The Ultimate Insect Repellent System for FR Clothing

4507, 4508, 4509

- Product Literature
- ARCWEAR.COM – DEET testing on FR clothing and conclusions
- Kinectrics High Current Laboratory – Electric arc exposure tests on DEET and RTC# 4507
- Dallas Laboratories, Inc – Flammability and Arc testing per ASTM F 1506
- Dallas Laboratories, Inc – “Flame Resistance of Cloth; Vertical” per FTM No. 191, method 5903
- Dallas Laboratories, Inc – Compatibility with Rubber Insulating Lineman’s Gloves
- Department of the Army Evaluation – Evaluation of Aviator Uniform
- Product SDS
DEET has been tested and shown to increase the flammability of FR Clothing by up to 7 times its normal rate. The JUNGLE FORMULA INSECT REPELLENT TOWELETTE (4508) provides skin protection without the risk of contact with the FR Clothing. DEET aerosol sprays are not recommended for utility workers who wear FR Clothing due to the risk of misapplication or accidental overspray which would leave a flammable residue.

TICK & MOSQUITO REPELLENT FOR FR CLOTHING (4507) has been tested to ASTM F1506 (Safety Requirements for FR Clothing). JUNGLE FORMULA INSECT REPELLENT TOWELETTE (4508) has been tested safe for use on rubber gloves.

An ASTM test 1958/F - 1958/M -05 was conducted on FR Clothing treated with TICK & MOSQUITO REPELLENT for FR Clothing, which showed no negative effects to the FR Clothing. During the same test, the FR Clothing treated with DEET showed that DEET caused the FR Clothing to burn, for 16 seconds after the arc flash.

Use TICK & MOSQUITO REPELLENT (4507) to:
- Treat FR clothing to prevent biting insects from spreading infectious disease even in the most heavily infested areas.

Use JUNGLE FORMULA INSECT REPELLENT TOWELETTE (4508) to:
- Treat exposed skin surfaces to prevent biting insects from spreading infectious disease even in the most heavily infested areas.

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>HOW YOU BENEFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested per ASTM F1506, and ASTM 1958F - 1958M - 05.</td>
<td>Safe for use on FR Clothing</td>
</tr>
<tr>
<td>Repels and kills ticks and mosquitoes</td>
<td>Maximum protection from disease carrying insects</td>
</tr>
</tbody>
</table>
Ultimate Insect Repellent System repels and kills ticks and mosquitoes. Ultimate Insect Repellent System prevents the spreading of Lyme disease, Rocky Mountain Spotted Fever, West Nile Virus, and other infectious diseases caused by ticks and mosquitoes.

Tick & Mosquito Repellent (4507) has been tested safe per ASTM F1506, Electrical ARC and Flammability Test, and ASTM 1958F - 1958M - 05, Electrical ARC Exposure method using mannequins F, Federal Test Method H191 method 5903, Flame resistance of clothing vertical burn.

Jungle Formula Insect Repellent (4508) has been tested safe for use on rubber gloves.

Rainbow Technology offers a comprehensive line of products to the utility and telecommunications industries. Users of ULTIMATE INSECT REPELLENT SYSTEM for FR clothing often find these other Rainbow products helpful too.

- Jungle Formula Insect Repellent (4501, 4508)
- Permethrin Tick Repellent (4504)
- Utility Sunscreen (4022, 40230)
- KNUCKLES Hand & Tool Cleaning Towels (79315, 79316)
- Tecnu® Oak-N-Ivy® Cleanser (4020)
- Ivy Block® (40203)
- CortiCool® (40202)
- Instant Hand Sanitizer (7152)
- Halt® & Halt II® - Animal Repellent (4019, 4027)
- Wasp & Ant Spray (88500)
- Wasp & Ant Killer (4334, 4335)
- Brief Relief™ (4026)
- Mice & Rat Bait (4025)
- Havoc® Mice Bait (43550)

This product is only for sale to and use by service personnel. SDS available on request.

<table>
<thead>
<tr>
<th>PRODUCT NUMBER</th>
<th>CONTAINER SIZE</th>
<th>UNITS/CASE</th>
<th>CASE WEIGHT</th>
<th>CASE SIZE L x W x H</th>
</tr>
</thead>
<tbody>
<tr>
<td>4507</td>
<td>6 oz Spray</td>
<td>12</td>
<td>6 lbs</td>
<td>9” x 7” x 8”</td>
</tr>
<tr>
<td>4508</td>
<td>Towlette</td>
<td>50</td>
<td>2 lbs</td>
<td>13” x 9” x 9”</td>
</tr>
</tbody>
</table>

Do you have a question about any Rainbow Technology product? Because we’ve been supplying the utility and telecommunications industries since 1971, our technical support team has the expertise to provide answers and solutions. Just call us at **1.800.637.6047**.

**RAINBOW TECHNOLOGY**

**Specialists in Utility Chemicals**

Correspondence:
PO Box 26445
Birmingham, AL 35260-0445

Shipping:
261 Cahaba Valley Parkway
Pelham, AL 35124-1146

Phone: 1.800.637.6047 or 1.205.733.0333
Fax: 1.800.521.6896 or 1.205.733.8930
E-mail: sales@rainbowtech.net
Website: www.rainbowtech.net
TICK & MOSQUITO REPELLENT FOR FR CLOTHING is formulated to provide up to six weeks of protection or six washings against biting insects such as ticks and mosquitoes on clothing surfaces without reducing the safety of the FR Clothing.

- The active ingredient permethrin not only repels, but kills the ticks and mosquitoes that come in contact with treated clothing helping to prevent the spreading of deadly diseases.

- TICK & MOSQUITO REPELLENT is so effective in killing and repelling ticks and mosquitoes it is used by U.S. Military personnel in the most heavily infested conditions.

- Use TICK & MOSQUITO REPELLENT on FR clothing surfaces per label directions combined with Jungle Formula Insect Repellent Towelette (4508) on exposed skin surfaces to provide the ultimate protective barrier against biting, disease carrying insects.

- An ASTM test 1958/F - 1958/M -05 was conducted on FR Clothing treated with TICK & MOSQUITO REPELLENT for FR Clothing, which showed no negative effects to the FR Clothing. During the same test, the FR Clothing treated with DEET showed that DEET caused the FR Clothing to burn for 16 seconds after the arc flash.

- TICK & MOSQUITO REPELLENT is used as follows: Treat outer surfaces of each outfit, front and back for 60 seconds each and allow to dry for at least 2 hours. (A complete outfit consists of shirt, trousers, and socks). Pay particular attention to socks, trouser cuffs, and shirt cuffs. Do not retreat clothing more than once every six weeks or six washings.

**FEATURES**

<table>
<thead>
<tr>
<th>Features</th>
<th>How You Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>One application lasts six weeks or six washings offering long-term protection</td>
<td>No need for frequent application, most insect repellents last for only 4 - 6 hours</td>
</tr>
<tr>
<td>Repels and kills ticks and mosquitoes</td>
<td>Maximum protection from disease carrying insects</td>
</tr>
<tr>
<td>Heavy-duty formula</td>
<td>Used by the military in the most heavily infested conditions</td>
</tr>
<tr>
<td>Non-Deet formula</td>
<td>Non-Flammable</td>
</tr>
</tbody>
</table>
Permethrin is a specially designed formula that bonds with fabric to provide protection up to six weeks or six washings. Repels and kills ticks and mosquitoes. Prevents the spreading of Lyme disease, Rocky Mountain Spotted Fever, West Nile Virus, and other infectious diseases caused by ticks and mosquitoes. Tested safe per ASTM F1506, Electrical ARC and Flammability Test, and ASTM 1958F - 1958M - 05, Electrical ARC Exposure method using mannequins F, Federal Test Method H191 method 5903, Flame resistance of clothing vertical burn.

Rainbow Technology offers a comprehensive line of products to the utility and telecommunications industries. Users of TICK & MOSQUITO REPELLENT for FR clothing often find these other Rainbow products helpful too.

Jungle Formula Insect Repellent (4501, 4508)
Utility Sunscreen (4022, 40230, 40223)
KNUCKLES Tool Cleaning Towels (79315, 79316)
Poison Oak & Ivy Cleanser (40201) Cleanser Towelettes (40204)
Poison Oak & Ivy Block (40203)
CortiCool® (40202)
Instant Hand Sanitizer (7152)
Halt® & Halt II® - Animal Repellent (4019, 4027)
Wasp & Ant Spray (88500)
Wasp & Ant Killer (4335)
Brief Relief™ (4026)
Mice & Rat Bait (4025)
Havoc® Mice Bait (43550)

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<table>
<thead>
<tr>
<th>PRODUCT NUMBER</th>
<th>CONTAINER SIZE</th>
<th>ORDERING UOM</th>
<th>UNITS/ CASE</th>
<th>CASE WEIGHT</th>
<th>CASE SIZE L x W x H</th>
</tr>
</thead>
<tbody>
<tr>
<td>4507</td>
<td>6 oz Trigger Spray</td>
<td>Case</td>
<td>12</td>
<td>6 lbs</td>
<td>9“ x 7“ x 8“</td>
</tr>
<tr>
<td>4509</td>
<td>24 oz Trigger Spray</td>
<td>Case</td>
<td>12</td>
<td>21.1 lbs</td>
<td>13.25“ x 10.25“ x 9.5“</td>
</tr>
</tbody>
</table>

Do you have a question about any Rainbow Technology product? Because we’ve been supplying the utility and telecommunications industries since 1971, our technical support team has the expertise to provide answers and solutions. Just call us at 1.800.637.6047.

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Phone: 1.800.637.6047 or 1.205.733.0333  
Fax: 1.800.521.6896 or 1.205.733.8930  
E-mail: sales@rainbowtech.net  
Website: www.rainbowtech.net
June 21, 2007

To Whom It May Concern:

RE: DEET (Di-Ethyl, Ethyl Toluene) on FR clothing test results

In photograph “A”, DEET Insect Repellent was applied to the FR shirt, per label direction, before the arc test was conducted. The result clearly demonstrates that an application of DEET on FR Clothing propagates the flame after an arc and can contribute to body burn in the event of electric arc. It is therefore advisable not to treat any FR Clothing with any Insect Repellent containing DEET (Di-Ethyl-Ethyl-Toluene).

Sincerely,

Hugh Hoagland

Elihu “Hugh” Hoagland
Hugh Hoagland Consulting, Inc.

ArcWear.com

R&D
Electric Arc Exposure Tests

For Rainbow Technology Corporation

Rainbow Technology Corporation Product Comparison

Product one: Flammable 30% Deet Insect Repellent,
Product two: Tick & Mosquito Repellent for FR Clothing, Product #4507

May 2007
Tests Conducted at Kinectrics High Current Laboratory
Toronto, Ontario, Canada
Rainbow Technology Corporation

Product Comparison

R&D Arc Exposure Tests at Kinectrics High Current Laboratory

At the request of Mr. Larry Joe Steeley, electric arc exposure R&D comparison tests were conducted on two samples of repellents for Rainbow Technology Corporation. Mr. Larry Joe Steeley arranged with Hugh Hoagland Consulting, Inc. to conduct tests at the High Current Laboratory of Kinectrics in Toronto and review test data.

The samples of the Rainbow Technology Corporation were tested according to:


This Standard evaluates personal clothing products for ignition, melting and afterflame.

Test Samples

The samples as tested are described in the Table below:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Rainbow Technology Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product one</td>
<td>Flammable 30% Deet Insect Repellent</td>
</tr>
<tr>
<td>Product two</td>
<td>Tick &amp; Mosquito Repellent for FR Clothing, Product #4507</td>
</tr>
<tr>
<td>Number of samples tested</td>
<td>two</td>
</tr>
</tbody>
</table>

Test Method

Test apparatus

The ASTM F 1958/F 1958M-05 Standard requires testing conducted in a high current laboratory with a controlled arc source. Test apparatus is required to be equipped with arc electrodes and flame resistant mannequins as shown on Figure 1.

The Kinectrics High Current Laboratory uses a 100 MVA supply (100 million volt-amperes). This supply feeds the arc current to the arc electrodes through co-axial circuit.
Arc electrodes are enclosed within a modified Faraday “cage” to minimize the effects of magnetic fields on the directionality of the arc. The test apparatus is placed in a test cell to minimize or eliminate the effect of rain, wind and ambient temperature.

Following parameters are set, checked and recorded for each trial:

- arc current
- arc duration
- arc electrodes spacing
- distance between test specimen(s) and arc electrode
- temperature rise for monitor sensors
- video

The peak current is controlled by closing phase angle of the 60 Hz supply source with accuracy of 0.01 cycles.

The center of the arc (mid point of a gap between the electrodes) is adjusted horizontally with the center of the chest.

Monitor sensors measure the incident energy ($E_i$) for the mannequin. Each monitor sensor is equipped with one copper calorimeter.

**Arc Thermal Energy Measurement**

The arc is not a straight vertical column. It may move horizontally or vertically or both. The co-axial supply and the arc “cage” (Fig. 1) reduce this arc movement caused by the magnetic field by the high currents in the test circuit.

![Figure 1. Test Set Up With Cage](image-url)
The monitor sensors on each side of the mannequin measure the heat across test object. The temperature rises of the sensors are evaluated to determine the results of each trial.

However, in addition to recorded data each trial must be evaluated using visual observations.

**Test Results**

Detailed test data and graphs are shown on attached page.

Test observations are shown in the table below.

The arc voltage record, arc current record, arc duration, arc energy and the temperature rise record for each sensor are included on CD.

<table>
<thead>
<tr>
<th>Trial # 07-1639</th>
<th>Mannequin</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product sprayed on shirt</td>
<td>30% Deet</td>
<td>#4507</td>
<td></td>
</tr>
<tr>
<td>Incident energy Ei, cal/cm²</td>
<td>5.85</td>
<td>5.17</td>
<td></td>
</tr>
<tr>
<td>Ignition</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Afterflame, s</td>
<td>16</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

![Mannequin A and Mannequin B](image)

<table>
<thead>
<tr>
<th>Trial # 07-1640</th>
<th>Mannequin</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product sprayed on shirt</td>
<td>30% Deet</td>
<td>#4507</td>
<td></td>
</tr>
<tr>
<td>Incident energy Ei, cal/cm²</td>
<td>7.88</td>
<td>8.46</td>
<td></td>
</tr>
<tr>
<td>Ignition</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Afterflame, s</td>
<td>5.5</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Each test was video taped. Video is included on CD.

CD is a part of this report.
Rainbow Technology Corporation, Rainbow Products #4507 and 30% Deet comparison, May 2007

May 16, 2007  
Test # 07-1639  
WO#: K-422739  

Client: ArcWear.com

Description: Power Arc Tests with mannequins at 12 inches with arc on the chest area.
Blue FR shirt insect repellent spray: Rainbow A: 30% Deet, B: #4507

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High Current Test Laboratory  
Kinectrics Inc.  
Test Sheet

---

Arc Voltage and Current

1 (kA rms) = 8.29
1 (kA Pk) = 16.5
V (rms) = 443.9
Cycles = 7.1
Energy (kJ) = 416.5

---

Head A: Total heat response and Stoll Curve vs Ei

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Head B: Total heat response and Stoll Curve vs Ei

---

Mannequin A
Ei = 5.85 Cal/cm²
Avg HAF = 100.0
R eye SCD = -1.20 cal/cm²
L eye SCD = -1.20 cal/cm²
Mouth SCD = -1.20 cal/cm²
Chin SCD = -1.20 cal/cm²
Neck SCD = -1.20 cal/cm²
Informative

Mannequin B
Ei = 5.17 Cal/cm²
Avg HAF = 100.0
R eye SCD = -1.20 cal/cm²
L eye SCD = -1.20 cal/cm²
Mouth SCD = -1.20 cal/cm²
Chin SCD = -1.20 cal/cm²
Neck SCD = -1.20 cal/cm²
Informative

---

PRIVATE INFORMATION: This test data shall not be disclosed or distributed without permission of the client.
**High Current Test Laboratory**
**Kinectrics Inc.**
**Test Sheet**

**Description:**
Power Arc Tests with mannequins at 12 inches with arc on the chest area.

Blue FR shirt insect repellent spray:
- Rainbow A: 30% Deet
- B: #4507

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### Arc Voltage and Current

![Arc Voltage and Current Graph]

\[ l_{(A \text{ rms})} = 8.29 \]
\[ l_{(A \text{ Pk})} = 16.4 \]
\[ V_{(rms)} = 454.6 \]
\[ Cycles = 16.1 \]
\[ Energy (kJ) = 510.6 \]

---

### Head A: Total heat response and Stoll Curve vs E1

![Head A Graph]

- Right eye
- Left eye
- Mouth
- Chin
- Neck
- Stoll

### Head B: Total heat response and Stoll Curve vs E1

![Head B Graph]

- Right eye
- Left eye
- Mouth
- Chin
- Neck
- Stoll

---

<table>
<thead>
<tr>
<th>Mannequin A</th>
<th>Mannequin B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ei = 7.88 Cal/cm²</td>
<td>Ei = 8.46 Cal/cm²</td>
</tr>
<tr>
<td>Avg HAF= 100.0</td>
<td>Avg HAF = 100.0</td>
</tr>
<tr>
<td>R eye SCD = -1.20 cal/cm²</td>
<td>R eye SCD = -1.20 cal/cm²</td>
</tr>
<tr>
<td>L eye SCD = -1.20 cal/cm²</td>
<td>L eye SCD = -1.20 cal/cm²</td>
</tr>
<tr>
<td>Mouth SCD = -1.20 cal/cm²</td>
<td>Mouth SCD = -1.20 cal/cm²</td>
</tr>
<tr>
<td>Chin SCD = -1.20 cal/cm²</td>
<td>Chin SCD = -1.20 cal/cm²</td>
</tr>
<tr>
<td>Informative</td>
<td></td>
</tr>
<tr>
<td>Neck SCD = -1.20 cal/cm²</td>
<td></td>
</tr>
</tbody>
</table>

**PRIVATE INFORMATION, This test data shall not be disclosed or distributed without permission of the client.**
September 19, 2006

Kevan Jones
Dallas Laboratories
1323 Wall Street
Dallas TX 75215

Dear Kevan;

Enclosed is the FR shirt and tick repellent for testing per ASTM F1506, NFPA-70E, OSHA CFR 1910.269 and the Federal Standard 191 test method 5903.

In your report and all correspondence going forward please reference the repellent by the name "Rainbow Tick and Insect Repellent for Clothing".

I look forward to getting your quote for the test methods referenced above. Should you need additional material or information please contact me directly at 205-987-1117 or e-mail ljsteeleyjr@rainbowtech.net.

Regards

Larry Joe Steeley, Jr.
Vice President of Operations
Test specimen shirts were provided by Carhartt FR Work Wear

Carhartt FR products available:

- Coats
- Bib Overalls
- Jeans
- Hoods
- Jackets
- Dungarees
- Shirts
- Vests

For more information on Carhartt FR workwear, please call our Customer Service Department at 1-800-786-3916 or visit:

www.carhatttFR.com

Flame-Resistant Workwear
Test specimen shirts were provided by Carhartt FR Work Wear

Premium FR fabrics provide increased protection against electric arc flash and flash fire exposures
The same durability, comfort and fit as our traditional workwear
Machine Washable
Guaranteed flame resistance for the life of the garment
Meets ASTM F1506, NFPA-70E and OSHA 29 CFR 1910.269 requirements

Flame-Resistant Workwear
DALLAS LABORATORIES, INC.
CONSULTANTS AND TECHNOLOGISTS
ANALYTICAL AND RESEARCH CHEMISTS
CHEMICAL ENGINEERS — PETROLEUM ENGINEERS
P. O. BOX 152837
1320 WALL ST.
DALLAS, TEXAS 75315

Rainbow Technology Corporation
261 Cahaba Valley Parkway
Pelham, AL. 35214-1146

Attn: Larry Joe Steeley, Jr.

February 19, 2007

Report Number: 38567A

REPORT

Sample Identification: Rainbow Technology Tick and Insect Repellent for Clothing, Lot 760

PROCEDURE

Sample was applied to the exterior of the shirt material, allowed to dry, and then analyzed for flammability and arc testing. The protocols and the requirements of ASTM F 1506 were followed and reported. The material used was Carhart FRS93 CBL (88% CottonFR/12% Nylon).

RESULTS

<table>
<thead>
<tr>
<th>Test/Method</th>
<th>Fabric Untreated</th>
<th>Fabric Treated</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability (ASTM D6413)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Char length, inches</td>
<td>2.6</td>
<td>3.2</td>
<td>6.0 maximum</td>
</tr>
<tr>
<td>After-flame, seconds</td>
<td>0.2</td>
<td>0.2</td>
<td>2.0 maximum</td>
</tr>
<tr>
<td>Arc Test (ASTM F1959, ATPV)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After-flame time, seconds</td>
<td>1.5</td>
<td>1.5</td>
<td>5.0 maximum</td>
</tr>
<tr>
<td>Arc Value, cal/cm²</td>
<td>5.2</td>
<td>5.0</td>
<td>Report</td>
</tr>
</tbody>
</table>

THE ANALYSES OF THE ABOVE SAMPLE OR SAMPLES DO NOT IMPLY AN ENDORSEMENT. THIS REPORT, OR ANY PART THEREOF, MAY NOT BE REPRODUCED OR USED FOR ADVERTISING PURPOSES WITHOUT OUR EXPRESS WRITTEN CONSENT.
DALLAS LABORATORIES, INC.
CONSULTANTS AND TECHNOLOGISTS
ANALYTICAL AND RESEARCH CHEMISTS —
CHEMICAL ENGINEERS — PETROLEUM ENGINEERS

P. O. BOX 152837
1323 WALL ST.
DALLAS, TEXAS 75315

Rainbow Technology Corporation
261 Cahaba Valley Parkway
Pelham, AL. 35214-1146

Attn: Larry Joe Steeley, Jr.

February 19, 2007

Report Number: 38567B

REPORT

Sample Identification: Rainbow Technology Tick and Insect Repellent for Clothing, Lot 760

PROCEDURE

Material was tested for “Flame Resistance of Cloth; Vertical” per FTM No.191, method 5903 both before and after spraying with Rainbow Tick and Insect Repellent for Clothing, Lot 760, (dried sample).

RESULTS

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Fabric Untreated</th>
<th>Fabric Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>After-flame, seconds</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>After-glow, seconds</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Char Length, inches</td>
<td>2.5</td>
<td>3.4</td>
</tr>
</tbody>
</table>

DALLAS LABORATORIES, INC.

(Original Signed by)
Kevan W. Jones, Vice President

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DISCUSSION

The results indicate compliance with ASTM F1506 requirements for a 5.5 oz/yd² fabric. The Rainbow Tick and Insect Repellent for Clothing, Lot 760 does not adversely affect the flame resistance or the arc rating of the fabric material.

DALLAS LABORATORIES, INC.

(Original Signed by)
Kevan W. Jones, Vice President

Analyst: KJ, TL
KWJ/ss
Submitted by: Rainbow Technology, Inc.
251 Cahaba Valley Parkway
Pellham, AL 35124

Attn: Larry Joe Steeley

Date: September 18, 2007
Report No.: 39251

REPORT

Lab Sample No.: 39251
Rainbow Tick and Mosquito Repellent for FR Clothing (#4507) was contacted with rubber gloves (Type 1, Class 2, ANSI/ASTM D120) to determine if any significant changes occur in the tested properties of the gloves.

PROCEDURE

Tensile Properties

The outer-surface of the glove was rubbed with a liberal amount of repellent, wiped off, allowed to stand for 4 hours and then washed with mild soap and warm water. The above procedure was repeated once a day for 3 days. On the fourth day, samples were cut from the cuff areas of the gloves and tested as reported.

Area Swell

Test samples were measured after 24 hour soak at 75°F in the repellant.

AC Electrical Proof Tests

Gloves samples exposed to the repellent as per tensile property samples but were not cut up. Test was performed at 20 KV @ 3 minutes, maximum proof test current was recorded during last 20 seconds of the test. Pass/Fail criteria is based on a maximum proof test current of 18 mA as dictated by Class 2 and 16° glove length. Clearance from cuff to water line was set at 3 inches. Test was repeated after 16 hour soak in distilled water.

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RESULTS

Tensile Properties (ASTM D412, Avg. of 5)

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Rainbow Repellant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tensile Strength, psi</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>2,818</td>
<td>-</td>
</tr>
<tr>
<td>After 3 day Exposure</td>
<td>-</td>
<td>2,698</td>
</tr>
<tr>
<td>% Change from Initial</td>
<td>-</td>
<td>-4.3%</td>
</tr>
<tr>
<td>Initial Aged 7 days @ 158°F</td>
<td>2,636</td>
<td>-</td>
</tr>
<tr>
<td>After 3 day Exposure and 7 day aging @ 158°F</td>
<td>-</td>
<td>2,518</td>
</tr>
<tr>
<td>% Change from Initial, aged</td>
<td>-6.5%</td>
<td>-6.7%</td>
</tr>
</tbody>
</table>

| **Ultimate Elongation, %** |         |                   |
| Initial                  | 1,563   | -                 |
| After 3 day Exposure     | -       | 1,512             |
| % Change from Initial    | -       | -3.3%             |
| Initial Aged 7 days @ 158°F | 1,316 | -                 |
| After 3 day Exposure and 7 day aging @ 158°F | - | 1,200 |
| % Change from Initial, aged | -15.8% | -8.8%             |

| **500% Modulus, psi**     |         |                   |
| Initial                  | 906     | -                 |
| After 3 day Exposure     | -       | 892               |
| % Change from Initial    | -       | -1.5%             |
| Initial Aged 7 days @ 158°F | 874  | -                 |
| After 3 day Exposure and 7 day aging @ 158°F | - | 862 |
| % Change from Initial, aged | -3.5% | -3.4%             |

**Area Swell, % (ASTM D471, Avg. of 3)**

24 hour soak

- 1.6%

**AC Electrical Proof Test (ASTM D120)**

A)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage at 20 KV, mA</td>
<td>12.2</td>
<td>12.1</td>
<td>12.4</td>
</tr>
<tr>
<td>Pass/Fail</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Breakdown Voltage, KV</td>
<td>37.4(FO)</td>
<td>38.0(FO)</td>
<td>37.0(FO)</td>
</tr>
</tbody>
</table>

Rainbow Repellant

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage at 20 KV, mA</td>
<td>12.4</td>
<td>12.6</td>
<td>12.4</td>
</tr>
<tr>
<td>Pass/Fail</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Breakdown Voltage, KV</td>
<td>37.0(FO)</td>
<td>37.4(FO)</td>
<td>36.8(FO)</td>
</tr>
</tbody>
</table>
### B) 16 hour Distilled Water Soak Test

<table>
<thead>
<tr>
<th>Initial – Glove #</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage @ 20 KV, mA</td>
<td>10.6</td>
<td>10.4</td>
<td>10.6</td>
</tr>
<tr>
<td>Pass/Fail</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Breakdown Voltage, KV</td>
<td>38.6(FO)</td>
<td>39.0(FO)</td>
<td>38.8(FO)</td>
</tr>
</tbody>
</table>

Rainbow Tick and Mosquito Repellant
(3 day Exposure followed by 16 hour Soak Test)

<table>
<thead>
<tr>
<th>Glove #</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage @ 20 KV, mA</td>
<td>10.8</td>
<td>11.3</td>
<td>11.2</td>
</tr>
<tr>
<td>Pass/Fail</td>
<td>Pass</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Breakdown Voltage, KV</td>
<td>38.2(FO)</td>
<td>39.4(FO)</td>
<td>39.0(FO)</td>
</tr>
</tbody>
</table>

**Note:** (FO) Flashover indicates that the arc occurred over, but not through the glove.

### DISCUSSION

The Rainbow Tick and Mosquito Repellant does not seem to adversely affect the rubber linesman gloves as tested.

---

**DALLAS LABORATORIES, INC.**

Analyst: KJ, GF  
KWJ: js
DEPARTMENT OF THE ARMY
U.S. ARMY TROOP SUPPORT COMMAND
MATTHEW RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
MATTHEW, WA
O1760-5019

STRNC-ITCP (70-1r)  28 SEP 1990

MEMORANDUM FOR Commander, U.S. Army Medical Material Development Activity,
ATTN: SGRD-UMB (LTC Phillip E. Pierce), Fort Detrick,
Frederick, MD 21702-5009

SUBJECT: Evaluation of Aviator Uniform

1. Reference memorandum, SGRD-UMB, dtd 18 September 1990, SAB.

2. Evaluation of the flammability properties of permethrin impregnated
   (Individual Dynamic Absorption Application Method) Sage Green Nomex/Kevlar
   fabric used in the aviator uniform has been completed. Treated and
   untreated samples were subjected to flammability Federal Standard 191 Test
   Method 5903 to determine if permethrin would propagate afterflame,
   afterglow or increase char length of treated fabric. There were no
   differences in burning characteristics of treated samples as compared to
   untreated samples.

3. Natick POC for this subject is Raymond Markey, DSN 256-4355. -- The
   Soldiers' Command

FOR THE COMMANDER:

[Signature]

KENDREY A. REINHART
Director, Individual Protection
Directorate
SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/DISTRIBUTOR: Rainbow Technology Corporation (800) 637-6047
CONTACT PERSON: Larry Joe Steeley, Jr.
EMERGENCY PHONE: Chem-Tel Inc. (800) 255-3924
TRADE NAME: Rainbow Tick & Mosquito Repellent for FR Clothing
PRODUCT NUMBER: 4507 & 4509
ISSUE DATE: July 3, 2013
REPLACES MSDS DATED: June 9, 2011

NFPA RATING
(Scale 0-4)
HEALTH.............................. 0
FIRE................................... 1
REACTIVITY........................ 0

SECTION 2 – COMPOSITION/INFORMATION ON COMPONENTS

<table>
<thead>
<tr>
<th>CAS NO</th>
<th>CHEMICAL NAMES</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>52645-53-1</td>
<td>Permethrin</td>
<td>0.50</td>
</tr>
<tr>
<td>64742-95-6</td>
<td>Aromatic Petroleum Distillate</td>
<td>&lt;1.00</td>
</tr>
<tr>
<td>N/A</td>
<td>Inert Ingredients</td>
<td>&gt;98.0</td>
</tr>
</tbody>
</table>

CHEMICAL CHARACTERIZATION/DESCRIPTION: Permethrin*
*(3-phenoxypentyl)methyl (+/-) cis/trans 3-(2,2-dichloroethenyl)-2,2-dimethyl cyclopropanecarboxylate. Cis/trans ratio: min 35% (max. 40%)(+/-) cis and max. 65% (min 60%)(+/-) trans.

SECTION 3 – HAZARD IDENTIFICATION

LABELING: Precautionary Statements: Keep out of Reach of Children. Avoid contact with face, eyes, or skin. Harmful if swallowed. Wash thoroughly after handling and before eating or smoking. Do not use on humans. Do not retreat clothing within 6 weeks unless clothing has been laundered between treatments.

SECTION 4 – FIRST AID MEASURES

First Aid: Emergency Procedures:
If Inhaled: Remove affected person to fresh air. Apply artificial respiration, if indicated.
Skin Contact: Remove contaminated clothing and wash affected areas with soap and water.
Eye Contact: Flush eyes with plenty of water. Call a physician if irritation persists.
If Swallowed: Drink one or two glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person.

SECTION 5 – FIRE FIGHTING MEASURES

Suitable Extinguishing Measures
Water Spray, Carbon dioxide, foam, or dry chemical. Use appropriate extinguishing media for surrounding fire.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Personal Precautions: Eye Protection – safety glasses, goggles, or face shield
Environmental Precautions: None necessary under normal conditions of use.
Measures for Cleaning/Collection: Open windows and doors to ventilate area thoroughly. Allow to discharge safely, avoiding breathing vapors. Soak up residues with an absorbent material.
SECTION 7 – HANDLING AND STORAGE
Do not store where temperature falls below 32 degrees F.

SECTION 8 – EXPOSURE CONTROL/PERSONAL PROTECTION
Personal Protective Equipment:
Respiratory Protection: None
Skin Protection: None
Eye Protection: Safety glasses, goggles or face shield.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor Pressure (mm Hg)</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor Density (AIR = 1)</td>
<td>N/A</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Miscible</td>
</tr>
<tr>
<td>Solubility in Oil</td>
<td>Negligible</td>
</tr>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Slight (Solvent)</td>
</tr>
<tr>
<td>Color</td>
<td>Milky White</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>0.995</td>
</tr>
<tr>
<td>Melting Point</td>
<td>N/A</td>
</tr>
<tr>
<td>Unit Pressure</td>
<td>N/A</td>
</tr>
<tr>
<td>Pounds/Gallon</td>
<td>8.31</td>
</tr>
<tr>
<td>Flash Point (TTC)</td>
<td>&gt;200 degrees F</td>
</tr>
<tr>
<td>PH</td>
<td>6.0-7.0</td>
</tr>
<tr>
<td>Auto Ignition Temp. (°C)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

SECTION 10 – STABILITY AND REACTIVITY
General: This product is considered stable.
Materials to avoid: None
Conditions to avoid: Do not store when temperature exceeds 130 degrees F
Hazardous Decomposition Products (including combustion products): None
Hazardous Polymerization: Will not occur

SECTION 11 – TOXICOLOGICAL INFORMATION
Systems of Overexposure: None
Health Effects of Risk from Exposure: Acute: NE  Chronic: NE

SECTION 12 – ECOLOGICAL EFFECTS
None anticipated under normal conditions of use.

SECTION 13 – DISPOSAL CONSIDERATIONS
Replace cap, wrap container in several layers of newspaper, and discard container in trash. Dispose of absorbents in trash. Dispose of all wastes in accordance with Federal, State, and Local regulations.

SECTION 14 – TRANSPORTATION INFORMATION
Proper Shipping Name: Insect Repellent/Clothing Treatment
Not Restricted.

SECTION 15 - REGULATORY INFORMATION
TSCA: (toxic Substances Control Act) Regulations, 40CFR710: This product is a pesticide and is exempt from TSCA regulation.
CERCLA and SARA Regulations (40CFR355, 370, and 372): This product does not contain chemicals subject to the regulation and reporting requirements of the Superfund Amendments and Reauthorization Act of 1986 (SARA, Title III), Section 311, 312 and 313.

SECTION 16 – OTHER INFORMATION
The information provided herein was believed to be accurate at the time of preparation and prepared from a compilation of sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of this product, and to determine the suitability of the product for its intended use.
SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/DISTRIBUTOR: Rainbow Technology Corporation (800) 637-6047
CONTACT PERSON: Larry Joe Steeley, Jr.
EMERGENCY PHONE: Chem-Tel Inc. (800) 255-3924
TRADE NAME: Rainbow Jungle Formula Insect Repellent Towelette
PRODUCT NUMBER: 4508
ISSUE DATE: June 24, 2013
REPLACES MSDS DATED: September 7, 2010

SECTION 2 – COMPOSITION/INFORMATION ON COMPONENTS

<table>
<thead>
<tr>
<th>CAS NO</th>
<th>CHEMICAL NAMES</th>
<th>% by wt</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>134-62-3</td>
<td>N,N Diethyl-m-toluamide (DEET)*</td>
<td>30</td>
<td>Not Established</td>
</tr>
<tr>
<td>64-17-5</td>
<td>Ethyl Alcohol</td>
<td>&lt;12</td>
<td>OSHA PEL: 1000 ppm (as 8-hr time-weighted avg)</td>
</tr>
</tbody>
</table>

Other Inert Ingredients **

* Active Ingredient
** Other inert ingredients are maintained as trade secrets, are any substances other than an active ingredient contained in this product. Some of these may be hazardous, but their identity is withheld because they are considered trade secrets. The hazards associated with the other ingredients are addressed in this document.

SECTION 3 – HAZARD IDENTIFICATION

Emergency Overview – A white liquid, lotion or cream with added fragrance (variable). This product does not present an immediate concern for emergency personnel.

Potential Health Effects

Eyes – May cause moderate irritation.
Skin – Keep away from mucous membranes and abraded skin.
Ingestion – May be harmful if ingested.
Inhalation – High gas, vapor, or mist concentrations may be harmful if inhaled.
Chronic (Carcinogen) – None of the components of this material is listed by IARC, NTP or OSHA as a carcinogen.
Teratogenicity – No data available for this mixture.
Mutagenicity – No data available for this mixture.

SECTION 4 – FIRST AID MEASURES

Eyes – Immediately flush the eyes with plenty of water for at least 15 minutes. Call a physician.
Skin – Wash thoroughly after skin contact.
Ingestion – Drink 1 to 2 glasses of water and induce vomiting by touching back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person. Get medical attention.
Inhalation – Remove from exposure. If not breathing, give artificial respiration and call a physician. Seek medical attention if medical problems persist.

SECTION 5 – FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES: FLASHPOINT >203 degrees F (>95 degrees C) Method: COC
FLAMMABLE LIMITS: LEL Not available UEL Not available
AUTOIGNITION: Not available
SECTION 5 – FIRE FIGHTING MEASURES CONT.

COMBUSTION PRODUCTS: As with other organic materials, combustion will produce carbon monoxide, carbon dioxide and nitrogen oxides.

EXTINGUISHING MEDIA: Foam, dry chemical, carbon dioxide (CO2), water spray.

FIREFIGHTING INSTRUCTION: Wear self-contained breathing apparatus and protective clothing. Normal firefighting procedures may be used.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Contain spilled material with sand or vermiculite and place in chemical waste container. Prevent runoff from entering drains, sewers, and streams.

SECTION 7 – HANDLING AND STORAGE

HANDLING: Avoid contact with eyes, mucous membranes and clothing. Use with adequate ventilation. Wash hands after handling. Since DEET is a good solvent, it is recommended that the formulation be kept away from painted and varnished surfaces, plastics, polymers and rubbers.

STORAGE: This product should be stored at ambient temperature in a dry, well-ventilated location. Keep container tightly closed.

SECTION 8 – EXPOSURE CONTROL/PERSONAL PROTECTION

ENGINEERING CONTROLS: Use with adequate ventilation. The use of local mechanical ventilation is recommended whenever this product is used in a confined space or heated above ambient temperature.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eyes/Face: Goggles or glasses with side shields

Skin: Clothing should be sufficient to minimize physical contact. Impermeable gloves recommended (i.e., disposable neoprene)

Respiratory: The use of a NIOSH-approved organic vapor respirator is recommended whenever this product is used in a confined space or heated above ambient temperature. Air-purifying respirators must not be used in oxygen-deficient atmospheres.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling Point</td>
<td>Initial boiling point = 78 degrees C (ethyl alcohol)</td>
</tr>
<tr>
<td>Vapor Pressure (mm Hg)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Vapor Density (AIR = 1)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Solubility in Water:</td>
<td>Water emulsion</td>
</tr>
<tr>
<td>Appearance:</td>
<td>White liquid, lotion or cream</td>
</tr>
<tr>
<td>Odor:</td>
<td>Fragrance added (varies)</td>
</tr>
<tr>
<td>Specific Gravity (water=1)</td>
<td>Approx. 1</td>
</tr>
<tr>
<td>Freezing/Melting Point:</td>
<td>Not Available</td>
</tr>
<tr>
<td>Physical State</td>
<td>Liquid, lotion or cream</td>
</tr>
<tr>
<td>PH</td>
<td>6.5-7.5 @ 1% aqueous solution</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>&lt;1 (Butyl Acetate = 1)</td>
</tr>
</tbody>
</table>

SECTION 10 – STABILITY AND REACTIVITY

STABILITY: Stable

INCOMPATIBILITY: Incompatible with oxidizing materials.

HAZARDOUS DECOMPOSITION PRODUCTS: As with other organic materials, combustion will produce carbon dioxide, carbon monoxide and oxides of nitrogen.

POLMERIZATION: Will not occur.

SECTION 11 – TOXICOLOGICAL INFORMATION

IRRITATION:
Skin – rabbit - 500 mg; slightly irritating
Eye – rabbit – 100 mg; moderately irritation

TOXIC EFFECTS:
Oral – rat
LD50 (female): between 2000 mg/kg and 5000 mg/kg
LD 50 (male) > 5000 mg/kg
Dermal – rat
LD50: > 5000 mg/kg
Inhalation – rate – LC50: > 2000 mg/m3
SECTION 11 – TOXICOLOGICAL INFORMATION CONT.

Other multiple dose toxicity
Skin – guinea pig – No evidence of dermal sensitizer effects.

SECTION 12 – ECOLOGICAL EFFECTS

No data available for this mixture.

SECTION 13 – DISPOSAL CONSIDERATIONS

Disposal must be in accordance with Federal, State, and Local regulations.

SECTION 14 – TRANSPORTATION INFORMATION

DOT SHIPPING CLASSIFICATION – Not Regulated
DOT HAZARD CLASS – ORM-D
UN NUMBER – Not applicable
DOT HAZARD LABEL – Not applicable
IMO – Not listed

SECTION 15 - REGULATORY INFORMATION

OSHA STATUS – Non-Hazardous
SARA TITLE III – Not Applicable
CERCLA – Not Applicable
California Proposition 65 – Ingredients Not Listed

NOTE: This material is an approved pesticide under U.S. EPA’s FIFRA and Health Canada requirements.

SECTION 16 – OTHER INFORMATION

HMIS RATING       NFPA Rating
Health – 1        Health - 1
Flammability – 1   Flammability - 1
Reactivity – 0     Reactivity - 0
Personal Protection - B

NOTE: ‘B’ designates a recommendation of safety glass and protective gloves when handling this material in bulk. This rating is
given to materials which have the potential for skin irritation, or which may be harmful if absorbed through the skin.

The information provided herein was believed to be accurate at the time of preparation and prepared from a compilation of sources
believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to
comply with all laws and procedures applicable to the safe handling and use of this product, and to determine the suitability of the
product for its intended use.