will contact 9-1-1 by cellular or ground-line telephone and cooperate as instructed with emergency personnel. Epi-Pens will be on-site. At least one qualified researcher will

remain with the other test subjects if other researchers depart with an injured or ill subject. We will be prepared to instruct emergency personnel on how to reach our site via multiple routes. In addition, we will personally transport affected persons to the nearest hospital if so advised by emergency personnel. There is sufficient redundancy in personnel that in such a case subjects remaining at the study site will still receive appropriate technical, scientific and safety guidance.

Subjects may also request access to standard first aid materials (such as bandages, antiseptics, and mild topical and oral antihistamines) and request qualified first aid assistance at any time.

As part of Medical Management, the Study Director will record all benign and adverse health observations.

1.3.7 Summary of Risks and Benefits

The combination of technical precautions and natural factors means that the chances that any subject will contract disease, suffer an injury, or suffer a severe reaction from a tick bite are extremely small.

Against these slight risks are balanced substantial and reasonably likely benefits. The principle beneficiary will likely be the Sponsor, for whom new data and new labeling will meet current US EPA registration standards. Because EPA registration requires efficacy data, a test such as that proposed here is the only path toward further product development, greater availability, and increased consumer acceptance of new repellent formulations in the United States. For the general public, tick-borne disease is of growing significance in the United States and around the world where U.S. citizens are active. Moreover, discomfort associated with nuisance biting restricts many work and pleasure activities

312
313 ## 2 Test Material(s): Description and Control
314
315 The following table summarizes all information about the test material(s)
316 relevant to this study.
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318

Test Materials as referred to in this Protocol:

	Cream 20%	Spray 20%
Test Material name (Picaridin conc.)	KBR 3032 All-Family Insect Repellent Cream (20%)	KBR 3023 All-Family Insect Repellent Spray (20%)
Manufacturer	LANXESS Corporation	LANXESS Corporation
Manufacturing Standards Applied	Good Manufacturing Practice standards, with records available to EPA.	Good Manufacturing Practice standards, with records available to EPA.
Transport	Commercial Courier, express, insulated container	Commercial Courier, express, insulated container
Chain of Custody	Documented	Documented
Specific gravity	0.98	0.96
Delivery system	Lotion	Pump Spray
Active ingredient(s) (%)	Picaridin 20%	Picaridin 20%
Inert ingredients	Proprietary, available to US EPA	Proprietary, available to US EPA
Stability	Stable	Stable
Storage conditions specified	Room temperature, max 30° C (86° F)	Room temperature, max 30° C (86° F)
Storage conditions applied	Locking, closed cabinet at room temperature (19-24°C) protected from light and moisture sources	Locking, closed cabinet at room temperature (19-24°C) protected from light and moisture sources
Description of cosmetic properties	White cream	Clear solution
NOAELs for Picaridin	NOAEL = 200 mg/kg (dermal); 308 mg/kg (oral)	NOAEL = 200 mg/kg (dermal); 308 mg/kg (oral)
Irritation and sensitization class	(Picaridin) No irritant or sensitizing potential	(Picaridin) No irritant or sensitizing potential
Hazard label requirements	Substantial but temporary eye injury. Do not get in eyes. Wash thoroughly with soap & water after handling, returning indoors, and before eating, drinking, chewing gum, or using tobacco. Discontinue use and consult a doctor if irritation or rash occurs; Flammable.	Moderate eye irritation, avoid contact with eyes or clothing, wash thoroughly with soap & water after handling, returning indoors, and before eating, drinking, chewing gum, or using tobacco. Flammable.
Reference materials	Sample labels in Appendix 4, page 52-53 MSDS and Toxicology documents in Appendix 5, page 54-65	

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The sponsor is responsible for completing all toxicological screening, compositional analysis, and stability studies for the test material(s) and providing the results to Carroll-Loye Biological Research prior to providing the test material(s) to Carroll-Loye.

3 Research Subjects: Recruitment, Screening, Consent, Privacy

3.1 Candidate Recruitment: Population, Sampling Frame, Representativeness

For reasons of practicality and control, we work with people associated the community in which our business is located (Davis, CA). Davis is a university-dominated community, and so the population demography differs somewhat from non-university communities. Compared to the Population of Concern (the US population - all potential repellent users), our sampling frame tends to under-represent blacks and over-represent Asians. It is also young, well educated, and slanted towards life science researchers and students.

Over time, we have developed a Volunteer Database of individuals who have expressed interest in participating in future repellency tests, provided contact information, and asked us to contact them. Initial recruiting is from this database, then from word-of-mouth of volunteers. The size and composition of the database varies over time as new individuals volunteer and old volunteers move out of the Davis area, but is now typically over 100 individuals, with the following average ethnic (self-identified) and gender distribution (averaged over 3 years):

Male	52%
Female	48%
Caucasian	74%
Asian	12%
Hispanic	7%
African-American	4%
Arabic	3%

In general, about three-quarters of the subjects are age 20-40, with the remainder between 40 and 55. Final composition is not determined until enrollment is completed. The relevant demographics of the participants will be reported.

Carroll (2006) reviewed the factors that influence the performance of insect repellents and concluded that there is no *a priori* means of predicting an

individual's attractiveness to a particular ectoparasite, or likely impact on a repellency trial's data set. Several studies have indicated that individuals differ in attractiveness to mosquitoes, for example, but individual attractiveness rankings shift substantially among parasite taxa. Skin-emanated volatiles influence attractiveness, as do skin temperature and absorption properties; these factors may likewise influence repellent efficacy. Studies of gender, age, race, hair color, complexion, weight, skin moisture, menses (females), hairiness, and sweat have shown only gender to have significant effects on individual attractiveness to mosquitoes. Though studies have shown that sweating increases attractiveness to at least one mosquito species, it is not clear whether individuals that sweat more than others, on average, tend to be more attractive to mosquitoes. Two studies with adequate sample sizes found females to be 25% less attractive to *Aedes* mosquitoes, while the other showed them to be significantly less well protected against *Anopheles* mosquitoes by deet – the opposite pattern. That difference is consistent with further findings that the type of repellent used also interacts complexly with individual subjects and mosquito species in determining efficacy. Nonetheless, while comparable data are not available for ticks, because gender effects seem most plausible, we attempt to enroll similar numbers of males and female subjects.

On the other hand, it *is* clear that conditions of use strongly influence repellent performance. We intentionally test under conditions of light, temperature and humidity conducive to tick foraging behavior. Further, we expose subject individuals as uniformly as possible to the ticks, and have them handle the ticks in ways that minimally disrupt tick behavior. We also monitor subjects to prevent exposure of treated areas to external moisture or abrasion.

Analogous to the summation for repellency, there are few clear patterns permitting us to predict which individuals might be at relatively greater risk from participating in this study. Pregnant and lactating women are excluded on general medical principles, and persons over age 55 are excluded due to slightly elevated health risks from arthropod-borne diseases (see above), though the likelihood of contracting the causal agent during a repellent test is very low.

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Based on review of the scientific literature regarding individual differences in repellent performance and attractiveness to ticks, we conclude that this study's deviations from the ideal frame will not influence the representativeness of the results, or their generalizability to the greater population. Lastly, because our Volunteer Database cohort is comprised by individuals who regularly spend time in outdoor setting (and thereby may have relatively frequent encounters

with biting arthropods), this group is probably appropriate for insect repellent users in general.

3.2 Candidate Recruitment Procedures

Recruitment for the Repellency Phase begins as soon as the test dates are determined.

Potential candidates are initially contacted by phone from our Volunteer Database and queried about interest and availability. Individuals are chosen using a random number table to choose subject numbers from the database and contacted. During the phone interview, we also inform potential candidates that they are permitted to refer others to us by having them contact us. Recruitment continues until the roster of subjects and alternates is full.

3.3 Candidate Screening

3.3.1 Inclusion Criteria, all subjects

Age: 18-55 years
Sex: Male/female
Race: Any race
Completed Consent Process (§3.4) including providing Written Consent (defined as having read, initialed, dated and signed Informed Consent Form and Experimental Subject Bill of Rights)
Language: Speak and read English

3.3.2 Exclusion criteria, all subjects:

1. Known to be hypersensitive to tick bites or exhibiting hypersensitivity during test
2. Phobic of ticks
3. Known to be allergic to insect repellents or common cosmetics
4. Known to be sensitive or showing sensitivity to any of the test product ingredients after application.
5. Poor physical condition.
6. Unwilling to submit to brief query about personal condition.
7. Use of insect repellent within one day preceding the efficacy test.
8. Unwilling to refrain from use of perfumed products, alcoholic beverages

or smoking after 9 PM the evening preceding the efficacy test and throughout that test.

9. Known to be pregnant or lactating. Each female volunteer of child bearing potential will self-check for pregnancy using an OTC test kit provided by a technician on the day of any study visit in which repellent will be applied or in which the subject will be exposed to ticks. Results of each such test will be immediately verified by direct inspection by a female technician experienced in making that assessment. Information regarding pregnancy test results will be kept in confidence. Only volunteers scored as nonpregnant will be allowed to participate.
10. Unable to deliver the test materials or nymphal ticks to own left and right arms.
11. Unable to see nymphal ticks on skin or otherwise effectively monitor them on skin.
12. Student or employee of the Study Director.
13. Does not regularly spend time in outdoor settings.

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15. Not attractive to target species.

3.4 Obtaining Subjects' Consent

All candidates are screened or re-screened for suitability for each test in a private, one-on-one conversation with the Study Director, at which time the Exclusion Criteria (§3.3.2) are exercised by asking each candidate to address them. It is explained to female candidates of child bearing potential that pregnancy will be assessed directly on the day of any study visit in which repellent will be applied.

The Study Director encourages candidates to ask questions and ask for clarification at any time during the interview and in all activities that follow. To candidates that pass screening, the Study Director describes the test purpose in plain language (in English), and the procedures and comportment to be followed are described. Candidates are then asked if they would like to retire from consideration at that point. If they wish to remain in consideration, it is emphasized that they may withdraw from the test at any time during the test without penalty to their compensation. This freedom is especially re-emphasized in cases in which considerable effort or expense has been required to include a subject (e.g., travel from a distant site), to discourage the subject from believing that the considerable effort or expense creates an added obligation to participate.

If the candidate indicates he or she wishes to proceed, the Study Director provides a copy of this study's IRB-approved Informed Consent Form (ICF) and State of California Department of Pesticide Regulation 'Experimental Subjects' Bill of Rights' (BOR) for review (Appendix 1). The candidate is also offered their own copy of the protocol itself, and supporting documents (MSDSs, toxicology study results, compositional analysis of the Test Materials, and training documents) for review. In a private session a senior CLBR staff member certified in protecting human research participants by the National Institute of Health (NIH), will read the ICF and BOR documents out loud with the candidate, offering to take questions and answering any that arise. The amount and form of compensation is described.

Candidates are again encouraged to ask any questions they have about the test, which may include understanding its purpose more fully, understanding risks and discomforts more fully, and understanding treatment and compensation for injury more fully. While the majority of our subjects have worked with us on an occasional basis for a number of years, we encourage them to personally evaluate their interests and concerns about participation seriously each time. We ask them not to sign on immediately but to give the situation due consideration (normally at least one day, sometimes less for those who have participated in multiple prior studies). Because most of the volunteers are researchers and/or have advanced degrees in life sciences, or work directly with or otherwise regularly encounter biting arthropods in infested habitats, we regard their motivations and decisions to participate as being well considered and well informed. Accordingly, we normally accept their decisions to participate if they so choose following due consideration. Nonetheless, the Study Director retains the final right to refuse participation to any candidate.

When all screening procedures are complete, the candidate is asked to sign, initial, and date the ICF and BOR for this study, both of which are then cosigned by a NIH certified staff member of Carroll-Loye. The candidate, now a subject, is then asked to complete a contact and emergency medical form

3.5 Protecting Subjects' Privacy

Screening interviews are conducted in private and one-on-one. All written records containing names, contact information, medical information, and signatures are kept in a locked, fire-proof cabinet. Access to these files is restricted to Carroll-Loye staff with the Study Director's permission. All subjects are assigned a unique number to identify them on all data forms and to

staff and other subjects during testing activities. Although many subjects interact socially during the tests, and may voluntarily share names or other personal information, subjects are never asked, required, or encouraged to do so. Individual data will be entered into the computer for retention and analysis with reference to individual number, not name. Records relating individual names to individual numbers will be retained separately. The Study Director will retain records indefinitely. Subjects may obtain their own records from the Study Director at any time.

We will enroll three more subjects than are required to meet our sample size. All subjects will be informed during the Consent process that on the day of testing, a small number of subjects may be designated as alternates and sent away after being compensated for coming to the test site. Alternate subjects may return later to replace subjects that initiate testing but withdraw before useful data are generated. They also serve as insurance against any enrolled subjects who fail to appear.

The possibility that any subject may be designated as an alternate will assist in protecting the privacy of any subject who must withdraw in or near the presence of other subjects at the start of the test day (i.e., before treatment and testing begins), for reasons such as a positive pregnancy test result, or for any other personal circumstance.

4 Study Design

4.1 Number of Subjects

In efficacy testing, we will use 10 subjects per treatment. Each subject is a replicate. Ten subjects are two-thirds more than the historical EPA requirement of six subjects. EPA is currently working on more precise guidance on sample size, but that remains forthcoming.

The number of subjects is chosen as a compromise among multiple factors. The goal is to meet regulatory requirements to provide an estimation of the true mean CPT, and so from a scientific standpoint an appropriate response under such circumstances is to increase size, but ethical and economic considerations demand the opposite in the present study, particularly during the efficacy-testing phase.

Importantly, under the historical guidelines, there seem to have been few problems with EPA registering repellents failing to meet their labeled performance specification. Nonetheless, there are clear risks in using a very small sample, and conspicuous among them in this study is that the probability of over-representing subjects inherently unattractive to the target species is rather large. We reduce this risk by confirming subject attractiveness to ticks before they participate in the phase of the test where efficacy data are collected. This should decrease the probability of certain sampling errors substantially.

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For calculating EPA-required mean and variance data, estimating the power associated with a given sample size is constrained by three factors, namely, little knowledge of the magnitude of individual CPT values in tick studies, little information regarding the distribution of CPT values in insect repellent studies in general, and, the first consideration notwithstanding, a reasonably high chance that there will be a number of censored values. If a minority of values is censored, and particularly if the range of values is not great (as in related mosquito repellent study LNX-001, MRID 47506401), a sample size of 10 should give excellent estimates of mean, median, and variation around those values, relative to historical standards. Still, 10 is sufficiently small, from both statistical and biological perspectives, that we are confident that we are not oversampling.

EPA has expressed interest in refining how CPT data are assessed and analyzed. We judge that such improvements are best made in the context of a further formalization of how EPA makes its labeling decisions from CPT data sets. The central ideas stem from types of survival analysis. One suggestion is to use, e.g., the time to 25% failure (among subjects) as the labeled protection time (when censoring is not too frequent). Another would require the Agency to specify acceptable Type I error probabilities for estimates of minimum CPTs *exceeding* a specified value. With the latter approach, EPA would also have to judge how to label with respect to the confidence interval around such probability estimates. Like the typical estimation of means and standard deviations, the soundness of such alternative statistical judgments will hinge on the accuracy of assumptions regarding the nature of the population distribution.

Given the success of past practices in application, and our clear improvements in sample size, it is premature for us to suggest further substantial change in how the EPA assesses repellent efficacy data. The basic philosophy, and therefore methodology, of how these data are analyzed should be based on a

clear and stable agency strategy regarding the information content of product labels.

4.2 Number of Controls

Each subject simultaneously serves as a treatment and control subject. Ticks are placed on the untreated arm of the subject to determine foraging avidness, then moved to the treated arm. The 'negative control' for efficacy data sets serves to insure that each individual tick employed in the study is attracted to the test subject before that tick is used in a repellency challenge. Ticks that fail to meet the questing criterion (§4.8.3.1) are not used against Test Materials. In this way the negative control serves as a pre-screening of the ticks, such that only actively questing ticks are then exposed to the treatments. Based on this manipulation of a standard control design, the crossing rate on the negative control is judged to be 100%.

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4.3 Controls for Matrix Materials

There are no controls by which the formulation matrices without the repellent active ingredient are tested. The study objective is to examine efficacy of the end products, and there is no a priori basis for anticipating significant repellent activity in the matrices. The question of whether there is interaction between matrix and active is external to the objective. Accordingly, the added risk of including additional subjects testing matrix-only formulations cannot be justified.

4.4 Controls with Comparison Materials

There are no comparison materials in this study. Questions of comparison between the Test Materials and other repellents are external to the objective.

4.5 Subject Measurements

We will measure length and circumference of the forearms of subjects. Circumference will be measured at four points (upper forearm, lower forearm, and two equally spaced points in between). This data will be averaged for mean circumference, which will be multiplied by length to calculate surface area. This data will be kept on file for each subject. Subjects will be re-

measured biennially or if, when asked, they indicate they may have gained or lost weight or muscle mass on their limbs since their measurements were last taken. This practice reduces the frequency of potentially invasive repeated measurement procedures for subjects.

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4.6 Standard Dose as Determined by Dosimetry

Dosimetry data are used to determine individual dosing for efficacy testing. Dosing rates are calculated on a per square cm basis. Those rates were obtained in a dosimetry study of each test material in 2007 during our conduct of an earlier study reported as LNX-001 (MRID 47506401).

Dosing Rates, by Test Material

	arms
Cream 20%	TBD*
Spray 20%	0.97 μl/cm^2

*As part of Carroll-Loye study LNX-002 (MRID 47506401), additional dosimetry data will be collected for the Cream 20% product. The augmented data set will be used to determine final dosage.

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The dosing rate for each Test Material is the grand mean rate calculated from 10 subjects (converted from weight to volume by reference to the specific gravity of each test material).

4.7 Efficacy – Components of the test

The efficacy study will consist of one laboratory trial. In each trial, each Test Material will be tested with 10 subjects. The individual subject will be the experimental unit.

Using a mean application rate derived from dosimetry (§4.6), individual dosages will be prepared for each subject volumetrically such that for each Test Material, all subjects receive the same amount of Test Material per unit skin area exposed. Skin surfaces of both treated and untreated limbs are first cleansed with water and a fragrance-free detergent soap, rinsed with a 35% ethanol in water solution, and then towel-dried. Test Material is dispensed from tuberculin (1 ml) syringes by technicians wearing surgical gloves who apply it to treated subjects by spreading evenly over the area to be treated using one finger in a light rubbing motion. Application of each Test Material is

considered a treatment. All treated limbs are monitored to minimize abrasion with clothing or laboratory surfaces from the time of application.

All subjects will be assigned to the treated group, which will be stratified by gender. The treatments will be allocated in sequence ('A', then 'B', then 'A', etc.). Within each gender, the treatments will be allocated at random excepting minor adjustments needed to constrain the numbers treated with a particular Test Material to 10. The treatment each subject receives and the time of application for each subject will be recorded on a data capture form (Appendix 2). Multiple technicians will make the applications, and each application will take only about two minutes to complete, so that subjects receiving 'A', for example, will not be treated on average significantly earlier than those treated with 'B'.

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Materials will be distributed among subjects as tabulated below.

Subject	Cream 20%	Spray 20%
1	Left arm	
2	Left arm	
3	Left arm	
4	Left arm	
5	Left arm	
6	Right arm	
7	Right arm	
8	Right arm	
9	Right arm	
10	Right arm	
11		Left arm
12		Left arm
13		Left arm
14		Left arm
15		Left arm
16		Right arm
17		Right arm
18		Right arm
19		Right arm
20		Right arm

4.7.1 Blinding of Study

Because the treated condition will be evident to researchers, technicians, and subjects, neither staff nor subjects will be effectively blinded. However, within the treated group, the two treatments will be indistinguishable to test subjects and staff based on their physical properties. Accordingly, the two treatments will

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be coded 'A' or 'B' by a technician. That technician will dispense the test materials so labeled for efficacy test treatments. That technician will not be involved in judging crossing events during efficacy data collection.

The treatment code key will be recorded in hardcopy by the technician and maintained in a locked file drawer to which only he/she has the key. As a backup, the key will also be recorded in a password protected computer file. For backup access, two technicians will be charged with privately maintaining the password offsite from the laboratory. Technicians will be charged not to reveal the code or the specific identity of test materials at any time during application or data collection, unless needed for medical or legal reasons. The Study Director will retrieve the code key from the technician(s) after the conclusion of data collection.

This moderate level of blinding security is deemed appropriate for a test in which the performance difference between untreated and treated conditions is unlikely to be ambiguous, and in which the performances of the test materials are not specifically being compared.)

4.7.2 Target Arthropods

Species challenging the repellent in the test are listed in §1.1. We will test repellency against deer tick - *Ixodes scapularis,* and American dog tick - *Dermacentor variabilis*.

4.7.3 Confirming Tick Foraging Activity

To be included in the test on a treated limb, each tick must first be determined to be a "qualifying tick" (defined as beginning walking on the hand of the subject's untreated arm within approximately 15 seconds of being placed there). Each tick must then also meet the crossing criterion on the untreated limb, following the procedure for the treated limb in the same test period (§4.8.3.1).

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4.7.4 Measuring Repulsion

For each tick species, the number of crossings on each subject's exposed treated area will be recorded (Appendix 2) as they occur during 3-minute exposure periods commencing once every 15 minutes, beginning at the onset of data collection and ending when the subject receives a confirming crossing, a stopping rule is invoked for the subject, or the Study Director stops the test for all subjects. Based on repellency trials of the Test Material(s) against mosquitoes (related study LNX-001, MRID 47506401), we expect the repellents may remain effective for up to 12-14 hours possibly more.

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4.7.5 Environmental Conditions – Data

Records (Appendix 2) of presence/absence and general rate/quality data for environmental conditions (temperature, relative humidity, light intensity) will be made at approximately one-hour intervals throughout the course of the laboratory trial.

4.7.6 Stop Rules

All subjects

Consented duration reached

Test site becomes unsafe for subjects for any reason

Individual subjects

Subject asks to withdraw

Subject's treated limb receives Confirming Crossings for both target species

Medical management is invoked for the subject (§1.3.6)

Subject proves unattractive to target species:

During subject training (see CLBR Training Manual §1.b Handling ticks and observing their movement on the skin) – if any qualifying tick (as defined in §4.7.3) per five exposures of each species fails to cross on the subject, the subject will be asked to withdraw.

During repellency trial - While we do not anticipate tick avidity as measured by our criteria (§4.8.3.1) will change significantly during the study, should a subject unexpectedly lose attractiveness to either tick species (as gauged on the untreated arm, detailed in the following paragraph) before a confirming crossing, he or she will be replaced on a later date if it is determined that his or her total exposure duration is less than 90% of the mean of subjects who did not withdraw, and when not more than 2 of 10 subjects have so withdrawn. If more than 2 of 10 subjects withdraw prematurely, those with the briefest participation will be replaced first. This stop rule is not automatically invoked if the Study Director ends exposures due to other factors, such as subject exhaustion; in such cases the data collected before termination may be sufficient to meet the study goals.

This stop rule is invoked in part or whole if the following sequence of events occurs: Three ticks of a species do not cross on subject's untreated arm during a test interval, in which case subject is retired from testing that species. The second tick species is then tested

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with the same failure criterion. Since each tick is given 3 minutes to cross on the untreated arm, note that in the unlikely scenario of a full 6 ticks (3 of each species, summing to 6 ticks for both species combined) being tested within an interval, testing of the sixth tick would not begin until after 15 minutes had elapsed, which would normally be the time at which the next exposure interval would begin. If the third tick of the second species crosses the untreated arm at that point, its data from the treated arm will be assigned to the prior exposure interval, and exposures for the next interval will begin immediately. If the third tick of the second species does not cross on the untreated arm, the subject is asked to withdraw.

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4.8 Sequence of efficacy test procedures

4.8.1 Within 30 days preceding Test Day

Candidate screening and subject consenting and orientation will occur.

4.8.2 1 Day prior to test

Staff prepare laboratory, arranging space in the facility to accommodate all test subjects and staff. A separate area for dispensing food and beverages is prepared and provisioned for subject access throughout the test.

4.8.3 Test Day

Subjects gather at the Carroll-Loye Biological Research laboratory to clean limbs and receive applications. The technicians and other researchers who will assist subjects during the test will be introduced or reintroduced to the subjects. Subjects are instructed to call on them whenever they have questions. Subjects are also reminded of procedures for the day's test.

The following test procedures (§4.8.3.1 and §4.8.3.2) are repeated for each species in sequence (not concurrently) by each subject within each interval, with intervals occurring every 15 minutes, until a stop rule (§4.7.6) is invoked.

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4.8.3.1 Tick screening for active foraging and repellency challenge

Three 'orientation' ink dots are arrayed longitudinally on both ventral forearms of each subject, at 3 cm intervals. On the treated arm, the first dot is 3 cm distal to the treated area, the second dot marks the threshold of the treated area, and the third dot is 3 cm into the treated area. The untreated limb/limb portion has a spatially identical array of 3 lines for tick activity screening. The first dot, used for placement, insures that ticks are not placed within the treated area and so can

detect a gradient of repellent density to which to orient. The second dot serves keep subjects aware of where the treated area begins and serves as a reorientation point for re-marking should either the first or the third dot become obscured.

Subjects screen ticks in two steps. First, whether an individual tick is "qualifying" (sufficiently active in general) is screened as described in §4.7.3. Second, whether an individual tick is "actively questing" is screened by observing whether it walks past the second marker dot in motion toward the elbow of the untreated arm.

Subgroups of approximately three subjects are led by a technician in the monitoring of time, ticks, and tick behavior. Each subject selects an unused tick and screens it for active questing behavior, repeating with the same tick species until an actively questing tick is identified, or the stopping rule for lack of active questing is invoked (§4.7.6, stopping rule 4 for individual subjects during repellency trial). The subject then transfers the tick to the treated arm for a repellent challenge.

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To initiate a screening or a repellent challenge, a tick is placed on the ventral arm or proximal palm, in the most hair-free portion, at the first (most distal) line. Ticks are manipulated with the bristles of a fine artist's paintbrush. Ticks are placed so that they face the elbow. Ticks may be oriented to locomote toward the margin of the treated area with the gentle action of the paintbrush. Forearms should be held from approximately 30° to vertically above the lab bench surface if that increases the propensity of ticks to travel toward the body.

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Active questing is verified if a qualifying tick travels past the second marker dot in motion towards the elbow on the untreated arm. On the treated arm, a crossing is scored if a tick travels at least 3 cm in a vector toward the elbow into the treated area (i.e., at least as far as the third line) within 3 minutes of beginning to move up the arm from the first line. A repulsion is scored when a tick changes its orientation away from, or parallel to, the margin of the treated area upon approach, or does not cross more than 3 cm toward the elbow within 3 minutes of entering the treated area.

4.8.3.2 Repellency data collection and tick removal

The technician will assist subjects in determining crossing versus repulsion events, and in determining whether a tick may be beginning to bite (an extremely unlikely event), and assisting in removing a tick should a bite occur (no embedding is anticipated, so removal should be possible with the same small paintbrush). Time is monitored by referring to an electric chronometer with a highly visible display.

The technician will record any crossings or repulsions as they occur. Repulsions are normally unambiguous reversals of direction. Subjects lift the tick off with the paintbrush after each assessment is complete. Any brushes that come into contact with a test material are discarded. Used ticks are immediately retired from the study by being transferred from the test arm to a container labeled "used".

4.8.4 Additional efficacy data collection

In the event that a subject withdraws during the Test Day or the Study Director invokes individual subject stopping rule number 4 (§4.7.6) for that subject, his or her data will be replaced by repeating the described procedures (this protocol, especially §4.8.3) on a subsequent day. Subsequent testing groups may consist of as few as one subject, who would work singly with a technician rather than in a subject group.

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4.9 Efficacy – Statistical design and analysis

Statistics will be computed with SAS's JMP software, Version 5.0.1.2 (SAS Institute, Cary, NC).

Because all subjects use different ticks, all ticks are used only once, and neither organism interacts directly with conspecifics at the level of the skin and the repellent during data collection, we will analyze data for each tick species by subject as independent, replicated values. The hypothesis that the test materials will significantly reduce the number of ticks Crossing treated versus untreated skin is not the objective of this study. The objective is to compute, for each test material, a reasonable estimate of mean and standard deviation for the duration between application and sufficient repellency breakdown such that for each tick species there are two ticks crossings on a subject within a half hour period. That pattern is here assessed for each tick species at a resolution of 15 minutes.

For each tick species on each treated subject, we will measure (data form Appendix 2):

- Exposure delay (min) – time between application and first exposure
- Minutes to First Confirmed Crossing (FCC) or end
- Complete Protection Time (CPT) – time between application and FCC

Complete protection time (CPT) is measured as the length of time from initial application to the First Confirmed Crossing (FCC). A FCC is a Crossing followed by another "confirming" Crossing within 30 minutes. For example, a

Crossing at 90 minutes followed by another at 135 minutes is not confirmed, but a third Crossing at 150 minutes would confirm the one at 135 minutes, giving a CPT of 135 minutes.

CPT is measured as a single time value for each subject for each tick species. Based on the requirements for such estimates in the EPA draft repellent efficacy testing guidelines (1999; OPPTS 810.3700), we will calculate mean CPT for each tick species across all 10 subjects, with standard deviation and 95% confidence interval information. Data will be normalized as possible to enhance the value of confidence interval calculations.

As described in §4.74, we anticipate that protection may span up to about 12 hours, and possibly 14 hours or more after application for some subjects. To examine the temporal pattern of failure further, we will employ Kaplan-Meier survival analyses by subject within tick species. Kaplan-Meier survival analysis accommodates some data censoring in the event that any subjects withdraw or are withdrawn before failure. In addition, we will estimate the Kaplan-Meier median, and the time until 25% failure, for each test product on each tick species. In the presence of a high frequency of censoring, median (and mean) values will be underestimated.

Our chosen sample size of 10 subjects will improve precision in estimating test material performance. This sample, which is larger than that traditionally required by US EPA, is implemented at considerable expense to the study sponsor, but is consistent with suggestions from HSRB advisors to EPA. The resulting data set will be provide values suitable for any additional statistical characterizations of repellent performance that EPA may wish to employ in developing labeling language for the Test Materials.

5 Quality Assurance

A separate, professional Quality Assurance Unit (QAU) will inspect the study. The QAU will report to the Study Director. Protocol Review and Comments must take place before data collection commences. In-Life Inspection must include observing the measurement and recording of key variables by subjects and technicians. In addition, the Final Report will be audited for completeness and accuracy. A QAU Statement will address compliance and noncompliance or any omissions in auditing. Findings from the In-Life Inspection and the Final Report, as well as the QAU Statement will be transmitted to both the Study Director and to the Sponsor Monitor.

6 Amendments and Deviations to the Protocol

Protocol amendments or deviations will be reviewed by the Study Monitor and the Study Director. Any changes that may affect the health or safety of study participants must be approved by the Study Director, the State of California Department of Pesticide Regulation, and the approving IRB. The amendments, deviations as well as any adverse events will be documented in the Study Director's final report. Documentation will include a description of the change, the reason for the change and the effect of the change on the conduct and outcome of the study.

7. LITERATURE CITED AND SELECTED REFERENCES

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8 Protocol Approval Signatures

Scott P. Carroll, Ph.D.
Study Director

July 26, 2009
Date

for Stanley C. Oslosky
Stanley C. Oslosky
Head of Regulatory Affairs
LANXESS Corporation

July 27, 2009
Date

G. K. Sangha, Ph. D.
Study Monitor

July 27, 2009
Date

INFORMED CONSENT AUTHORIZATION TO PARTICIPATE AS A RESEARCH STUDY SUBJECT

Title of Study: LNX-003 EFFICACY TEST OF KBR 3023 (PICARIDIN; ICARIDIN) - BASED PERSONAL INSECT REPELLENTS (20% CREAM AND 20% SPRAY) WITH TICKS UNDER LABORATORY CONDITIONS

Principal Investigator: Scott P. Carroll, Ph.D.
Carroll-Loye Biological Research
711 Oak Avenue
Davis, CA 95616
(530) 902-8267

Site of Investigation: Carroll-Loye Biological Research
711 Oak Avenue, Davis, CA 95616

Sponsor: LANXESS Corporation

Participant's Name: _____

INTRODUCTION
You are being asked to participate in a research study. Your participation is voluntary. The information in this Informed Consent Form explains the study. You will receive a copy of this form, and you may take it home to think about before making your decision. If you request, we will also provide you with a copy of the study Protocol, which details all the procedures of the study, and contains details about product safety. If you have any questions or do not understand anything in this form, please ask the Principal Investigator to explain any words or information you do not clearly understand.

NATURE AND PURPOSE
Carroll-Loye Biological Research is conducting this research study in order to develop effective repellents. Many people are interested in having new and better insect repellents available to them. The insect repellents that we will study were developed with improved formulations of the ingredient Picaridin. More studies are needed to determine how well such new insect repellents work.

The purpose of the study is to test how well this insect repellent, in cream and pump spray formulations, works against two types of ticks. The information gained from the study will assist in developing these repellents for commercial marketing. During the study, we will test the insect repellents against ticks in a laboratory.

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Independent IRB

_____ 7/28/09
Signature Date

Initials: _____
Date: _____

The sponsor, LANXESS Corporation, has contracted Carroll-Loye Biological Research to conduct the study. Scott Carroll, Ph.D., of Carroll-Loye Biological Research is the Principal Investigator (Study Director) in charge of the study.

SUBJECT SELECTION

You have been invited to participate in this research study because you are a male or female, read and speak English, consider yourself to be in good physical condition and are 18-55 years old.

If you are a female of child-bearing potential, you cannot be pregnant or breastfeeding. Using an over-the-counter (OTC) pregnancy kit supplied by a technician, you will perform a pregnancy test at the laboratory on the day of any study visit in which repellent will be applied or in which you will be exposed to biting insects. Your test results will be verified by a female technician experienced in making that assessment. If you are pregnant, you will not be allowed to participate in the study. Information regarding your pregnancy test results will be kept in confidence. If you decide to withdraw from the study after taking the pregnancy test you do not need to show a positive result.

RESTRICTIONS

- You must not be a student or employee of the Principal Investigator.
- You must not be hypersensitive (allergic) to tick bites, or phobic of ticks.
- You must not be sensitive to any of the test product ingredients, or allergic to common cosmetics.
- You must regularly spend time in outdoor settings.
- You must be able to see and remove ticks that come in contact with your skin.
- You must not have used repellents within a day prior to the start of the study.
- You must not use perfumed products after 9 p.m. the night before and throughout the tests. To meet this restriction, you may need to purchase fragrance-free cosmetics prior to the test days. If you do, you will be reimbursed for your expenses.
- You must refrain from smoking or consuming alcoholic beverages after 9 p.m. the night before and throughout the tests.

NUMBER OF SUBJECTS PARTICIPATING

Up to about 23 subjects will be enrolled at this single-site study. A few more subjects will be enrolled than are needed in order to make up for anyone who is unexpectedly unable to participate once testing begins. If more subjects are present than are needed for any part of the test, you may be asked not to

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participate, but will instead be an 'alternate subject' who may be contacted to participate later if needed. If you are designated as an alternate, you will be compensated for your participation up to that point and for your inconvenience.

STUDY INTRODUCTION AND DURATION

Schedule of visits and time required to participate in the study

Activity	Visit 1	Visit 2
1. Orientation visit	X	
2. Lab study visit		X
Total time	2-2.5 hours	8-16 hours

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You will be given a training manual and will have a chance to review it and to read along with the instructions.

Visit 1 for Orientation

Within 30 days before the second visit (in which we will test the repellents against ticks), you will meet with a researcher to perform orientation activities for the repellent study. The researcher will tell you more about what you will experience while participating and what is expected of you, and you will sign this consent form. You will also be shown how handle ticks on your skin with a small artist's paintbrush. This training and practice will take about ½ hour.

The total time for Visit 1 activities will be about 2-2.5 hours.

Visit 2 for the Tick Repellent Test

The study will also require a second visit to the same laboratory. This second visit will most likely require approximately 12 hours of your time. However, it may require as few as about 4 hours or many as about 16 hours, depending on how long the repellents remain effective. Bathrooms are available, and meals, drinks and snacks will be provided.

STUDY PROCEDURES

Visit 1

At the laboratory, a researcher will measure the length and circumference of your forearm. If you have participated in a Carroll-Loye Biological Research study within the last two years, and were measured for that study, we will use your on-file limb measurements unless, when asked, you indicate that you think you have gained or lost weight or muscle mass on your limbs since the previous measurements were taken.

You will also be given a verbal orientation to the activities of the test day, with an opportunity to ask the researcher questions or share your concerns about any aspect of the research activities.

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At the laboratory, you will spend about 30 minutes practicing handling ticks in the laboratory in preparation for the repellent study. A technician will show you how to catch the ticks, place them on your skin, take them off, and place them in a container. You will practice these tasks several times in order to familiarize yourself with how to handle the ticks carefully and successfully. You will also be trained to recognize tick attachment/biting behavior, which includes cessation of crawling motion and pressing mouth parts against the subject's skin or placing head down against your skin while lifting hindmost legs off of the your skin. If you observe this behavior during the test, you will alert the attending technician, who will remove the tick immediately using a paintbrush or, if needed, tweezers. You may ask the technician for advice on how to handle the ticks at any time while you are practicing. The ticks used for this training are reared in the laboratory and free from diseases.

The 30-minute practice also tests to make sure the types of ticks to be used in the test will move up your arm. If either of the two types of ticks will not move up your arm, you will be asked to withdraw from the study.

Visit 2

This is the day of the actual repellent study. You will first be guided to wash your lower arms with mild, low fragrance soap, rinsing them with a spray of ethyl alcohol (mixed at 35% in water), and then drying them with a clean towel. Experienced personnel will then apply repellent to one of your forearms to give even, complete coverage of the skin. The amount of repellent applied on an arm is likely to be no more than about ¼ teaspoon. You will be randomly (like a flip of a coin) assigned to receive either 20% Picaridin Spray or 20% Picaridin Cream. Your other arm will not be treated, but will instead be used to determine whether each tick is active enough to be tested on your treated arm.

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During the test, you will be seated at a laboratory table with about six other treated subjects, and a researcher or technician will lead you in handling and keeping track of the ticks, of the time, and of your tick observations. Every 15 minutes, you will test a new tick from one species first on your untreated and then on your treated arm, and report the results to your leader. You will then repeat that sequence with a tick of the other species. Together testing the two ticks will usually take between 5 and 10 minutes to complete, rarely longer. At times you may need to stand so that the ticks may climb upward, which is their preference.

Every 15 minutes a researcher or technician will announce the beginning of the next period for testing the treated skin. You will continue in this way until a tick of each species crosses the repellent in two of three consecutive periods, as long as you are comfortable. There will usually be time for brief breaks to eat and use the bathroom between test periods. Rarely, there may be several test periods during the test that are unusually long, leaving little or no time until the next period. In this case, you may need to wait until the following period to take a break.

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When a technician indicates you are finished with the testing activity, the technician will direct you to discard your gloves and wash any applied skin area to make sure all treatment residues are removed. Using a clean towel each time, wash applied areas with cleanser, rinse with water, dry, then wash with mild alcohol solution (35% ETOH in water) rinse with water, and dry.

RISKS / DISCOMFORTS

If at any time you feel ill, inform the Principal Investigator (or anyone else who is assisting to direct the study) immediately. You will be taken to receive medical attention at the nearest healthcare facility. You may also request access to standard first-aid materials (such as bandages, antiseptics and mild antihistamines) and request first-aid assistance at any time. You may remove yourself for any reason from the study at any time without penalty to your compensation. At least one qualified researcher will remain with the other test subjects if other researchers depart with an injured or ill subject.

The cream repellent will cause substantial but temporary injury to eyes on contact. The pump spray repellent will cause moderate irritation to eyes on contact. Both are harmful if swallowed. You may obtain more information about the safety of the repellents by asking a technician at any time. You will be given the Material Safety Data Sheets, which list product safety details similar to those found on commercial product labels.

If they bite you, ticks can transmit serious diseases, or cause tick paralysis. Ticks require many minutes to bite through the skin, and we do not expect them to attempt to bite you during the study. The artist's paintbrush that we will train you to use to handle ticks will also be used to remove any ticks before they bite or bury in the skin. The ticks have been screened for infectious diseases at the US Centers for Disease Control and have been determined to be free of the pathogens that cause Lyme Disease, Rocky Mountain Spotted Fever, Ehrlichiosis, and Anaplasmosis. Contact a physician and the Principal Investigator if you develop a rash within 7 days after the day of testing. The first-aid kit at the laboratory contains treatments to reduce allergic symptoms. Inform the Principal investigator if you are allergic to any nonprescription medicines. At least one technician with current first-aid training will be present during the test.

PREGNANCY RISKS

The risks to the unborn are unknown and may be hazardous. If you are a woman of childbearing potential, it is important that you do not participate in this study if you are, or if you think you may be pregnant, or if you are lactating.

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If you are a female subject who is tested for pregnancy, and you test positive, there is some risk of psychological stress from the surprise of the result. Only a single female technician will evaluate the results, and no record will be made of the results, to maximize your privacy by minimizing the small but present risk that other staff or subjects may become aware of the results.

UNKNOWN / UNFORESEEABLE RISKS
In addition to the risks and discomforts listed above, there may be some unknown or infrequent and unforeseeable risks associated with using this product, including allergic reaction or interaction with a medication. You will be informed in a timely manner both verbally and in writing of any new information, findings or changes to the way the research will be performed that might influence your willingness to continue participation in this study, or change the nature of the risks associated with participating.

RESEARCH-RELATED INJURIES
If you are injured as a result of being in this study, a consulting physician who is aware of the study will be contacted immediately by telephone. Medical treatment will be available from a healthcare facility. Carroll-Loye Biological Research will cover the costs of such medical treatment that are not covered by your own insurance or by a third party that covers you. If necessary, Carroll-Loye Biological Research will transport you to receive medical attention and pay costs associated with the reasonable and appropriate treatment for any injuries incurred as a result of participation in the study. For further information about this, volunteers should call the Carroll-Loye Biological Research office at (530) 902-8267.

You <u>DO NOT</u> waive any of your legal rights by signing this form.

TREATMENT ALTERNATIVE
Since this study is not intended to provide any therapeutic or other health-related benefit, your alternative is to not participate in this study.

BENEFITS
There are no immediate benefits to you from your participation. However, by serving as a participant, you may assist in making new insect repellent products available to consumers.

OFFER TO ANSWER ANY QUESTIONS ABOUT THIS STUDY
If you have any questions or problems during this study, or if you think that you may have experienced a research-related injury, you should contact Scott Carroll of Carroll-Loye Biological Research at (530) 902-8267 at any time.

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If you have any questions regarding your rights as a research participant, please contact Kim Lerner, Chair of the Independent Investigational Review Board, Inc. at toll free 1- (877) 888-iirb (4472) between 6:00 AM and 2:00 PM, Pacific time, Monday through Friday. You can also contact the Independent Investigational Review Board, Inc. if you would like to report problems in a research study, express concerns, ask questions, request information, or provide input. The Independent Investigational Review Board is a committee established for the purpose of protecting the rights of participants in a research study. For more information about your rights and role as a research participant you can visit the Research Participant section of the IIRB, Inc. website at www.iirb.com.

COSTS AND REIMBURSEMENT
There will be no costs to you from participating in this study.

For participation in the study, each research study participant will receive a cash payment of $20 per hour. Payment will be made at the end of each visit or whenever you withdraw from the study. If you are designated as an 'alternate subject,' you will be paid $50 to compensate you for being inconvenienced.

CONFIDENTIALITY
Carroll-Loye Biological Research will retain records of this study indefinitely. You may access your own records by contacting the Study Director. Representatives from the sponsor (LANXESS Corporation), the U.S. Environmental Protection Agency (EPA), the California Department of Pesticide Regulation and the Independent Investigational Review Board, Inc. (an independent committee that reviewed this study's ethical aspects to help protect the rights and welfare of study participants) may have access to all non-personal information collected in this study. Because of the need to release information to these parties, absolute confidentiality cannot be guaranteed. Any information or reports published as a result of this study will not identify you by name, or by any other personal identification.

STATEMENTS OF UNDERSTANDING
Right to withdraw or removal from study
You understand that you are free to withdraw from this study at any time, and you agree to inform the Principal Investigator immediately if you intend to withdraw. It is understood that your decision to participate in this study or to withdraw from this study will not influence the availability of your future medical care and will involve no penalty or loss of compensation or benefits to which you are otherwise entitled. You may withdraw from this study at any time.

You agree that the Principal Investigator in charge of the study can remove you from this study without your consent for any reason, including, but not limited to:

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a. His/her judgment that any condition or circumstance may jeopardize your welfare or the integrity of the study.
b. Your failure to follow the instructions of the investigator(s).
c. If the study is stopped by the sponsor and/or Principal Investigator prior to completion.

Consent and signatures

I have read, in a language that I understand well, and understand the information which has been stated above. I have received satisfactory answers to all of the questions that I have asked. I hereby voluntarily consent to take part in this study and to be a research study participant in this study. I do **not** waive any of my legal rights by signing this Informed Consent Form. I shall receive a copy of the signed Informed Consent Authorization.

_____	_____	_____	_____
Date (MM/DD/YY)	Time	**Print** Subject Name	**Sign** Subject Name

_____	_____	_____
Date	**Print** Carroll-Loye Biological Research Representative	**Sign** Carroll-Loye Biological Research Representative

Copy of signed/dated consent form given to subject on (date)_____ by_____ (initials)

Independent Investigational Review Board, Inc.
Approved: 7/28/09

APPROVED BY
Independent IRB

_____ 7/28/09
Signature Date

Initials: _____
Date: _____

Carroll-Loye Biological Research
711 Oak Avenue Davis, California 95616 Tel (530) 902-8267 http://www.carroll-loye.com/

CLBR Training Manual

§1.b. Handling ticks and observing their movement on the skin

A. Goals of exercise

1. Learn to move and handle ticks using a fine artist's paintbrush in preparation for participating in a tick repellent study.
2. Learn to observe ticks and measure their movement in preparation for collecting data on the effectiveness of a repellent against ticks.
3. Determine if the types of ticks to be used in the study will move up your arm.
4. Learn to identify and distinguish between the two species of ticks you will be handling.

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B. General information

1. A technician will show you how you how to remove ticks from a plastic vial using a small paintbrush, how to avoid injuring the ticks, and how to place them on you arm and remove them, and how to dispose of them.
2. A technician will draw three lines on your forearm, each 3 cm apart. You will practice placing ticks on the arm and both watching and timing their movement in relation to those lines.
3. You will work one tick at one time. The ticks are reared in the laboratory and are free from disease.

C. Materials and equipment needed

1. Fine paintbrush
2. Marking pen
3. Approximately 6 unfed ticks
4. Labeled vials for accessing and disposing of ticks
5. Shallow pans with water
6. Timer
7. Practice data sheet and pen

D. Learning the methods

Spend about 30 minutes practicing handling two kinds of ticks in the laboratory in preparation for the repellent study. Your trainer will show you how to remove ticks from vials (held in water pans in order to keep ticks from escaping). Your trainer will draw three fine lines with removable ink across your inner forearm, near the wrist, 3 cm apart from one another. From the vial labeled 'Fresh", gently touch the paintbrush tip near the front of a tick's body. It will climb onto the brush. Place the tick on the line nearest your wrist, noting the time. If the tick does not begin walking within approximately 15 seconds, the tick is considered not active enough. Remove this tick and replace it with another, again noting the time. A tick that is active enough will usually walk toward your elbow. If the tick instead walks toward your hand, elevate your elbow further above the hand and use the brush to gently guide the tick back toward the lines. Once it passes the first line, walking toward the elbow, note the time at that point. Observe whether the tick crosses both the second and third lines toward your elbow within three minutes of the start time. After it has crossed the third line, or after three minutes if not, use your brush to remove the tick and place it in the vial labeled 'Used'. If it crossed that line within three minutes, record 'C' on the practice data sheet; otherwise record 'R' for 'repelled'. You will practice these tasks five times with each kind of tick in order to familiarize yourself with how to handle the ticks carefully and successfully, and to determine if both kinds of ticks will move up your untreated arm. It is very unlikely that ticks will attempt to bite you during this training or during the actual study. However, if you see a tick stop

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Shawn King User 9/8/09 3:27 PM
Deleted: several times

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moving and press it mouth against your skin for more than a minute, or you feel a tick begin to bite, immediately remove it with the paintbrush, and alert the trainer. You may ask your trainer for advice about any aspects of these activities at any time while you are practicing.

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October 30, 2009

Mr. Robert Roogow
Independent Investigational Review Board
6738 W. Sunrise Blvd., Suite 102
Plantation, Florida 33313

Amendment 1, Carroll-Loye Protocol LNX-003

Please find below Amendment 1 for CLBR Protocol LNX-003: EFFICACY TEST OF KBR 3023 (PICARIDIN; ICARIDIN) - BASED PERSONAL INSECT REPELLENTS (20% CREAM AND 20% SPRAY) WITH TICKS UNDER LABORATORY CONDITIONS, along with the associated Informed Consent Form and the Protocol body as MS Word files with tracked changes showing.

The amendment is prepared in response to HSRB reviews at the October 2009 meeting at US EPA in Crystal City, VA., and to reviews by California EPA. The amendment is presented as a list of entries arranged in order of appearance in the Protocol. For all edits, the location of the change in the protocol and the exact change of wording are given. The line numbers provided refer to beginning locations in the original document, approved by IIRB, Inc. 30 July 2009. Adjustments to Consent documents, and miscellaneous support documents, are provided after.

This amendment clarifies how described procedures apply to or include one, both, or either of the two tick species to be used in the test, how subjects are screened for attractiveness to the target tick species, and how stopping rules apply to the cessation of tick foraging activity. In addition, this amendment will correct several minor errors and potentially confusing statements.

Please let us know if IIRB, Inc. will be providing an expedited review of this submission.

Thank you.

Sincerely,

Dr. Scott P. Carroll, Ph.D.
Study Director

Carroll-Loye Study LNX-003 Amendment 1

Section 1.1 Objective of Research and Endpoints:
Line 139 (paragraph four first sentence), the phrase "for both species" is inserted at the beginning of the sentence so that it now reads,

> "For both species, efficacy and duration will be measured as Complete Protection Time, or CPT, defined herein as the time between application of test material and the First Confirmed Crossing of an actively foraging tick from the untreated skin surface of a subject's hand 3 cm or more into the treated forearm skin area."

Line 146 (Paragraph five), the phrase "first confirmed" is deleted and the phrase "for each species" is added after "FCC" so that the sentence now reads

> "The endpoint will be the time of failure expressed as the time of the FCC for each species for each subject."

Section 1.3.2 Risks from Exposure to Biting Arthropods
Line 212 (first paragraph, third sentence) the phrase "treated limb" is deleted and replaced with the word "subject" and the phrase "the repellent begins failing" is deleted and replaced with the phrase "that subject has received confirming crossings for both tick species" such that the sentence now reads:

> "Stopping Rules (§4.7.6) and Medical Management practices (§1.3.6) specify removing any subject from the study when that subject has received confirming crossings for both tick species or the subject shows signs of reacting to a bite or to contact with ticks.

Line 214 (first paragraph, fourth sentence). The sentence "Subjects will be exposing small areas of treated and untreated skin for a maximum 24 minutes per hour" is deleted.

Second paragraph, last sentence (line 225) becomes the first sentence of a new paragraph, and the word "This" is deleted and replaced with the phrase "The training procedure". New content is added after, such that the new paragraph now reads as follows:

> "The training procedure also serves to verify the subject's attractiveness to ticks in the study. If during subject training any qualifying tick (as defined in §4.7.3) per five exposures of each species fails to cross on the subject, the subject will be asked to withdraw."

Section 3.1 Candidate Recruitment: Population, Sampling Frame, Representativeness

Line 368 (paragraph four, last sentence), the phrase "while comparable data are not available for ticks," is inserted after "Nonetheless" so that the sentence now reads:

> "Nonetheless, while comparable data are not available for ticks, because gender effects seem most plausible, we will enroll similar numbers of males and female subjects."

Line 382 misspelled word "principals" is corrected to "principles"

Section 3.3.2 Exclusion criteria, all subjects:
Line 447 (Item number 14)
Item deleted. Content is edited and moved to §4.7.6 Stop Rules (see below).

Line 455 (Item number 15)
Item deleted. Content is edited and moved to §4.7.6 Stop Rules (see below).

Section 4.1 Number of Subjects:

Line 565 (third paragraph third sentence) "is" is replaced with "are" such that the sentence now reads:

> "We reduce this risk by confirming subject attractiveness to ticks before they participate in the phase of the test where efficacy data are collected."

Section 4.2 Number of Controls

Line 607 To clarify that each tick is screened for its attraction to a given subject in addition to each subject being screened for his or her attractiveness to each tick species, the word "individual" is inserted before the word "tick" and the word "it" is replaced with the phrase "that tick" in the third sentence of the first paragraph so that the sentence now reads:

> "The 'negative control' for efficacy data sets serves to insure that each individual tick employed in the study is attracted to the test subject before that tick is used in a repellency challenge."

Line 610, the reference to §4.8.2.1 is corrected to §4.8.3.1.

Section 4.5 Subject measurements

Line 640-641 (first paragraph, fourth sentence) the word "bi-annually" is replaced with "biennially" so that the sentence now reads:

> "Subjects will be re-measured biennially or if, when asked, they indicate they may have gained or lost weight or muscle mass on their limbs since their measurements were last taken."

Section 4.6 Standard Dose as Determined by Dosimetry

Line 654, table first row second column, the quantity "2.51 µl/cm^2" is deleted and replaced with the acronym "TBD"

Line 655, footnote to dosing rates table; the entire footnote is deleted and replaced with the sentence:

> "As part of Carroll-Loye study LNX-002 (MRID 47506401), additional dosimetry data will be collected for the Cream 20% product. The augmented data set will be used to determine final dosage."

Section 4.7 Efficacy – Components of the test

Line 682, third paragraph, first sentence – the statistical term "blocked" is used inappropriately in the protocol. The word "blocked" is replaced with the correct term "stratified" so that the sentence now reads:

> "All subjects will be assigned to the treated group, which will be stratified by gender."

Section 4.7.1 Blinding of Study

Line 698 and 700 (first paragraph second and third sentences), the word "three" is deleted and replaced with "two" so the sentences now read:

> "However, within the treated group, the two treatments will be indistinguishable to test subjects and staff based on their physical properties. Accordingly, the two treatments will be coded 'A' or 'B' by a technician."

Section 4.7.3 Confirming Tick Foraging Activity

Line 726, after the phrase "must first" the phrase "be determined to be a "qualifying tick" (defined as beginning walking on the hand of the subject's untreated arm within approximately 15 seconds of being placed there). Each tick must then also" is inserted so the section it its entirety now reads:

> "To be included in the test on a treated limb, each tick must first be determined to be a "qualifying tick" (defined as beginning walking on the hand of the subject's untreated arm within approximately 15 seconds of being placed there). Each tick must then also meet the crossing criterion on the untreated limb, following the procedure for the treated limb in the same test period (§4.8.3.1)."

Line 728, reference to §4.8.2.1 is corrected to §4.8.3.1.

Section 4.7.4 Measuring Repulsion

Line 731 (first sentence), the phrase "For each tick species" is inserted at the beginning and the phrase "the First Confirmed Crossing" is deleted and replaced with "a confirming crossing" so that the sentence now reads:

> "For each tick species, the number of crossings on each subject's exposed treated area will be recorded (Appendix 2) as they occur during 3-minute exposure periods commencing once every 15 minutes, beginning at the onset of data collection and ending when the subject receives a confirming crossing, a stopping rule is invoked for the subject, or the Study Director stops the test for all subjects."

Section 4.7.6 Stop Rules

Individual rules are now numbered for ease of referencing.

All Subjects, third statement (line 750) "Foraging pressure falls below threshold needed to challenge the Test Material(s)" is deleted.

Individual Subjects second statement (line 755) is moved down to become the last statement in the list (i.e. rule number 4). For the phrase "Subject proves unattractive to target species" a colon is placed on the end, and the following content is added after:

> *"During subject training (see CLBR Training Manual §1.b Handling ticks and observing their movement on the skin)* – if any qualifying tick (as defined in §4.7.3) per five exposures of each species fails to cross on the subject, the subject will be asked to withdraw.
>
> *During repellency trial* - While we do not anticipate tick avidity as measured by our criteria (§4.8.3.1) will change significantly during the study, should a subject unexpectedly lose attractiveness to either tick species (as gauged on the untreated arm, detailed in the following paragraph) before a confirming crossing, he or she will be replaced on a later date if it is determined that his or her total exposure duration is less than 90% of the mean of subjects who did not withdraw, and when not more than 2 of 10 subjects have so withdrawn. If more than 2 of 10 subjects withdraw prematurely, those with the briefest participation will be replaced first. This stop rule is not automatically invoked if the Study Director ends exposures due to other factors, such as subject exhaustion; in such cases the data collected before termination may be sufficient to meet the study goals.
>
> This stop rule is invoked in part or whole if the following sequence of events occurs: Three ticks of a species do not cross on subject's untreated arm during a test interval, in which case subject is retired from testing that species. The second tick species is then tested with the same failure criterion. Since each tick is given 3 minutes to cross on the untreated arm, note that in the unlikely scenario of a full 6 ticks (3 of each species, summing to 6 ticks for both species combined) being tested within an interval, testing of the sixth tick would not begin until after 15 minutes had elapsed, which would normally be the time at which the next exposure interval would begin. If the third tick of the second species crosses the untreated arm at that point, its data from the treated arm will be assigned to the prior exposure interval, and exposures for the next interval will begin immediately. If the third tick of the second species does not cross on the untreated arm, the subject is asked to withdraw."

Section 4.8.3 Test Day

Line 777 (second paragraph, first sentence) the section references "(§4.8.3.1 and §4.8.3.2)" are inserted after the word "procedures" and the phrase "for each species in sequence (not concurrently)" is inserted after the word "repeated" and the phrase "at designated time intervals" is deleted and replaced with the phrase "within each interval, with intervals occurring every 15 minutes," so that the sentence now reads:

> "The following test procedures (§4.8.3.1 and §4.8.3.2) are repeated for each species in sequence (not concurrently) by each subject within each interval, with intervals occurring every 15 minutes, until a stop rule (§4.7.6) is invoked."

Section 4.8.3.1 Tick screening for active foraging and repellency challenge

Line 790
The following new content is inserted:

> "Subjects screen ticks in two steps. First, whether an individual tick is "qualifying" (sufficiently active in general) is screened as described in §4.7.3. Second, whether an individual tick is "actively questing" is screened by observing whether it walks past the second marker dot in motion toward the elbow of the untreated arm."

Line 792 (second paragraph second sentence), the phrase "every 15 minutes" is deleted and after the word "repeating" the phrase "with the same tick species" is inserted. After the word "identified", the phrase ", or the stopping rule for lack of active questing is invoked (§4. 7.6, stopping rule 4 for individual subjects during repellency trial)" is inserted. The sentence now reads:

> "Each subject selects an unused tick and screens it for active questing behavior, repeating with the same tick species until an actively questing tick is identified, or the stopping rule for lack of active questing is invoked (§4.7.6, stopping rule 4 for individual subjects during repellency trial)."

Line 797-798 (third paragraph first sentence) an inappropriately placed parenthesis is moved from after the word "line" to after the word "distal" so that the sentence now reads:

> "To initiate a screening or a repellent challenge, a tick is placed on the ventral arm or proximal palm, in the most hair-free portion, at the first (most distal) line."

Line 805 (forth paragraph first sentence), insert the word "qualifying" before the word "tick" such that the sentence now reads:

> "Active questing is verified if a qualifying tick travels past the second marker dot in motion towards the elbow on the untreated arm."

Line 826, a new section is inserted 4.8.4 Additional efficacy data collection.

> "In the event that a subject withdraws during the Test Day or the Study Director invokes individual subject stopping rule number 4 (§4.7.6) for that subject, his or her data will be replaced by repeating the described procedures (this protocol, especially §4.8.3) on a subsequent day. Subsequent testing groups may consist of as few as one subject, who would work singly with a technician rather than in a subject group."

Section 4.9 Efficacy – Statistical design and analysis

This section requires numerous corrections as additions (inserts). They are organized by paragraph number and sentence number here, in table format for ease of review.

Paragraph	Sentence (line #)	Changes made	Resulting sentence
2	1 (832)	Add "for each tick species" after "analyze data"	Because all subjects use different ticks, all ticks are used only once, and neither organism interacts directly with conspecifics at the level of the skin and the repellent during data collection, we will analyze data for each tick species by subject as independent, replicated values.
2	3 (837)	Add "for each tick species" after "such that"	The objective is to compute, for each test material, a reasonable estimate of mean and standard deviation for the duration between application and sufficient repellency breakdown such that for each tick species there are two ticks crossings on a subject within a half hour period.
2	4 (840)	Add "for each tick species" after "assessed"	That pattern is here assessed for each tick species at a resolution of 15 minutes.
3	1 (843)	Add "tick species on each" after "for each"	For each tick species on each treated subject, we will measure (data form Appendix 2):
4	2 (849)	Add " 'confirming' " after "another"	A FCC is a Crossing followed by another "confirming" Crossing within 30 minutes.
5	1 (855)	Add "for each tick species" after "subject"	CPT is measured as a single time value for each subject for each tick species.
5	2 (855)	Add "for each tick species" after "CPT"	Based on the requirements for such estimates in the EPA draft repellent efficacy testing guidelines (1999; OPPTS 810.3700), we will calculate mean CPT for each tick species across all 10 subjects, with standard deviation and 95% confidence interval information.
6	2 (863)	Add "within tick species" after "subject"	To examine the temporal pattern of failure further, we will employ Kaplan-Meier survival analyses by subject within tick species.
6	4 (867)	Add "on each tick species" after "product"	In addition, we will estimate the Kaplan-Meier median, and the time until 25% failure, for each test product on each tick species.

Section 6 Amendments and Deviations to the Protocol

Line 894 (First paragraph second sentence) the missing word "by" is added to the phrase "approved the Study Director" so the phrase now reads "approved by the Study Director".

CLBR Training Manual §1.b. Handling ticks and observing their movement on the skin
Page 51 of the Protocol

Part A. Goals of exercise
In item 1, the word "participate" is corrected to "participating".

An item 3 is added as follows "Determine if the types of ticks to be used in the study will move up your arm."

An item 4 is added as follows "Learn to identify and distinguish between the two species of ticks you will be handling."

Part D. Learning the methods
First sentence, after "handling" the phrase "two kinds of" is inserted so the sentence now reads:

"Spend about 30 minutes practicing handling two kinds of ticks in the laboratory in preparation for the repellent study."

Sixth sentence, after the phrase "noting the time" a period is added and a new sentence begins, "If the tick does not begin walking within approximately 15 seconds, the tick is considered not active enough. Remove this tick and replace it with another, again noting the time." The phrase "as soon as the tick begins to" is deleted and replaced with the phrase "A tick that is active enough will usually". In the next sentence, the word "further" is inserted after the phrase "your elbow". The thus edited portion of the paragraph now reads:

> "Place the tick on the line nearest your wrist, noting the time. If the tick does not begin walking within approximately 15 seconds, the tick is considered not active enough. Remove this tick and replace it with another, again noting the time. A tick that is active enough will usually walk toward your elbow. If the tick instead walks toward your hand, elevate your elbow further above the hand and use the brush to gently guide the tick back toward the lines."

Fourth from last sentence, the phrase "several times" is deleted and replaced with the phrase "five times with each kind of tick" and after the word "successfully" the phrase "and to determine if both kinds of ticks will move up your untreated arm" is inserted so that the sentence now reads:

> "You will practice these tasks five times with each kind of tick in order to familiarize yourself with how to handle the ticks carefully and successfully, and to determine if both kinds of ticks will move up your untreated arm."

Informed Consent Form

Number of Subects Participating:
Title line, add "j" into "Subects" to correct misspelling.

Study Introduction and Duration
In the table, the word "Field" is replaced with "Lab".

Study Procedures:
Visit 1 subsection, add new paragraph after the third paragraph reading as follows:

> "The 30-minute practice also tests to make sure the types of ticks to be used in the test will move up your arm. If either of the two types of ticks will not move up your arm, you will be asked to withdraw from the study."

Visit 2 subsection,

First paragraph, third sentence – the inappropriately pluralized word "repellents" is corrected to "repellent" such that the sentence now reads:

> "Experienced personnel will then apply repellent to one of your forearms to give even, complete coverage of the skin."

Second paragraph, fourth sentence, add the phrase ", rarely longer" so that the sentence now reads:

> "Together testing the two ticks will usually take between 5 and 10 minutes to complete, rarely longer."

Third paragraph: In the third sentence, add the phrase "usually be" to the phrase "there will time" and at the end of the paragraph, add a new sentence such that the third and fourth sentences of that paragraph now read as follows:

> "There will usually be time for brief breaks to eat and use the bathroom between test periods. Rarely, there may be several test periods during the test that are unusually long, leaving little or no time until the next period. In this case, you may need to wait until the following period to take a break."

Carroll-Loye Study LNX-003 Amendment 1 Approval

Scott P. Carroll, Ph. D.
Study Director

30 October 2009
Date

Stanley C. Oslosky
Head of Regulatory Affairs
LANXESS Corporation

October 30, 2009
Date

Ghona Sangha, Ph. D.
Study Monitor

October 30, 2009
Date

INFORMED CONSENT AUTHORIZATION TO PARTICIPATE AS A RESEARCH STUDY SUBJECT

Title of Study: LNX-003 EFFICACY TEST OF KBR 3023 (PICARIDIN; ICARIDIN) - BASED PERSONAL INSECT REPELLENTS (20% CREAM AND 20% SPRAY) WITH TICKS UNDER LABORATORY CONDITIONS

Principal Investigator: Scott P. Carroll, Ph.D.
Carroll-Loye Biological Research
711 Oak Avenue
Davis, CA 95616
(530) 902-8267

Site of Investigation: Carroll-Loye Biological Research
711 Oak Avenue, Davis, CA 95616

Sponsor: LANXESS Corporation

Participant's Name: _____

INTRODUCTION

You are being asked to participate in a research study. Your participation is voluntary. The information in this Informed Consent Form explains the study. You will receive a copy of this form, and you may take it home to think about before making your decision. If you request, we will also provide you with a copy of the study Protocol, which details all the procedures of the study, and contains details about product safety. If you have any questions or do not understand anything in this form, please ask the Principal Investigator to explain any words or information you do not clearly understand.

NATURE AND PURPOSE

Carroll-Loye Biological Research is conducting this research study in order to develop effective repellents. Many people are interested in having new and better insect repellents available to them. The insect repellents that we will study were developed with improved formulations of the ingredient Picaridin. More studies are needed to determine how well such new insect repellents work.

The purpose of the study is to test how well this insect repellent, in cream and pump spray formulations, works against two types of ticks. The information gained from the study will assist in developing these repellents for commercial marketing. During the study, we will test the insect repellents against ticks in a laboratory.

APPROVED BY
Independent IRB
Signature 11/2/09 Date

Initials: _____
Date: _____

The sponsor, LANXESS Corporation, has contracted Carroll-Loye Biological Research to conduct the study. Scott Carroll, Ph.D., of Carroll-Loye Biological Research is the Principal Investigator (Study Director) in charge of the study.

SUBJECT SELECTION

You have been invited to participate in this research study because you are a male or female, read and speak English, consider yourself to be in good physical condition and are 18-55 years old.

If you are a female of child-bearing potential, you cannot be pregnant or breastfeeding. Using an over-the-counter (OTC) pregnancy kit supplied by a technician, you will perform a pregnancy test at the laboratory on the day of any study visit in which repellent will be applied or in which you will be exposed to biting insects. Your test results will be verified by a female technician experienced in making that assessment. If you are pregnant, you will not be allowed to participate in the study. Information regarding your pregnancy test results will be kept in confidence. If you decide to withdraw from the study after taking the pregnancy test you do not need to show a positive result.

RESTRICTIONS

- You must not be a student or employee of the Principal Investigator.
- You must not be hypersensitive (allergic) to tick bites, or phobic of ticks.
- You must not be sensitive to any of the test product ingredients, or allergic to common cosmetics.
- You must regularly spend time in outdoor settings.
- You must be able to see and remove ticks that come in contact with your skin.
- You must not have used repellents within a day prior to the start of the study.
- You must not use perfumed products after 9 p.m. the night before and throughout the tests. To meet this restriction, you may need to purchase fragrance-free cosmetics prior to the test days. If you do, you will be reimbursed for your expenses.
- You must refrain from smoking or consuming alcoholic beverages after 9 p.m. the night before and throughout the tests.

NUMBER OF SUBJECTS PARTICIPATING

Up to about 23 subjects will be enrolled at this single-site study. A few more subjects will be enrolled than are needed in order to make up for anyone who is unexpectedly unable to participate once testing begins. If more subjects are present than are needed for any part of the test, you may be asked not to

APPROVED BY
Independent IRB
Julia Blasini 11/2/09
Signature Date

Initials: _____
Date: _____

participate, but will instead be an 'alternate subject' who may be contacted to participate later if needed. If you are designated as an alternate, you will be compensated for your participation up to that point and for your inconvenience.

STUDY INTRODUCTION AND DURATION

Schedule of visits and time required to participate in the study

Activity	Visit 1	Visit 2
1. Orientation visit	X	
2. Lab study visit		X
Total time	2-2.5 hours	8-16 hours

You will be given a training manual and will have a chance to review it and to read along with the instructions.

Visit 1 for Orientation

Within 30 days before the second visit (in which we will test the repellents against ticks), you will meet with a researcher to perform orientation activities for the repellent study. The researcher will tell you more about what you will experience while participating and what is expected of you, and you will sign this consent form. You will also be shown how handle ticks on your skin with a small artist's paintbrush. This training and practice will take about ½ hour.

The total time for Visit 1 activities will be about 2-2.5 hours.

Visit 2 for the Tick Repellent Test

The study will also require a second visit to the same laboratory. This second visit will most likely require approximately 12 hours of your time. However, it may require as few as about 4 hours or many as about 16 hours, depending on how long the repellents remain effective. Bathrooms are available, and meals, drinks and snacks will be provided.

STUDY PROCEDURES

Visit 1

At the laboratory, a researcher will measure the length and circumference of your forearm. If you have participated in a Carroll-Loye Biological Research study within the last two years, and were measured for that study, we will use your on-file limb measurements unless, when asked, you indicate that you think you have gained or lost weight or muscle mass on your limbs since the previous measurements were taken.

You will also be given a verbal orientation to the activities of the test day, with an opportunity to ask the researcher questions or share your concerns about any aspect of the research activities.

APPROVED BY
Independent IRB
Julie Bleszy 11/2/09
Signature Date

Initials: _____
Date: _____

At the laboratory, you will spend about 30 minutes practicing handling ticks in the laboratory in preparation for the repellent study. A technician will show you how to catch the ticks, place them on your skin, take them off, and place them in a container. You will practice these tasks several times in order to familiarize yourself with how to handle the ticks carefully and successfully. You will also be trained to recognize tick attachment/biting behavior, which includes cessation of crawling motion and pressing mouth parts against the subject's skin or placing head down against your skin while lifting hindmost legs off of the your skin. If you observe this behavior during the test, you will alert the attending technician, who will remove the tick immediately using a paintbrush or, if needed, tweezers. You may ask the technician for advice on how to handle the ticks at any time while you are practicing. The ticks used for this training are reared in the laboratory and free from diseases.

The 30-minute practice also tests to make sure the types of ticks to be used in the test will move up your arm. If either of the two types of ticks will not move up your arm, you will be asked to withdraw from the study.

Visit 2

This is the day of the actual repellent study. You will first be guided to wash your lower arms with mild, low fragrance soap, rinsing them with a spray of ethyl alcohol (mixed at 35% in water), and then drying them with a clean towel. Experienced personnel will then apply repellent to one of your forearms to give even, complete coverage of the skin. The amount of repellent applied on an arm is likely to be no more than about ¼ teaspoon. You will be randomly (like a flip of a coin) assigned to receive either 20% Picaridin Spray or 20% Picaridin Cream. Your other arm will not be treated, but will instead be used to determine whether each tick is active enough to be tested on your treated arm.

During the test, you will be seated at a laboratory table with about six other treated subjects, and a researcher or technician will lead you in handling and keeping track of the ticks, of the time, and of your tick observations. Every 15 minutes, you will test a new tick from one species first on your untreated and then on your treated arm, and report the results to your leader. You will then repeat that sequence with a tick of the other species. Together testing the two ticks will usually take between 5 and 10 minutes to complete, rarely longer. At times you may need to stand so that the ticks may climb upward, which is their preference.

Every 15 minutes a researcher or technician will announce the beginning of the next period for testing the treated skin. You will continue in this way until a tick of each species crosses the repellent in two of three consecutive periods, as long as you are comfortable. There will usually be time for brief breaks to eat and use the bathroom between test periods. Rarely, there may be several test periods during the test that are unusually long, leaving little or no time until the next period. In this case, you may need to wait until the following period to take a break.

APPROVED BY
Independent IRB
Julie Bleasy 11/2/09
Signature Date

Initials: _____
Date: _____

When a technician indicates you are finished with the testing activity, the technician will direct you to discard your gloves and wash any applied skin area to make sure all treatment residues are removed. Using a clean towel each time, wash applied areas with cleanser, rinse with water, dry, then wash with mild alcohol solution (35% ETOH in water) rinse with water, and dry.

RISKS / DISCOMFORTS

If at any time you feel ill, inform the Principal Investigator (or anyone else who is assisting to direct the study) immediately. You will be taken to receive medical attention at the nearest healthcare facility. You may also request access to standard first-aid materials (such as bandages, antiseptics and mild antihistamines) and request first-aid assistance at any time. You may remove yourself for any reason from the study at any time without penalty to your compensation. At least one qualified researcher will remain with the other test subjects if other researchers depart with an injured or ill subject.

The cream repellent will cause substantial but temporary injury to eyes on contact. The pump spray repellent will cause moderate irritation to eyes on contact. Both are harmful if swallowed. You may obtain more information about the safety of the repellents by asking a technician at any time. You will be given the Material Safety Data Sheets, which list product safety details similar to those found on commercial product labels.

If they bite you, ticks can transmit serious diseases, or cause tick paralysis. Ticks require many minutes to bite through the skin, and we do not expect them to attempt to bite you during the study. The artist's paintbrush that we will train you to use to handle ticks will also be used to remove any ticks before they bite or bury in the skin. The ticks have been screened for infectious diseases at the US Centers for Disease Control and have been determined to be free of the pathogens that cause Lyme Disease, Rocky Mountain Spotted Fever, Ehrlichiosis, and Anaplasmosis. Contact a physician and the Principal Investigator if you develop a rash within 7 days after the day of testing. The first-aid kit at the laboratory contains treatments to reduce allergic symptoms. Inform the Principal investigator if you are allergic to any nonprescription medicines. At least one technician with current first-aid training will be present during the test.

PREGNANCY RISKS

The risks to the unborn are unknown and may be hazardous. If you are a woman of childbearing potential, it is important that you do not participate in this study if you are, or if you think you may be pregnant, or if you are lactating.

APPROVED BY
Independent IRB
Signature 11/2/09 Date

Initials: _____
Date: _____

If you are a female subject who is tested for pregnancy, and you test positive, there is some risk of psychological stress from the surprise of the result. Only a single female technician will evaluate the results, and no record will be made of the results, to maximize your privacy by minimizing the small but present risk that other staff or subjects may become aware of the results.

UNKNOWN / UNFORESEEABLE RISKS

In addition to the risks and discomforts listed above, there may be some unknown or infrequent and unforeseeable risks associated with using this product, including allergic reaction or interaction with a medication. You will be informed in a timely manner both verbally and in writing of any new information, findings or changes to the way the research will be performed that might influence your willingness to continue participation in this study, or change the nature of the risks associated with participating.

RESEARCH-RELATED INJURIES

If you are injured as a result of being in this study, a consulting physician who is aware of the study will be contacted immediately by telephone. Medical treatment will be available from a healthcare facility. Carroll-Loye Biological Research will cover the costs of such medical treatment that are not covered by your own insurance or by a third party that covers you. If necessary, Carroll-Loye Biological Research will transport you to receive medical attention and pay costs associated with the reasonable and appropriate treatment for any injuries incurred as a result of participation in the study. For further information about this, volunteers should call the Carroll-Loye Biological Research office at (530) 902-8267.

You DO NOT waive any of your legal rights by signing this form.

TREATMENT ALTERNATIVE

Since this study is not intended to provide any therapeutic or other health-related benefit, your alternative is to not participate in this study.

BENEFITS

There are no immediate benefits to you from your participation. However, by serving as a participant, you may assist in making new insect repellent products available to consumers.

OFFER TO ANSWER ANY QUESTIONS ABOUT THIS STUDY

If you have any questions or problems during this study, or if you think that you may have experienced a research-related injury, you should contact Scott Carroll of Carroll-Loye Biological Research at (530) 902-8267 at any time.

If you have any questions regarding your rights as a research participant, please contact Kim Lerner, Chair of the Independent Investigational Review Board, Inc. at toll free 1- (877) 888-iirb (4472) between 6:00 AM and 2:00 PM, Pacific time, Monday through Friday. You can also contact the Independent Investigational Review Board, Inc. if you would like to report problems in a research study, express concerns, ask questions, request information, or provide input. The Independent Investigational Review Board is a committee established for the purpose of protecting the rights of participants in a research study. For more information about your rights and role as a research participant you can visit the Research Participant section of the IIRB, Inc. website at www.iirb.com.

COSTS AND REIMBURSEMENT

There will be no costs to you from participating in this study.

For participation in the study, each research study participant will receive a cash payment of $20 per hour. Payment will be made at the end of each visit or whenever you withdraw from the study. If you are designated as an 'alternate subject,' you will be paid $50 to compensate you for being inconvenienced.

CONFIDENTIALITY

Carroll-Loye Biological Research will retain records of this study indefinitely. You may access your own records by contacting the Study Director. Representatives from the sponsor (LANXESS Corporation), the U.S. Environmental Protection Agency (EPA), the California Department of Pesticide Regulation and the Independent Investigational Review Board, Inc. (an independent committee that reviewed this study's ethical aspects to help protect the rights and welfare of study participants) may have access to all non-personal information collected in this study. Because of the need to release information to these parties, absolute confidentiality cannot be guaranteed. Any information or reports published as a result of this study will not identify you by name, or by any other personal identification.

STATEMENTS OF UNDERSTANDING

Right to withdraw or removal from study

You understand that you are free to withdraw from this study at any time, and you agree to inform the Principal Investigator immediately if you intend to withdraw. It is understood that your decision to participate in this study or to withdraw from this study will not influence the availability of your future medical care and will involve no penalty or loss of compensation or benefits to which you are otherwise entitled. You may withdraw from this study at any time.

APPROVED BY
Independent IRB
Julie Bleszynski 11/2/09
Signature Date

Initials: _____
Date: _____

You agree that the Principal Investigator in charge of the study can remove you from this study without your consent for any reason, including, but not limited to:

a. His/her judgment that any condition or circumstance may jeopardize your welfare or the integrity of the study.
b. Your failure to follow the instructions of the investigator(s).
c. If the study is stopped by the sponsor and/or Principal Investigator prior to completion.

Consent and signatures

I have read, in a language that I understand well, and understand the information which has been stated above. I have received satisfactory answers to all of the questions that I have asked. I hereby voluntarily consent to take part in this study and to be a research study participant in this study. I do **not** waive any of my legal rights by signing this Informed Consent Form. I shall receive a copy of the signed Informed Consent Authorization.

Date (MM/DD/YY)	Time	**Print** Subject Name	**Sign** Subject Name

Date	**Print** Carroll-Loye Biological Research Representative	**Sign** Carroll-Loye Biological Research Representative

Copy of signed/dated consent form given to subject on (date)_____ by_____ (initials)

Independent Investigational Review Board, Inc.
Approved: 7/28/09; Revised: 11/2/09

APPROVED BY
Independent IRB
Signature 11/2/09 Date

Initials: _____
Date: _____

EXPERIMENTAL SUBJECT'S BILL OF RIGHTS

Any person who is requested to consent to participate as a subject in a research study involving an experiment, or who is requested to consent on behalf of another, has the right to:

1. Be informed of the nature and purpose of the study.

2. Be given an explanation of the procedures to be followed in the experiment, and any drug or device to be used.

3. Be given a description of any attendant discomforts and risks reasonably to be expected from the experiment.

4. Be given an explanation of any benefits to the subject reasonably to be expected from the experiment, if applicable.

5. Be given a disclosure of any appropriate alternative procedures, drugs, or devices that might be advantageous to the subject, and their relative risks and benefits.

6. Be informed of avenues of medical treatment, if any, available to the subject after the experiment if complications should arise.

7. Be given an opportunity to ask any questions concerning the experiment or the procedures involved.

8. Be instructed that consent to participate in the study may be withdrawn at any time, and the subject may discontinue participation in the medical experiment without prejudice.

9. Be given a copy of a signed and dated written consent form and Experimental Subject's Bill of Rights when one is required.

10. Be given the opportunity to decide to consent or not to consent to an experiment without the intervention of any element of force, fraud, deceit, duress, coercion or undue influence on the subject's decision.

If you have any questions or problems during this study, or if you think that you may have experienced a research-related injury, you should contact Scott Carroll of Carroll-Loye Biological Research at (530) 902-8267 at any time.

If you have any questions regarding your rights as a research volunteer, please contact Kim Lerner, Chairman of the Independent Investigational Review Board, Inc. at toll free (877) 888-IIRB (4472) between 6AM and 2PM, Pacific Time, Monday through Friday. The Independent Investigational Review Board is a committee established for the purpose of protecting the rights of volunteers in a research study.

_____ _____

Signature of Subject Date

_____ _____

Signature of Witness Date

APPROVED BY
Independent IRB

_____ 7/28/09

Signature Date

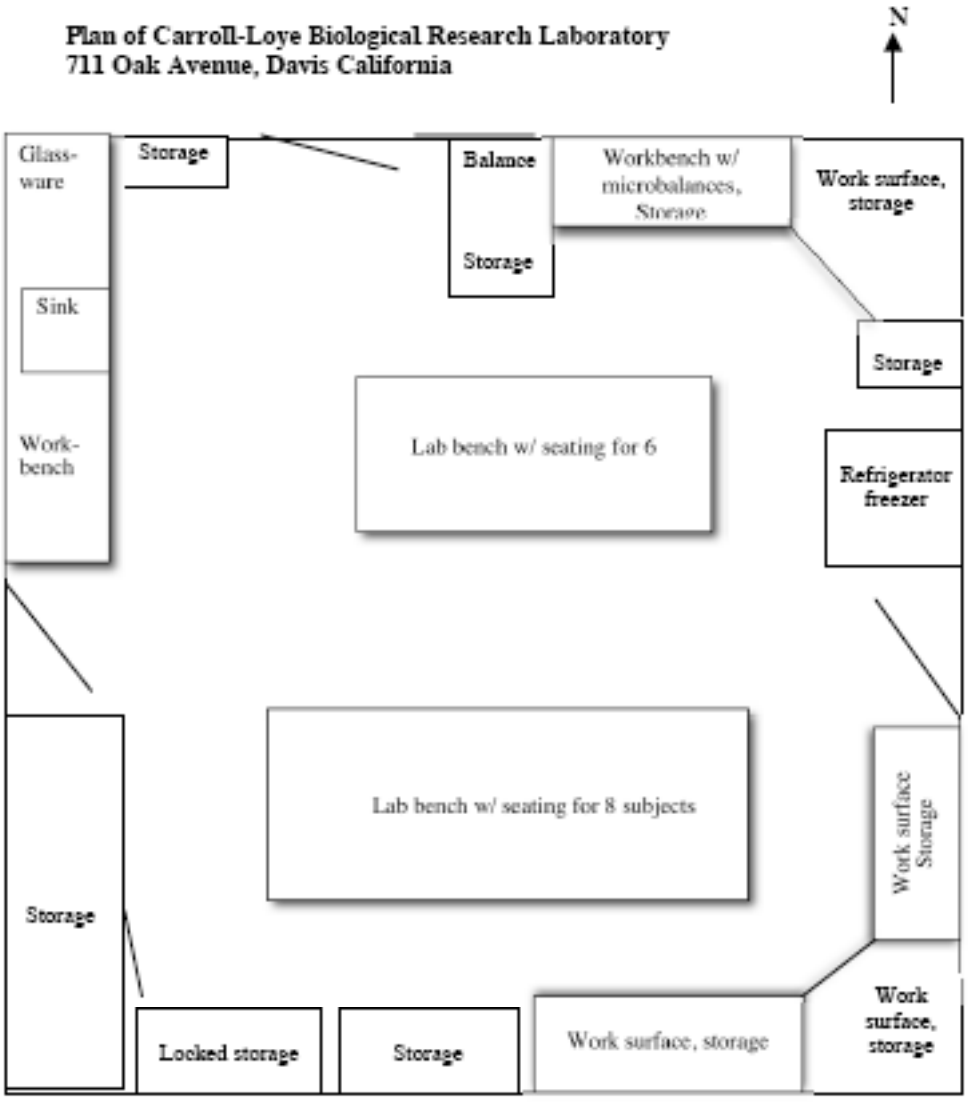
Carroll-Loye Biological Research Study LNX-003
Summary of Protocol Deviations

There were no protocol deviations observed or noted for this study.

Scott P. Carroll, Ph.D.
Study Director

31 March 2010
Date

Appendix 9. Physical plan of Carroll-Loye Biological Research Laboratory



Department of Pesticide Regulation

Mary-Ann Warmerdam
Director

Arnold Schwarzenegger
Governor

November 16, 2009

Dr. Scott P. Carroll
711 Oak Avenue
Davis, California 95616

Dear Dr. Carroll:

In accordance with the provisions of the California Code of Regulations, Title 3 (3CCR), Chapter 3, Section 6710, the Director of the Department of Pesticide Regulation (DPR) grants final approval of the pesticide study protocol entitled, **"Efficacy Test of KBR 3023 (Picaridin; Icaridin) - Based Personal Insect Repellents (20% Cream and 20% Spray) with Ticks Under Laboratory Conditions"** on November 10, 2009. This study protocol and associated consent form were reviewed and unanimously approved by the Independent Investigational Review Board of Plantation, Florida on November 2, 2009, in accordance with 40 CFR Part 26. This study approval will expire on November 1, 2010.

Please note that Section 6710 of 3CCR authorizes DPR staff to observe your study. Site visits may include observing subject recruitment and the informed consent procedures. This section also authorizes an official observer from DPR or the county agricultural commissioner's office to terminate any study activity that jeopardizes the safety of the study subjects, the public, or the environment.

This study must be conducted according to the approved protocol and consent forms. All protocol and consent form amendments that may impact the health of the human participants must have DPR and Institutional Review Board approval prior to implementing such changes (3CCR 6710, subsection g).

If during the study, problems should arise related to the safety of the study subjects, please notify our office immediately. If you have any questions, please feel free to contact Don Richmond of my staff at (916) 445-4192, or by e-mail at: drichmond@cdpr.ca.gov.

Sincerely,

George Farnsworth, Environmental Program Manager I
Worker Health and Safety Branch
(916) 445-4163

cc: Anna M. Fan, Ph.D., Chief, Pesticide and Environmental Toxicology Branch (PETB), OEHHA
Joy Wisniewski, Ph.D., Pesticide Epidemiology Section, PETB, OEHHA
Susan Edmiston, Environmental Program Manager II, WHS Branch, DPR
Joseph P. Frank, D.Sc., Senior Toxicologist, WHS Branch, DPR
Roger Cochran, Ph.D., D.A.B.T., Staff Toxicologist, WHS Branch, DPR
Don Richmond, Research Scientist II, WHS Branch, DPR

LNX-003 IRB <-> CLBR CORRESPONDENCE
Post-Submission of Protocol for HSRB Review

Amendment 1 submission by CLBR to IIRB, Inc. 2 November 2009

Amendment 1 approval by IIRB, INC. 9 November 2009

Request for Meeting Minutes, Current Roster, and Current HRPP Plan, 5 Februray 2010

CLBR Acknowledges receipt and readability of Roster and HRPP Plan documents, 10 February 2010

from **Shawn King** <sbkingster@gmail.com>
to Robert Roogow <rroogow@iirb.com>
cc Yesenia Crespo <ycrespo@iirb.com>,
Scott P Carroll <spcarroll@ucdavis.edu>,
Ghona Sangha <sangha8@roadrunner.com>
date Mon, Nov 2, 2009 at 12:41 AM
subject Study LNX 003 Amendment 1 submission for review

Hi Robert,

Please find enclosed Amendment 1 and supporting documents for Carroll-Loye Biological Research study LNX-003. If you have any questions, please contact us at your earliest convenience. Thank you.

Ed. Note: The attachments to this email appear as follows –
Amendment 1 FINAL appears on pages 135-144 of this report
ICF amended appears on pages 125-132 of this report
Protocol amended appears on pages 97-124 of this report
Tick training v5 amended appears on pages 133-134 of this report

From **Yesenia Crespo** <YCrespo@iirb.com>
to Shawn King <sbkingster@gmail.com>
date Mon, Nov 2, 2009 at 8:09 AM
subject RE: Study LNX 003 Amendment 1 submission for review

Thanks Shawn for your submission, we will go ahead and try to review this by this week.

Regards,
Yesenia Crespo
Project Leader

Independent Investigational Review Board INC.

from **Yesenia Crespo** <YCrespo@iirb.com>
to Shawn King <sbkingster@gmail.com>
date Mon, Nov 9, 2009 at 9:48 AM
subject LNX Amendment

Please see attached
Regards,

Yesenia Crespo
Project Leader
Independent Investigational Review Board INC

Ed. Note: The cover letter (page one) of this attachment appears below. The remainder of the attachment is final version of the Informed Consent Form as it appears on pages 145-152 of this submission.

INDEPENDENT
INVESTIGATIONAL
REVIEW BOARD INC.
Your Advocate for Clinical Research Participants

DATE: November 02, 2009

TO: Scott P. Carroll, PhD
Principal Investigator

FROM: Authorized Signatory
Independent Investigational Review Board, Inc.

SUBJECT: Protocol Amendment ;
- Informed Consent Form version 11/2/2009
- Amendment 1 dated 10/30/2009

PROTOCOL: LNX-003

The Independent Investigational Review Board, Inc. had an opportunity to review the above referenced Informed Consent Form and Amendment 1 for the above noted research study. The Amendment included administrative changes to the Objective of the Research, Risk Section, candidate recruitment and Exclusion Section. In addition other administrative changes were made throughout the document. This submission met the criteria for a minor change in previously approved research and was reviewed under expedited review procedures.

The Informed Consent Form and Amendment 1 are approved. The Informed Consent Form has been revised to accommodate the Amendment. The approved revised Informed Consent Form is identified as Version 11/2/2009 and stamped, "Approved 11/2/2009". All current subjects and future research participants must sign the revised consent forms.

Thank you for your cooperation.

FC/JB/yc/rr:

from **Shawn King** <sbkingster@gmail.com>
to Yesenia Crespo <ycrespo@iirb.com>
cc Robert Roogow <rroogow@iirb.com>,
Scott P Carroll <spcarroll@ucdavis.edu>
date Fri, Feb 5, 2010 at 8:29 AM
subject LNX 003 Meeting minutes, HRPP, Roster

Hi Yesenia,

I hope you are well. When you have a chance, could you forward the meeting minutes for IIRB's review of Amendment 1 for our study LNX-003? For your reference, the amendment was reviewed and approved by IIRB the week of November 2 2009. Also, we have on file IIRB's HRPP dated June 1 2009 and a membership roster dated August 5 2009. If either have been updated, could you forward the new versions to us as well? We greatly appreciate your assistance.

Best, Shawn King
Director of Operations
Carroll-Loye Biological Research

from **Robert Roogow** <RRoogow@iirb.com>
to Shawn King <sbkingster@gmail.com>
cc Yesenia Crespo <YCrespo@iirb.com>
date Fri, Feb 5, 2010 at 9:21 AM
subject RE: LNX 003 Meeting minutes, HRPP, Roster

Hello Shawn,

I have attached all of our rosters since August 5, 2009. I will need to send the newest HRPP Plan with a different email to ensure it goes through. As for the Amendment that was approved 11/2/2009, it was approved through expedited procedures and not at a convened meeting; therefore, there are not meeting minutes for that transaction. Let me know if you should need anything else.

Best regards,
Robert

Robert Roogow, MS, CIM
Chief Operating Officer
Independent Investigational Review Board, Inc.

INDEPENDENT INVESTIGATIONAL REVIEW BOARD INC.
The IRB of Choice When the Choice is Yours

IRB Membership Roster

- The following lists the members identified by name; earned degrees; representative capacity; indications of experience such as board certifications, licenses, etc., sufficient to describe each member's chief anticipated contributions to IRB deliberations.

- No member of the Independent Investigational Review Board, Inc has employment or other relationship (for example, full-time employee, a member of governing panel or board, stockholder, paid or unpaid consultant) of any study sponsor, or otherwise involved with the research.

PRIMARY MEMBERS	
Frances Conway, RN **CHAIR** (Scientific) *Affiliated* *Member since 2008*	Ms. Conway is a registered nurse with knowledge of regulatory requirements as related to IRB compliance with FDA, DHHS, and EPA regulations.
Julie A. Blasingim, BA, MBA **VICE CHAIR** (Non-Scientific) *Affiliated* *Member since 2009*	Ms. Blasingim comes to the IRB with extensive knowledge of human research protection issues and regulatory compliance. She presents ongoing educational programs and regulatory updates to the IRB members and IIRB staff.
Marcos Rejtman, DO (Scientific) *Unaffiliated* *Member since 2005*	Dr. Rejtman is Board Certified in Family Practice, Geriatric Medicine and Hospice & Palliative Care. Through his experience, Dr. Rejtman is able to evaluate protocols from a scientific perspective with a focus on risks/benefit analysis.
Rabbi Akiva D. Mann, MA (Non-Scientific) *Unaffiliated* *Member since 1997*	Rabbi Mann is the Director of The Institute of Jewish Knowledge and Learning and provides moral and ethical perspectives to the review process.
Edward Wiederhorn (Non-Scientific) *Unaffiliated* *Member since 1995*	Mr. Wiederhorn is a community representative to the IIRB, Inc. He is a member of the American Association of Retired Persons (AARP) and has been involved with Fraternal and Charitable Organizations.
Shari Somerstein, RPh (Scientific) *Unaffiliated* *Member since 1999*	Ms. Somerstein has extensive experience in clinical pharmacology and the drug development process through analysis of clinical and non-clinical data, with a focus on human research protection.
George J. Garbarino (Non-Scientific) *Unaffiliated* *Member since 2004*	Mr. Garbarino has been an advocate for Labor Union members and brings a wide range of experience in the area of workers' rights.
ALTERNATE MEMBERS *Alternate Members serve as a voting member, when filling the role of an absent voting member. Alternate Scientific Members can serve as a voting alternate member for Frances Conway, but cannot serve as a Chair of the IRB. Alternate Non-Scientific Members can serve as an alternate voting member for Julie Blasingim, but cannot serve as a Vice Chair of the IRB.*	
Ernest Bertha, MD, MBA *(Scientific) *Unaffiliated* *Member since 2009*	Dr. Bertha is a Board Certified Pediatrician specializing in emergency medicine, bringing with him a background of pediatric acute care medicine.
David D. Wells, MD (Scientific) *Unaffiliated* *Member since 1996*	Dr. Wells has served as an Emergency Medicine Department Chairman. He has worked with different ethnic populations, especially migrant workers and brings his sensitivity of the social mores of the underprivileged to the IRB.
Glenn K. Moran, MD, FACOFP (Scientific) *Unaffiliated* *Member since 2004*	Dr. Moran is Board Certified in Family Practice. Through his present practice, he is able to contribute up to date information related to the current medical world. In addition, Dr, Moran is a Professor of Osteopathic Medicine at a local university.
Robert Lettman, Esq (Non-Scientific) *Affiliated* *Member since 2004*	Mr. Lettman is a practicing Attorney providing legal understanding with regard to the rights of research participants.

Levi G. Williams, Esq (Non-Scientific) *Unaffiliated* *Member since 2007*	Mr. Williams is a practicing Attorney with a focus on cultural diversity, including multi-racial and juvenile rights.
Marijke Adams, PharmD, PhD (Scientific) *Unaffiliated* *Member since 2009*	Ms. Adams is an adjunct pharmacology Professor at a local University. She also has extensive experience in pharmaceutical drugs development, protocol development, regulatory requirements, and the conduct of clinical and nonclinical research.

CHANGES FROM PREVIOUS ROSTER (Version: 6/1/09)
Resignation of Kim Lerner as Chair, appointment of Frances Conway, RN as Chair, appointment of Julie Blasingim, BA, MBA as Vice Chair, appointment of Marijke Adams, PharmD, PhD as an alternate IRB Member as well as other minor clarifications.

INDEPENDENT INVESTIGATIONAL REVIEW BOARD INC.
The IRB of Choice When the Choice is Yours

IRB Membership Roster

Association for the Accreditation of Human Research Protection Programs, Inc. — Full Accreditation

- The following lists the members identified by name; earned degrees; representative capacity; indications of experience such as board certifications, licenses, etc., sufficient to describe each member's chief anticipated contributions to IRB deliberations.

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ALTERNATE MEMBERS *Alternate Members serve as a voting member, when filling the role of an absent voting member. Alternate Scientific Members can serve as a voting alternate member for Frances Conway, but cannot serve as a Chair of the IRB. Alternate Non-Scientific Members can serve as an alternate voting member for Julie Blasingim, but cannot serve as a Vice Chair of the IRB.*	
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Robert Lettman, Esq (Non-Scientific) *Affiliated* *Member since 2004*	Mr. Lettman is a practicing Attorney providing legal understanding with regard to the rights of research participants.
Levi G. Williams, Esq (Non-Scientific) *Unaffiliated* *Member since 2007*	Mr. Williams is a practicing Attorney with a focus on cultural diversity, including multi-racial and juvenile rights.
Marijke Adams, PharmD, PhD (Scientific) *Unaffiliated* *Member since 2009*	Dr. Adams is an adjunct pharmacology Professor at a local University. She also has extensive experience in pharmaceutical drugs development, protocol development, regulatory requirements, and the conduct of clinical and nonclinical research.
Rev. Pat Alessi (Non-Scientific) *Unaffiliated* *Member since 2010*	Rev. Pat Alessi is an ordained minister serving as an Associate Minister for more than 35 years. Her experience allows her to provide moral and ethical perspectives to research involving humans.

CHANGES FROM PREVIOUS ROSTER (Version: 10/1/09)

Addition of Rev. Pat Alessi, and change in affiliation status for Shari Somerstein, RPh.

from **Robert Roogow** <RRoogow@iirb.com>
to Shawn King <sbkingster@gmail.com>
date Fri, Feb 5, 2010 at 9:24 AM
subject RE: LNX 003 Meeting minutes, HRPP, Roster

Shawn,

Here is the HRPP plan.

Robert Roogow, MS, CIM
Chief Operating Officer
Independent Investigational Review Board, Inc.

Ed. Note: The HRPP plan is provided as a separate electronic document bundled with the Study Final Report submission to EPA

from **Shawn King** <sbkingster@gmail.com>
to Robert Roogow <RRoogow@iirb.com>
date Wed, Feb 10, 2010 at 1:55 PM
subject Re: LNX 003 Meeting minutes, HRPP, Roster

Robert,

Thanks for your prompt responses. Sorry to so slow in sending confirmation - I had no problem downloading and opening the hrpp plan and membership roster documents.

Best, Shawn King
Director of Operations
Carroll-Loye Biological Research

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report
Printed on Thursday, October 30, 2008

Learner: Scott Carroll (username: scottpcarroll)
Institution: University of California, Davis
Contact Information 711 Oak Avenue
Davis, CA 95616 United States
Department: Entomology
Phone: 530 297 6080
Email: spcarroll@ucdavis.edu

Group 1.: This course is suitable for **Students, Investigtors and staff** conducting BIOMEDICAL RESEARCH with human subjects. The VA module must be completed if you plan to work with subjects at a VA facillity.

Stage 2. Refresher 2 Course Passed on 04/10/08 (Ref # 1120376)

Required Modules	Date Completed
History and Ethical Principles.	07/05/07
Regulations and Process, Part 1	10/24/07
Regulations and Process, Part 2	10/24/07
Informed Consent.	10/24/07
Social & Behavioral Research (SBR)	10/24/07
Genetics Research, Part 1	10/24/07
Genetics Research, Part 2	10/24/07
Records-Based Research, Part 1	04/08/08
Records-Based Research, Part 2	04/08/08
Records-Based Research, Part 3	04/08/08
Research with Protected Populations - Vulnerable Subjects: A Definition.	04/09/08
Vulnerable Subjects - Prisoners, Part 1	04/09/08
Vulnerable Subjects - Prisoners, Part 2	04/09/08
Studies With Minors, Part 1	04/09/08
Studies With Minors, Part 2	04/09/08
Studies With Minors, Part 3	04/09/08
Studies with Pregnant Women and Fetuses, Part 1	04/09/08
Studies with Pregnant Women and Fetuses, Part 2	04/09/08
Group Harms: Research with Culturally or Medically Vulnerable Groups.	04/09/08
FDA Regulated Research, Part 1	04/09/08
FDA Regulated Research, Part 2	04/10/08
Human Subjects Protections at the VA, Part 1	04/10/08
Human Subjects Protections at the VA, Part 2	04/10/08
HIPAA and Human Subjects Research.	04/10/08
Conflicts of Interest in Research Involving Human Subjects.	04/10/08
How to Complete the CITI Refresher Course and Receive a Completion Report	04/10/08

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

Return

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **William Johnson** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 10/03/2008

Certification Number: 110234

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Shawn King** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 10/21/2008

Certification Number: 121628