UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
ALEXANDRIA DIVISION

FIRECLEAN LLC 21155 Whitfield Place Suite 103 Potomac Falls, Virginia 20165 Plaintiff, v. [redacted] and [redacted] Defendants.	**CASE NO.** 1:16cv294 JCC/MSN **JURY TRIAL DEMANDED**

COMPLAINT

Plaintiff FireClean LLC ("FireClean"), by counsel, files this Complaint against Defendants Andrew Tuohy ("Tuohy" or "Defendant Tuohy") and Everett Baker ("Baker" or "Defendant Baker"), and alleges as follows:

PRELIMINARY STATEMENT

In 2012, FireClean's founders developed a proprietary formulation that helps prevent and reduce the build-up of carbon residue on firearms. The patent-pending product is called FIREClean®. FIREClean® has been a success in testing and in sales, and FireClean's revenues have, until recently, increased by twenty to fifty percent annually since sales began in 2012.

In September 2015, Defendant Tuohy initiated a public smear campaign against FireClean. Tuohy maintains an online publication, located at www.vuurwapenblog.com ("Vuurwapen Blog"), for which he writes articles on the topics of guns and weaponry. Tuohy published false and disparaging statements about FireClean and its product on Vuurwapen Blog and on Vuurwapen Blog's Facebook page, which Tuohy authors. Tuohy's statements were widely read and commented upon within the community of gun owners, retailers, and aficionados, including those in the Commonwealth of Virginia. Online reviews and comments about FireClean and its product, including on Amazon.com, demonstrate that Tuohy's comments have materially damaged FireClean's reputation. As a result of Tuohy's libelous attacks, FireClean's revenues have fallen dramatically since September.

In addition, Defendant Tuohy later conspired with an individual named Everett Baker who, in the wake of the attention that Tuohy's first articles received, contacted Tuohy for the express purpose of conspiring with him to further defame and damage FireClean.

As a result of the Defendants' tortious conduct, FireClean's revenues have fallen by over $25,000 per month since Tuohy's first tortious act, and FireClean will continue to suffer losses in the future, and likely permanently, due to Tuohy's and Baker's public and malicious campaign against it. Through this action, the Plaintiff seeks to redress these wrongs.

THE PARTIES

1. Plaintiff FireClean is a Virginia Limited Liability Company. Each of FireClean's members is a natural person who resides in Virginia.

2. Defendant Andrew Tuohy is, and was at all times relevant hereto, a citizen and resident of Arizona.

3. Defendant Everett Baker is, and was at all times relevant hereto, a citizen and resident of New Hampshire.

JURISDICTION AND VENUE

4. This Court has jurisdiction over this action pursuant to 28 U.S.C. § 1332(a)(2) in that there is complete diversity of citizenship between Plaintiff and Defendants, and the amount in controversy exceeds $75,000, exclusive of interest, attorneys' fees and costs.

5. Personal jurisdiction over the Defendants arises under Va. Code Ann. § 8.01-328.1 in that Defendants Tuohy and Baker caused tortious injury in Virginia, and engaged in a persistent course of conduct in Virginia.

6. Defendant Tuohy has engaged in a persistent course of conduct in Virginia by calling, texting, and emailing with Dave Sugg and Ed Sugg, FireClean's managers, regarding FIREClean®.

7. Defendant Tuohy knows that Dave Sugg and Ed Sugg reside in Virginia. Tuohy has known and been in communication with Dave Sugg and Ed Sugg since 2012. During that time, Tuohy called, e-mailed, texted, and otherwise sent communications nearly 100 times to FireClean and its mangers in Virginia. The majority of those communications pertained to Tuohy's trials of FIREClean®.

8. Defendant Tuohy knew that FireClean is a Virginia company, and knew that FireClean would suffer the effects of Tuohy's tortious conduct in Virginia, including with its local customers. Tuohy's persistent false statements regarding FireClean and its product demonstrate his intent to aim his defamatory publications, and his conspiracy, into Virginia, and to a Virginia audience. This is evident from various third-party blog and internet posts that

comment upon Tuohy's articles—where location data is available, it reveals that some commenters are located in Virginia.

9. Defendant Tuohy has also posted public commentary on FireClean's Facebook page, knowing that it is a Virginia company.

10. Defendant Tuohy's Vuurwapen Blog is interactive in that it permits any viewer to leave a comment, and any viewer to reply to those comments. On information and belief, Vuurwapen Blog has subscribers who are Virginia residents. As described in this Complaint, each defamatory article that Tuohy published regarding FireClean and its product generated numerous comments by readers and responses by Tuohy. Tuohy has published statements knowing that Virginia residents and FireClean customers would be exposed to his commentary.

11. Moreover, the Vuurwapen Blog allows readers to request and receive notifications of new posts to the blog, and new comments to a particular blog post, via email. Upon information and belief, there are regular readers and subscribers of Vuurwapen Blog who reside in Virginia and who receive updates to Tuohy's blog via email in Virginia.

12. On information and belief, when Tuohy sends updates for his blog to his Virginia subscribers, he uses computer networks in Virginia to do so.

13. Defendant Tuohy has traveled to Virginia to cover stories on which he reported in his blog, Vuurwapen Blog.

14. In addition, Defendants Tuohy and Baker transacted business in the Commonwealth by, purchasing, and/or requesting orders of FIREClean® directly from the company in Virginia, and they know that FireClean is located in Virginia. Defendants' orders were received in Virginia, and FIREClean® was shipped to Defendants from Virginia. The very

product that Defendants received from the company in Virginia was the subject of Defendants' testing, commentary, and defamatory statements.

15. Upon information and belief, Baker, like Tuohy, knows that FireClean is located in Virginia, and knew that he was causing tortious injury to FireClean in Virginia. The widespread effects of his conspiratorial efforts, and defamatory comments, have reached Virginia, as Baker intended.

16. Defendant Baker's disparaging statements and conspiracy against FireClean, manifests his intent to aim his tortious acts into Virginia, and to a Virginia audience.

17. Defendant Baker maintains an online publication, located at https://granitestateguns.wordpress.com. Baker's publication allows readers to subscribe and receive notifications of updated posts to the publication via email. Baker has also sent messages to FireClean via Facebook messenger, knowing that FireClean is based in Virginia. Upon information and belief, some subscribers of Baker's blog reside in Virginia.

18. Defendant Baker's publication is interactive in that it permits any reader to write or reply to a comment. Baker actively participated in the commenting process in his articles regarding FireClean. Additionally, Baker has participated in exchanges elsewhere online, including Facebook and other forums, knowing that FireClean's Virginia customers may be in his intended audience.

19. On information and belief, when Baker sends updates for his blog to his Virginia subscribers, he uses computer networks in Virginia to do so.

20. Thus, Defendant Baker has engaged in a persistent course of conduct in Virginia by using its computer networks to send his blog updates, which contain the defamatory content described in this Complaint, to his blog's Virginia subscribers.

21. Venue is proper in this Court pursuant to 28 U.S.C. § 1391(b)(3).

FACTS RELATING TO ALL CAUSES OF ACTION

22. In January 2012, Ed Sugg and Dave Sugg (collectively "Sugg Brothers") developed a substance that improves reliability and performance of firearms by reducing the adhesion of carbon residue that results from discharging a firearm. Such carbon residue or build-up is also known as "fouling." The product itself is specially formulated so that it will not "gum," or leave behind a solid residue from its use. The product also functions as a firearm lubricant.

23. A thin layer applied to the areas of a firearm that are subject to friction and fouling will form a thin protective layer against carbon and other fouling.

24. In May 2012, the Sugg Brothers began distributing and selling the product, which they gave the name FIREClean®. That same month, FireClean LLC was formed in Virginia.

25. As its patent application states, FIREClean® is a "[a] method of removing or preventing carbon fouling on a mechanical component of a device," consisting of a proprietary blend of at least three "natural, non-petroleum, non-synthetic oil[s] derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or flower or tree nut," where each oil has a smoke point above 200 degrees Fahrenheit, and the total volume of the at least three oils is at least 25% of the total volume of the oil composition. (Exhibit A at 1 & 5).

26. Also, FIREClean® contains at least one high-oleic oil, or highly monounsaturated fatty acid, which is preferred over significantly polyunsaturated fatty acids (found in most common vegetable oils), due to the performance, stability and non-drying, and non-gumming

nature of high-oleic oils. The use of high-oleic oils also enhances the temperature range and storage stability of the substance. (Ex. A at 8.)

27. The patent application for the product that is FIREClean® has been publicly available since at least September of 2013.

28. FIREClean® is not made from a single type of oil.

29. FIREClean® is not Crisco Canola Oil nor is it otherwise common canola oil.

30. In fact, during testing and development, FireClean determined that canola oil was one of the worst-performing oils for the prevention or removal of fouling.

31. FIREClean® is not Crisco Vegetable Oil (which is soybean oil), nor is it common soybean oil.

32. FIREClean® is not otherwise a re-labeled or re-packaged pre-existing consumer or retail product.

33. Vuurwapen Blog is publicly accessible on the internet. Its target audience is gun owners, gun retailers, and gun aficionados. Defendant Tuohy also maintains a Facebook Page for Vuurwapen Blog, as well as a YouTube channel. Defendant Tuohy contributes as a writer, on occasion, to other websites, including www.thefirearmblog.com, which sites have similar target audiences in the gun community.

A. Defendant Tuohy Publishes the Spectroscopy Article, September 12, 2015

34. On August 29, 2015, Defendant Tuohy sent a Facebook message to Ed Sugg: "Ed, Do you guys have a response to the claims that FireClean is just Crisco? Andrew." (Exhibit B.)

35. Ed Sugg replied, "Hi Andrew-categorically deny. If you let me know where you are hearing it I would appreciate it. If it's a competitor it will generate a strong response. Thanks! Ed." (*Id.*)

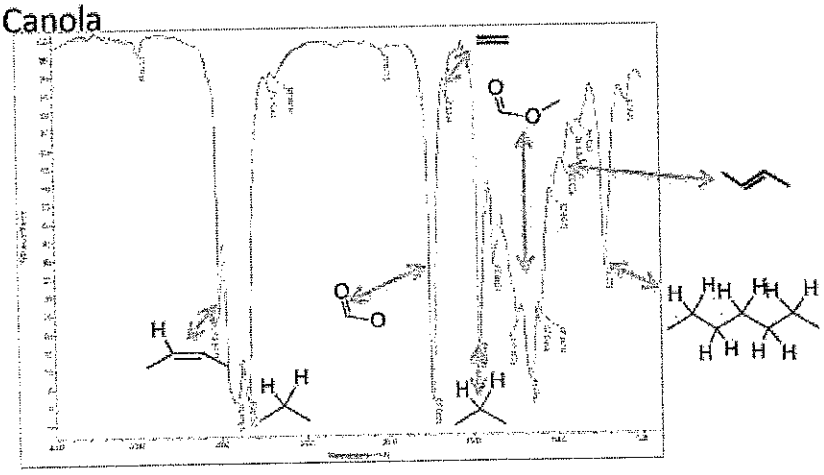
36. On September 12, 2015, Defendant Tuohy published an article entitled, "Lies Errors and Omissions; Infrared Spectroscopy of FireClean and Crisco Oils." (The "Spectroscopy Article," attached as Exhibit C) on Vuurwapen Blog.

37. As of the date of the filing of this Complaint, the article remains available at: http://www.vuurwapenblog.com/general-opinion/lies-errors-and-omissions/ir-spectra-fireclean-crisco/.

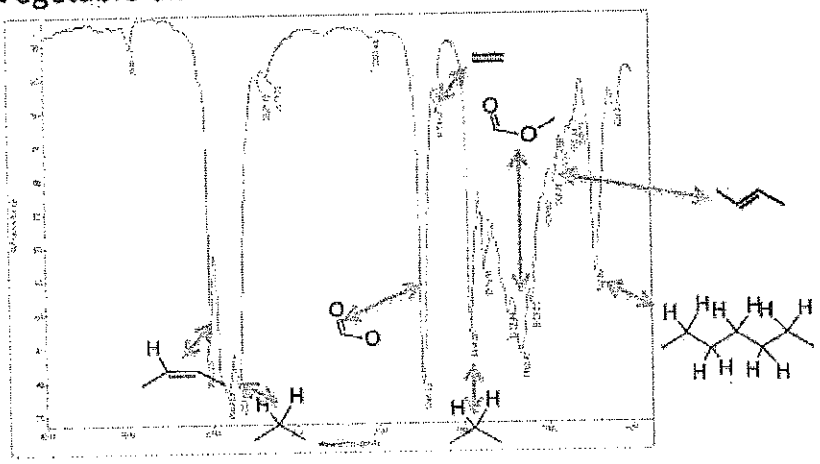
38. In this article, Defendant Tuohy referred to prior reports on the internet "that FireClean is nothing more than Crisco vegetable oil." He wrote that the "makers of FireClean, Ed Sugg. . . assured me that not a single drop of Crisco has ever been part of their formulation . . ." but that "[d]espite these assurances, which I was inclined to believe, I sought to undertake my own testing to determine whether or not these claims are true about FireClean. Trust, but verify." (Ex. C at 1.)

39. In the Spectroscopy Article, Tuohy asserts that he obtained the assistance of a professor at the University of Arizona, who performed an infrared spectroscopy analysis of FIREClean®, Crisco Vegetable Oil, and Crisco Canola Oil. The spectra for each of the three substances appear in the article as follows:

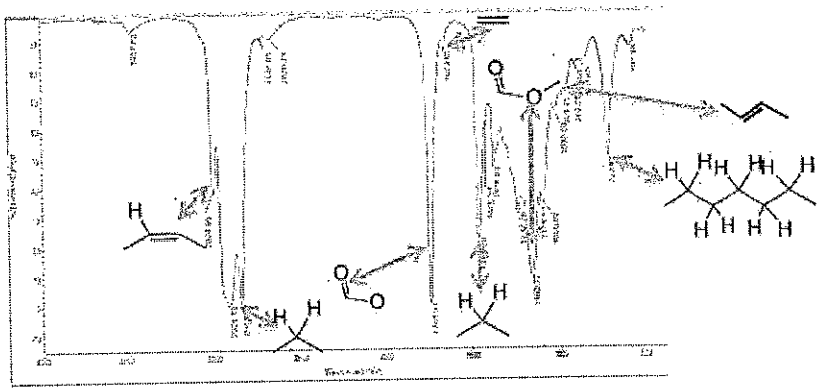
Crisco Pure Canola



Crisco Pure Vegetable oil



Fire Clean



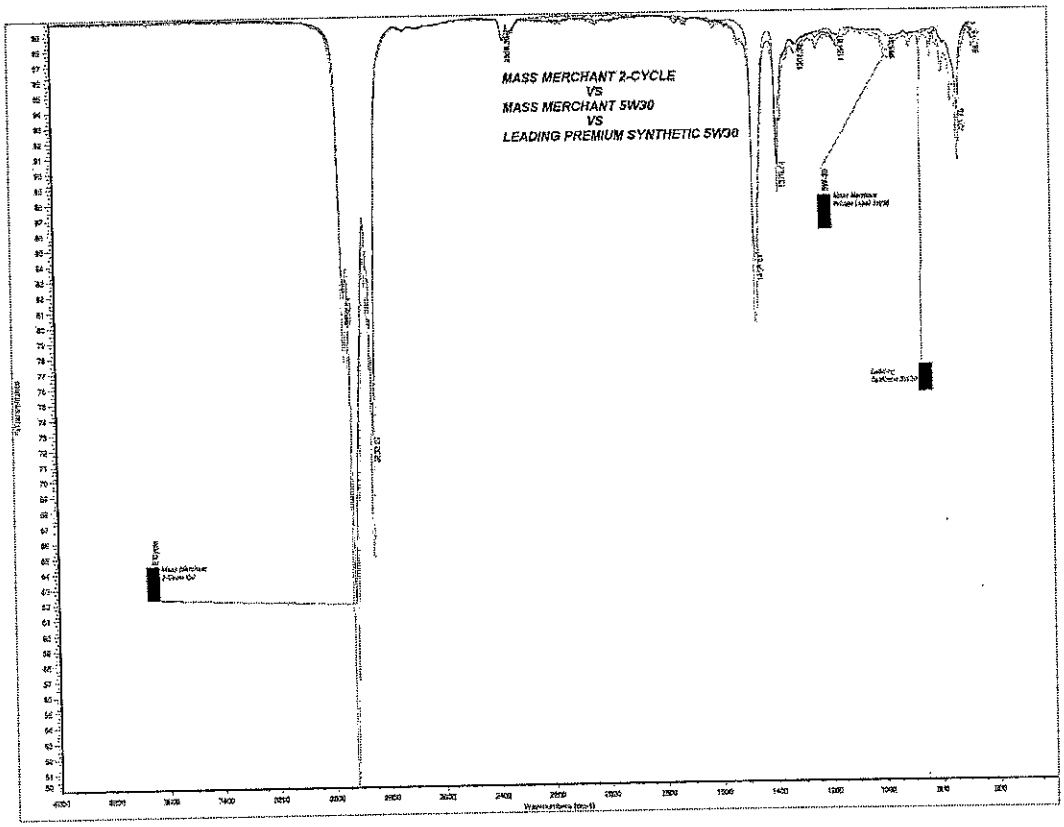
(Ex. C at 3. A magnified view of each spectra follows the Spectroscopy Article at Exhibit C.)

40. Tuohy concludes, in bolded words: "**FireClean is probably a modern unsaturated vegetable oil virtually the same as many oils used for cooking.**" (Ex. C at 3.)

41. This statement, alongside the side-by-side spectra, which are scaled differently, conveys the false and disparaging notion that FIREClean® is Crisco Vegetable Oil, Crisco Canola Oil, or a single common household cooking oil.

42. In fact, similar yet distinct spectra of FIREClean®, Crisco Canola Oil, and Crisco Vegetable Oil would be expected because all three substances contain plant or vegetable-based oils, which are from the same class of compounds: triacylglycerides.

43. For example, the below spectra overlay illustrates why infrared spectroscopy is not scientifically suitable for comparing oils from the same class of compounds, such as triacylglycerides or hydrocarbons. The spectra are of three different substances: the mass-merchant 2-cycle oil is oil used for mixing into fuel for power equipment such as chain saws and grass trimmers; the two different "5W30" oils are car engine oils, with one being conventional mass-merchant oil and the other, a fully-synthetic leading brand. The spectra are similar, as with the spectra comparing FIREClean® to Crisco. Yet, these are three different substances, with different uses.



44. Tuohy's published analysis did not include any controls, nor did it analyze any other substances, whether plant or vegetable-based, or otherwise.

45. The analysis failed to evaluate whether many oils or oil blends would have similar basic patterns. The similar spectra for different Crisco oils (e.g. Crisco Canola and Crisco soybean) should have been an obvious indicator of the unsuitability of this analysis.

46. Tuohy also failed to perform any other number of tests that would help ascertain whether the substances are the same.

47. The statement, "FireClean is probably a modern unsaturated vegetable oil virtually the same as many oils used for cooking," and its implications, are false.

48. FIREClean® is neither Crisco Canola oil nor Crisco Vegetable Oil, nor equivalent thereto. FIREClean® is not made from a single oil. FIREClean is not "virtually the same as

many oils used for cooking." FIREClean® is not a common household product that has simply been repackaged, nor is it common canola or soybean oil that has been repackaged.

49. Tuohy published this disparaging statement knowing it was false, or with reckless or negligent disregard for the truth.

50. Defendant Tuohy also quoted the anonymous professor as saying: *"I don't see any sign of other additives such as antioxidants or corrosion inhibitors. Since the unsaturation in these oils, especially linoleate residues, can lead to their oligomerization with exposure to oxygen and light, use on weapons could lead to formation of solid residues (gum) with time. The more UV and oxygen, the more the oil will degrade."* (Ex. C at 3-4, emphasis in original.)

51. Based on these purported facts, Tuohy wrote that "[g]iven that people in the military are often exposed to both UV and oxygen (such as when they go outdoors) and also need corrosion protection for their firearms, I would not recommend FireClean be used by members of the military." (*Id.* at 4.)

52. In fact, FTIR spectroscopy is not an appropriate tool to test for corrosion resistance.

53. The suggestion that FIREClean is not suitable for military use is false. The assertion that FIREClean® is not suitable for use in settings with UV, light, moisture and oxygen is false.

54. As explained previously, FIREClean® is specially formulated to resist thermal breakdown under such circumstances. Indeed, FIREClean® possesses extreme heat resistance, with a flash point of 325 degrees Celsius, or 617 degrees Fahrenheit, which is approximately four times higher than military requirements for firearm lubricant. FIREClean is suitable for military use because it is specifically made to handle heat and carbon overload which are often

found in military use, notably with suppressed or silencer equipped arms or fully automatic weapon fire. These severe applications burn off or otherwise cause most lubricants to fail.

55. Tuohy is well aware that FIREClean® performs well in extreme conditions.

56. As stated in its directions, FIREClean® should be used in thin layers in on the areas of the gun that are subject to friction and fouling. Such areas on a firearm are internal and thus are not generally exposed to UV or light. The implication that FIREClean®, when used as instructed, will impede normal firearm functioning, is false.

57. Tuohy is well aware that a proper application of FIREClean® involves properly applying it to internal components of a firearm. As recently as September 1, 2015—just days before the Spectroscopy Article, Tuohy stated on his Facebook page, in a post he has since deleted, that he has used FIREClean® over "several years" and "tens of thousands of rounds," and had "zero complaints" about its performance. His Facebook post included a video demonstration of the firing of a dirty rifle that was lubricated with FIREClean® and then left uncleaned in storage for two years after firing **corrosive** surplus ammunition. The rifle was discharged and showed no evidence of impaired operation. The video may be found at the following URL: https://www.youtube.com/watch?v=ixruuRYyKaE&feature=youtu.be. In the video, Tuohy states, "I am shooting it now to address concerns over whether or not FIREClean® causes the action to gum up over time if you let it sit for more than six to twelve months." After shooting for approximately twenty seconds, Tuohy examines the gun and states: "Magazine is clear, weapon is clear, all rounds fired without any malfunction."

58. Moreover, the internal components of a firearm to which FIREClean® is applied, while not airtight, are subject to minimal air exposure.

59. Simply put, the statement or inference that the normal and proper use of FIREClean® will lead to corrosion or the formation of solid residues on firearms or weapons is false.

60. In the comments section below the main text of the article, Tuohy later states that the "IR [infrared spectroscopy] data was sufficient to draw the conclusion," the inference being that the "conclusion" is that FIREClean® is Crisco or canola oil. (Ex. D. at 7.)

61. Read as a whole, the Spectroscopy Article explicitly and implicitly conveys that FIREClean® is a common cooking oil that is likely to cause corrosion of a firearm, and that it is inappropriate (or unsafe) in particular for military use. This is untrue, and Tuohy knows this.

62. The Spectroscopy Article (with its title, "Lies, Errors, and Omissions") also falsely implies that FireClean has misrepresented its product.

63. The Spectroscopy Article has been damaging to FireClean's business.

64. Readers of Defendant Tuohy's publication have, to date, left approximately 140 comments on the Spectroscopy Article. (Reader comments attached as Exhibit D.) They include statements such as, "Guess I have to oil al [sic] my shit with a proper gun oil now. Snake oil won't do." (*Id.* at 6.)

65. The comments demonstrate that readers believed the assertions about FireClean, and that FireClean's reputation was materially damaged as a result of Tuohy's statements.

66. Defendant Tuohy's interest in spectroscopy may have been prompted by George Fennell ("Fennell"), who is the president of a company that manufactures a product, Weapon Shield, which competes with FIREClean®. Recently, Fennell claimed responsibility for turning Tuohy's attention to spectroscopy analysis, and stated on his Facebook page that:

> "And I'm sure everyone remembers the firestorm [Tuohy] set off when he did what I told him to do which started this whole spectral process that he's enamored

with…compared FireClean to Crisco Oil…same deal…he saw my video where I said FireClean was pretty much a Crisco oil, long before Andrew did his spectra comparison and validated me then. . . .Didn't mean to get off track here, but just sharing the history behind these….it all started right here. ☺

67. In response to one comment, Tuohy wrote: "….I'm not terribly interested in determining the exact composition of the oil; the IR data is enough to satisfy the question at hand." (*Id.*) The same commenter replied: "Not really. We know nothing about the length of the carbon chains or their structure. All we know is that the functional groups are similar to Crisco, which any oil-like, plant based product would have." Defendant Tuohy responded: "Well, you are most welcome to foot the bill for your own testing." (*Id.* at 8.)

68. Tuohy's cavalier statements demonstrate his reckless disregard for the truth

69. Tuohy was motivated by actual malice, spite and ill-will. His false statements are vicious, blatant attempts to gain for attention for himself and his publication, and to damage FireClean.

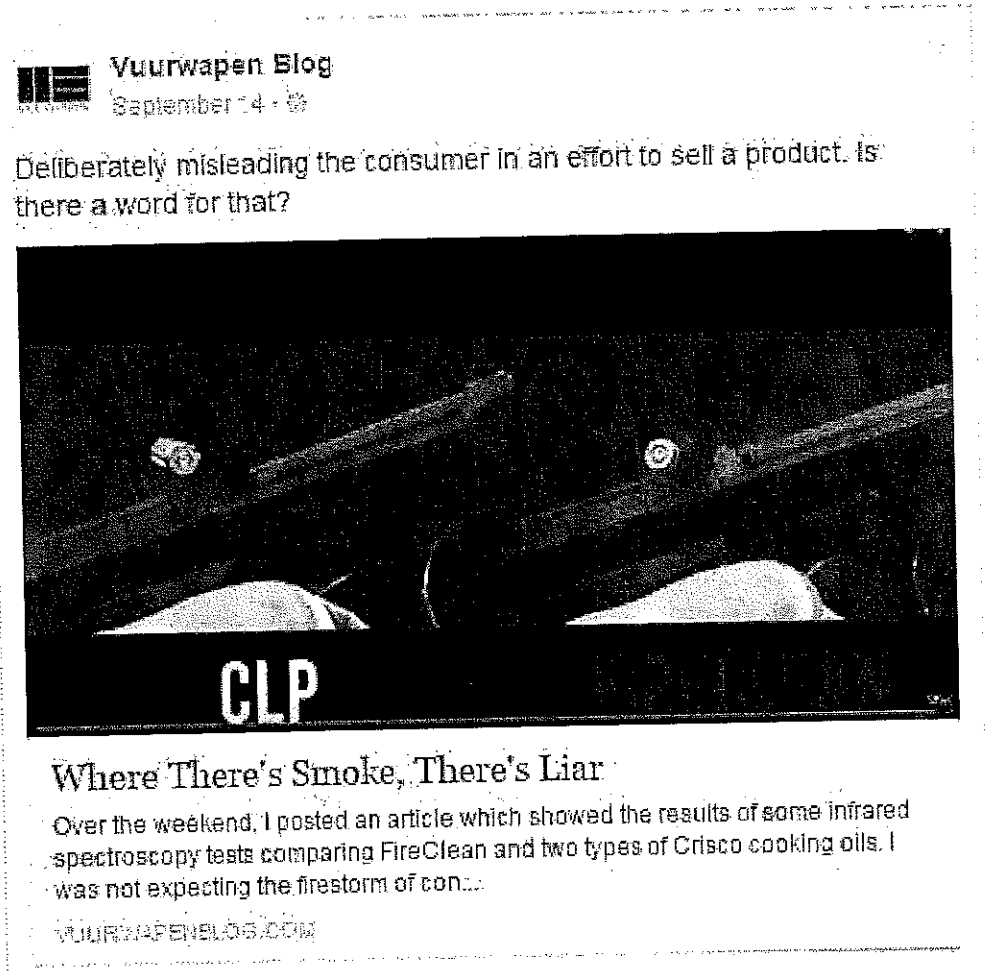
B. Defendant Tuohy Posts "Where There's Smoke, There's Liars," September 14, 2015.

70. A mere two days after publishing the Spectroscopy Article, Defendant Tuohy posted another article on Vuurwapen Blog: "Where There's Smoke, There's Liar."

71. At some point after September 14, 2015, Tuohy changed the title of the article on his publication to, "Severe Problems with Vickers Tactical Video," however, the URL address for the article remains, as of the date of the filing of this complaint, "http://www.vuurwapenblog.com/general-opinion/lies-errors-and-omissions/where-theres-smoke-theres-liar/." (The "Smoke/Liar Article," attached as Exhibit E.)

72. Tuohy posted a link to the article on Vuurwapen Blog and its Facebook page with the statement, "Deliberately misleading the consumer in an effort to sell a product. Is there a

word for that?" (Exhibit F.) A screen shot of the post appears as follows:



73. In the Smoke/Liar article, Tuohy writes: "I made a discovery which calls into question any claim or statement made by FireClean as a company and Ed and Dave Sugg as individuals." (Ex. E at 1.)

74. The article provides a link to a video posted to YouTube by an individual named Larry Vickers, who owns a company called Vickers Tactical, and entitled by Mr. Vickers as a "FireClean Lube Test."[1] The video depicts Vickers interviewing Ed Sugg and Dave Sugg, who describe the development of FIREClean®.

[1] Until recently, the video was publicly available at: https://www.youtube.com/watch?v=S0OAsOCEJfQ

75. Vickers then states that he will be performing a lubricant test, and that two firearms will be discharged, each of them first with no lubricant, then with CLP, a military-grade lubricant, and finally with FIREClean®.

76. Vickers states, "Hopefully we think that you will be able to see this on high speed camera and you'll be able to see the amount of fouling that is actually jettisoned out of the gun and therefore keeps the gun cleaner. Stand by, coming at you."

77. Vickers then fires the two weapons, first with no lubricant, then with CLP, and then FIREClean®. Ed Sugg and Dave Sugg observe and comment on the testing.

78. In the Smoke/Liar Article, Defendant Tuohy claims that a different type of cartridge was used for the FIREClean® firing than for the other two firings (the CLP test and the no-lubricant firing). For the FIREClean® firing, Tuohy states:

> I'll bet you four bottles of FireClean that was a factory +P Cor-Bon load; +P loads being hotter and having more powder than standard, bargain ammunition like Prvi Partizan. Barring that, it was a handload, with a smoky powder selected for maximum effect. . . . [I]t is indisputable that the cartridge fired for the FireClean demonstration was significantly different than the cartridges fired for the dry gun and CLP demonstrations . . . . No honest person with a basic understanding of the scientific method would use handloaded or +P ammunition in a comparison with standard pressure bargain priced ammunition if the comparison was meant to show differences between lubricants and their effect on how much smoke comes out of the chamber during firing . . . . Smoke after firing is put forth as evidence of a cleaner gun. The cleaner gun concept is central to the ethos of FireClean; it's even their URL. Different ammunition was selected for the FireClean portion of the demonstration to give the appearance of more smoke and thus a cleaner gun. . . . All the information required to judge the integrity of statements made by FireClean is contained in that Vickers Tactical video.

(Ex. E at 4.)

79. The article explicitly and implicitly conveys that FireClean dishonestly and intentionally used different ammunition for the FIREClean® firing, therefore falsifying the results to portray FIREClean® as more effective than CLP or no lubricant.

80. FireClean did no such thing.

81. In fact, the ammunition used for all of the firings depicted in the video were standard pressure, factory-loaded, including factory remanufactured, ammunition.

82. The ammunition used for the FIREClean® firing was not "handload" or "Cor Bon +P" rounds.

83. The ammunition used for the FIREClean® firing was not materially different from the ammunition used for the CLP and no-lubricant demonstrations.

84. Defendant Tuohy's accusations are false and disparaging in their entirety.

85. The URL address for the article, and the original title of the article, "Where There's Smoke, There's Liar," falsely conveys that FireClean has deceived the public and/or consumers.

86. Defendant' Tuohy's Facebook post, "Deliberately misleading the consumer in an effort to sell a product. Is there a word for that?" falsely conveys that FireClean has defrauded its consumers. (Ex. F.)

87. As a result of Defendant Tuohy's false and disparaging statements, FireClean has been damaged.

88. Readers of Defendant Tuohy's publication have, to date, left 84 comments on the Smoke/Liar Article. The comments are attached as Exhibit G. The comments include statements such as:

(a) "The problem is they used different ammo for the FireClean gun, making the test completely irrelevant and the makers of the video liars." (Ex. G. at 1.)

(b) "Andrew's point wasn't about the quantity of smoke, it was that the test appears to be rigged." (*Id.* at 7.)

(c) "Man, I would love to be able to reference your info in a video to shut up some of the people still supporting this product." (*Id.* at 18.)

89. These comments demonstrate that readers believed the assertions made in the Smoke/Liar to be fact, and that FireClean's reputation was damaged as a result of Tuohy's statements.

C. The Firearm Blog Picks up Defendant Tuohy's Article

90. On September 13, 2015, www.thefirearmblog.com (the "Firearm Blog") reported on the Spectroscopy Article with an article entitled, "Yes, It's True: FireClean is Crisco." (The "Firearm Blog Article," Exhibit H.)

91. Several days later, the Firearm Blog changed the title to, "Yes, It's True: FireClean is Vegetable Oil," however, the URL of the article remains: "http://www.thefirearmblog.com/blog/2015/09/13/yes-its-true-fireclean-is-crisco/."

92. The article displayed a full-page color picture of a bottle of FIREClean®, at a distorted size, next to a bottle of Crisco oil. (Ex. H.) The false connotation of the illustration is that the two products are equivalent and in fact the same.

93. The image appears on the Firearm Blog's website as follows:

94. The author, Nathaniel Finch, posted a link to the Spectroscopy Article and wrote: "So, in short, to the best of my knowledge, FireClean is canola oil." (Ex. H at 4.)

95. When the Firearm Blog posted "Yes it's True: FireClean is Crisco" to its Facebook page, it was "shared" by over 17,400 Facebook followers in the first eight hours alone. (Exhibit I.)

96. The ramification of the widespread falsehoods about FireClean and its product is evident not only from the sharing of the Firearm Blog's posts and the comments on Vuurwapen Blog, but it is also apparent from third-party comments on various online retailers.

97. For example, on Amazon.com, product review comments for FIREClean® include:

(a) "Crisco. Seriously overpriced." (October 24, 2015, by M.D. Milner).

(b) "Who cares if it's Crisco? It works. Really well." (October 21, 2015).

(c) "Don't let them rip your [sic] off. It's literally just Canola oil. Which works great, but for god sake just buy it from the grocery store not for $30 per 2 oz bottle." (September 20, 2015, by "Anthony").

(d) "DONT BUY! Fireclean = SNAKE OIL! Con artists. I had a suspicion something was very wrong with Fireclean when I saw that they would delete every comment and block every user on their webpage that asked what Fireclean was made of and what was in Fireclean. Pretty shady and sleazy behavior, even for the gun lube industry. Now we know why, they are con artists and were scamming us out of millions the whole time." (September 20, 2015, by "Hurricane Ace").

(e) "Revealed to be nothing but the cheapest of canola oil! Save your money and buy canola oil if you want this stuff! .... Put these guys out of business, damn charlatans! Do a google search if you don't believe me!" (September 19, 2015, by Chris Wardell).

(f) "Caution, I bought this and it contained Snake Oil in the form of Crisco Vegetables." (September 18, 2015 by "Nelson").

(g) "This has been great at keeping food from sticking to my stainless steel cookware. Also great at exposing Larry Vickers as a fraud." (September 18, 2015, by "G of KC").

(h) "Bad at gun cleaning. Great for cooking." (September 16, 2015 by W. Chen).

(i) "This, or you can get it at your local supermarket under a different name:) Usually in the information age, normal people share all kinds of valuable tips to save you money. In this case someone discovered that canola oil works just as well if not better

than gun oil, but instead of sharing this he decided to capitalize on this knowledge and make a profit. But, the stuff does indeed work pretty well and I'm using it myself. Of course, had I known I would have gotten mine from the supermarket." (September 14, 2015, by "St8kout").

(j) "Crisco by the quart is cheaper. Works okay, but far too expensive for rebranded cooking oil. If you're skeptical, google 'Infrared Spectroscopy of FireClean and Crisco Oils.' I wish I had known this before. And still isn't as good at long term protection and lubrication as CLP or Rem Oil." (September 14, 2015 by "MechChef").

(k) "FRAUD. Recently the product has been chemically analyzed and has been revealed to be rebranded Crisco vegetable oil." (September 13, 2015 by John Freckleson).

(l) "Warning to consumers regarding FIREClean Gun Oil. Warning to consumers: An Infrared Spectroscopy test has proven that Fireclean Gun Oil is '...a modern unsaturated vegetable oil virtually the same as many oils used for cooking.' Source: [...] Users may find that this oil is a fine lubricant, but please be aware that if this analysis is true, this product is sold at an absolutely enormous markup." (September 13, 2015, by Shawn Cathcart).

(m) One reviewer posted the graphs that appeared in the Spectroscopy Article. Collins wrote, "This is Crisco vegetable oil." (September 13, 2015, Sean Collins).

98. These are only some of the negative reviews that reference the false notion that FIREClean® is a Crisco or canola oil. All such reviews were posted on or after September 13, 2015, the day after Defendant Tuohy posted the Spectroscopy Article. Prior to that date,

FIREClean®'s reviews on Amazon were almost uniformly positive, with no reference to FIREClean® supposedly being equivalent to Crisco.[2]

D. Defendant Tuohy Conspires with Defendant Baker; Posts "Lies, Errors and Omissions; A Closer Look at FireClean and Canola Oil," October 23, 2015

99. On October 23, 2015, Defendant Tuohy posted a new article entitled, "Lies, Errors and Omissions; A Closer Look at FireClean and Canola Oil." (Exhibit J.) (The "Closer Look Article"). As of the date of the filing of this Complaint, the Closer Look Article remains available on Vuurwapen Blog at: http://www.vuurwapenblog.com/general-opinion/lies-errors-and-omissions/a-closer-look-at-fireclean-and-canola-oil/.

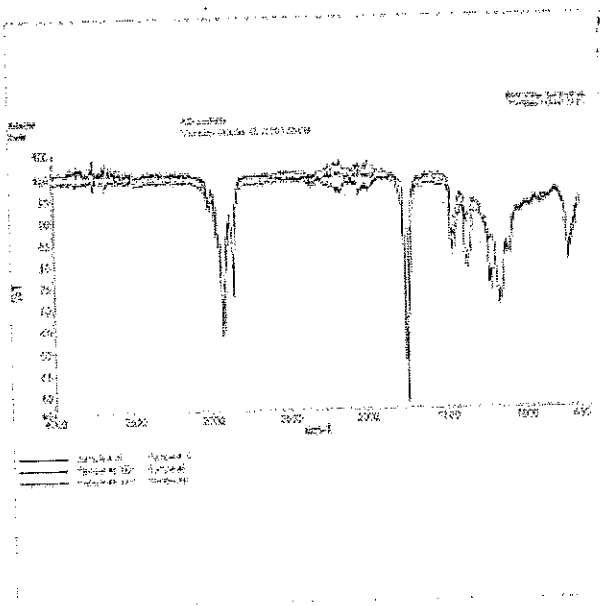
100. Tuohy also posted the Closer Look Article to the Vuurwapen Blog Facebook page on October 23, 2015, and that post appeared as follows:

[2] The only exception is one review that originally appeared in October 2013 and that was updated to refer to FIREClean® being canola oil on September 29, 2015.

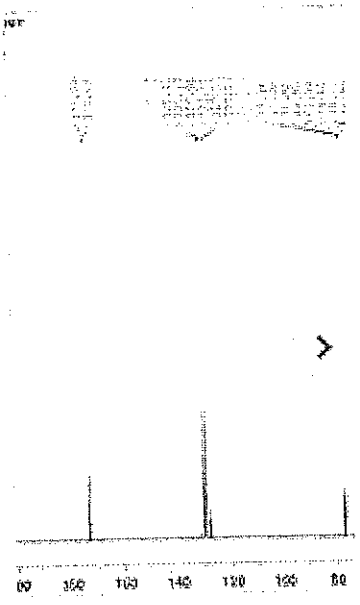
Vuurwapen Blog
October 23 ·

Four tests at two different labs using samples from multiple sources. I'll save you the click and give you the most important sentence right here - According to every PhD who looked at the NMR results, FireClean and Canola oil appear to be "effectively" or "nearly" identical.

A few weeks ago, FireClean said that putting canola oil on your firearm could have catastrophic results. Some people believed that, probably because they are stupid. I don't like it when people in political arguments call the other side stupid and I don't throw around the word stupid lightly. However, if you think that putting canola oil - an oil with a long history of use as an industrial lubricant for metal-to-metal contact -on your rifle is dangerous, but that putting FireClean on your rifle is safe, then you're stupid. There is no other way to define your level of intelligence and critical thinking.



A Closer Look at FireClean and Canola Oil



A Closer Look at FireClean ar

Like Comment Share

234 people like this. Top Comments

101. In the Closer Look article, Defendant Tuohy purported to have obtained a second round of testing on FIREClean®, through Defendant Baker at Worcester Polytechnic Institute ("WPI").

102. Tuohy concludes that "…FireClean and Canola oil appear to be 'effectively' or 'nearly' identical." (Ex. J at 1.)

103. The Closer Look article includes a link to Baker's own post. (Attached as Exhibit K.) Baker writes: "[a]fter I read [Tuohy's] original post of the IR spectra, I sent an email to my academic advisor asking if I could get access to one of the instrument rooms in our labs for a personal project. Once I confirmed that I could do IR testing, I emailed Mr. Tuohy to see if he was interested in the project." (*Id.* at 3.)

104. According to Baker, Tuohy sent in samples of various substances, including FIREClean®.

105. Baker claims to have performed spectroscopy and NMR testing on the substances.

106. Baker concludes: "FIREClean is pure and unmodified canola oil." (*Id.*)

107. Baker conspired with Tuohy to injure FireClean and its product.

108. Baker conspired with Tuohy to injure FireClean despite the fact that FireClean advised Baker, on or about October 29 and 30, 2015, that other tests demonstrated that FIREClean® is not canola oil.

109. Baker conspired with Tuohy to injure FireClean despite the fact that, according to Baker, one of his professors even advised him that his result "isn't 100% conclusive…You do have other tests to provide additional evidence, though!" (Exhibit L at 2.)

110. Tuohy also posted Baker's purported NMR and spectra, and, as with the Spectroscopy Article, they show a similar basic pattern. (Ex. J at 2 & 3.) To an experienced and

skilled scientist, the distinctions, as well as the impropriety of the spectroscopy test, would be apparent.

111. Tuohy states:

> FireClean is, as stated previously on this blog, **a common vegetable oil, with no evidence of additives for corrosion resistance or other features. The science is solid in this regard** . . . .I have absolutely no issue with the concept of making money (I applaud those who make money hand over fist) or taking a product from one sphere and introducing it to another. I think a certain amount of "finder's fee" is absolutely reasonable . . . . **What I do take issue with are attempts to mislead consumers and distort the facts. There is a line between being an aggressive and effective salesman and not being entirely truthful about your product, the way it works, or what it contains. It is my belief that FireClean crossed that line long ago—and that many of their recent statements are simply egregious.**

(Ex. J at 6) (emphasis added.)

112. The statements in the preceding paragraph falsely convey that FIREClean® is a re-packaged common household product and/or simple, single vegetable oil.

113. FIREClean® is not a re-packaged common household product.

114. FIREClean® is not a single vegetable oil. FIREClean® is composed of at least three oils, each of which is a "natural, non-petroleum, non-synthetic oil derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or flower or tree nut." This composition makes up at least 25% of FIREClean®'s total volume.

115. Tuohy's statements above convey that use of FIREClean® will lead to corrosion of a firearm.

116. FIREClean® will not cause corrosion of a firearm.

117. The statements above convey that FireClean has simply "taken a product from one sphere and introduced it to another."

118. FIREClean® was developed with a distinct formulation and is not a repackaged product that already exists in another sphere of the market.

119. The statements above convey that FireClean has deceived or defrauded its customers with respect to its formulation.

120. FireClean has not deceived or defrauded its customer with respect to its formulation.

121. These statements have been injurious to FireClean's business and reputation.

122. In one Facebook post, which is publicly visible, Defendant Tuohy also stated:

> More power to [FireClean] for having been able to sell something at a 100x markup for three years, but they had to know the gravy train would come off the rails at some point. I admire their gusto for having done it and part of me wonders if I could look people in the eye and tell them they needed to spend $7.50 an ounce on some sort of cooking oil for their gun. I don't think I could.

(Exhibit M.)

123. The Closer Look Article (with the title, "Lies, Errors, and Omissions") falsely implies that FireClean has disseminated false information about its product. FireClean has not "lied" about or "omitted" material information about its product.

124. Tuohy further stated in the Comments section: "But knowing that FireClean has been willing to manipulate testing to make themselves look good, why would you trust anything they say?" (Exhibit N at 1.)

125. Readers of Defendant Tuohy's publication have, to date, left 68 comments on the Closer Look Article. The comments are attached as Exhibit O.

126. The comments include statements such as:

(a) "I have yet to use FireClean, and based on how they've handled things since this whole thing started, I probably never will." (Ex. O at 1.)

(b) "So I think the definitive test would be if someone whipped up a batch of fries cooked in FireClean and did a taste test." (*Id.* at 2.)

(c) "This certainly is a slam dunk on the whole issue. So much science. And then more science, twice with Doctors. The world needs more of this." (*Id.* at 3.)

(d) "Andrew [Tuohy], this is exactly the sort of thing I've come to expect from your blog and one of the reasons I've continued to read. Thanks for being a beacon of truth and accuracy." (*Id.* at 3.)

(e) "I guess I got taken. I've used FireClean and it worked, but now with all this evidence and especially the video with LV, I no longer have any faith in this company."

(f) "Now that you have put this one in its grave how about some write ups on AKs."

(Exhibit O.)

127. These comments illustrate the damage of the Closer Look Article to FireClean's reputation.

128. After Tuohy published the Closer Look Article to his publication, Defendant Baker commented upon the article by posting the following statement to Vuurwapen Blog, on October 26, 2015:

> I'd love to see this make people question things. I hope I don't make you distrust lubricant companies, but question claims before you blindly believe things. I spent way too much on Fireclean at one time too. Don't be mad about it, it still works as a lubricant, so use it for that. And when you go to buy more just know you can get it for less in the cooking section.

(Exhibit P.)

129. This statement falsely conveys that FireClean is a cooking oil that can be purchased at a grocery store.

130. This statement also implies that FireClean has made false claims about its product.

131. Baker and Tuohy knew, or recklessly disregarded, that the testing they performed was not sufficient to determine whether FIREClean® is the same as any form of Crisco or canola oil.

132. Baker and Tuohy knew, or recklessly disregarded, that the testing they performed was not sufficient to determine FIREClean® is the same as any form of Crisco or any form of canola oil.

133. Baker and Tuohy knew or recklessly disregarded these facts because they wanted to publish a test that would purport to show that FIREClean® is the same as Crisco or canola oil.

134. Defendant Baker agreed to assist Tuohy in harming FireClean's reputation, revenues, and goodwill.

135. Defendant Tuohy was motivated to harm FireClean by the knowledge that sensational headlines equating FIREClean® to Crisco would drive reader traffic to his blog and his Facebook page, and would enhance his online popularity.

136. As a result of Defendants Tuohy and Baker's tortious acts as previously described in this Complaint, FireClean's reputation has been damaged, and the company has lost approximately $150,000 to date, with losses projecting to grow to no less than $3.772 million over five years.

E. Tuohy Attacks FireClean on Facebook, January 18, 2016

137. Early in 2016, Defendant Tuohy was not satisfied with the harm he caused with his multiple unprovoked attacks on FireClean, and he decided to continue his malicious and tortious campaign against the company.

138. On January 18, he posted to Facebook an article he had written for another website, www.luckygunner.com, in 2013, along with the following introduction (also attached as Exhibit Q):

> "It has been just over three years since the LG brass/steel 40,000 round test was published. If you have not looked at it in a while, I would encourage you to do so again. There are lessons in there for everyone (including me). If we look at this photo from the article which I have selected, you can see one of the bolt carrier groups at the halfway point. This would be five thousand rounds with a brief scrub at 2500 rounds. It is filthy and has lots of carbon caked on. The contact points on the bolt are scraped clean by force of mechanical action. **The oil used was Fireclean. Keep this photo in mind the next time you see an image of a dirty AR BCG with "10,000 rounds and no cleaning" that looks much wetter and cleaner than this one. People lie for the strangest reasons but one of the more common reasons is to separate you from your money. Question people when they make statements you find hard to believe. Don't be a fool. Be an educated consumer.**"

(Ex. Q)(emphasis added.)

139. The January 18 post was "liked" by at least 190 people, and "shared" by at least 160. Numerous people "commented" on the post, including one individual who posted a picture of Crisco on a grocery store shelf, with the comment, "Speaking of FireClean, is this a good deal?" To which Tuohy replied, "Canola oil. Go for the green cap." (Exhibit R.)

140. The January 18 post falsely connotes that FireClean has made misrepresentations about its product to defraud its customers. It also falsely connotes that FIREClean® is canola oil.

141. As previously described throughout this Complaint, these statements and their implications are false. As a result of these malicious statements, Tuohy continues to maliciously and unjustifiably harm FireClean.

F. Independent Laboratory Testing Results of FIREClean®.

142. Defendant Tuohy's statements are demonstrably false. In fact, FireClean has commissioned testing by Petro-Lubricant Testing Laboratories ("Petro Lube") in Lafayette, New Jersey, to analyze and compare FIREClean® to Crisco Vegetable Oil and Crisco Canola Oil. Petro Lube performed eight separate analyses, including Fourier Transform Infrared ("FT-IR") spectroscopy, on each of the three oils, with the following results (Petro Lube documentation also attached as Exhibit S):

	Iodine Value	**Kinematic Viscosity at 40° C**	**Kinematic Viscosity at 100° C**	**Pour Point**	**Flash Point**	**Fire Point**	**Specific Gravity**
Crisco Canola Oil	113 cg/g	36.07 cSt	8.069 cSt	-21 ° C	324 ° C	356 ° C	.9200
Crisco Vegetable Oil	132 cg/g	30.92 cSt	7.521 cSt	-6 ° C	324 ° C	356 ° C	.9230
FIREClean®	93.8 cg/g	31.75 cSt	8.364 cSt	-15 ° C	325 ° C	357 ° C	.9163

143. An overlay of the FT-IR spectra of all three substances is also part of Exhibit S. The spectra demonstrate that these three substances do, in fact, have similar basic patterns, as is to be expected, but the above-referenced tests also demonstrate that a spectrographic analysis ***alone*** is not sufficient to draw the conclusion, in this situation, to a reasonable degree of scientific certainty, that two or more of the substances are identical.

144. The Petro Lube test results prove that FIREClean® is not Crisco Canola Oil or Crisco Vegetable Oil. A non-drying oil is an oil that does not harden when exposed to air. Oils with an iodine value of less than 100 (according to the German Insurance Association) to 115 (according to Wikipedia) are considered non-drying. FIREClean®'s iodine value of 93.8 defines FIREClean® as a non-drying oil and hence the product will not gum or form solid residue when exposed to air, as Tuohy's articles have suggested.

145. In sum, Tuohy's attack on FireClean has permeated the gun community's social media. A simple Google search for "FireClean" reveals numerous websites, blog posts, and other online commentary that has seized upon and discusses the FireClean/Crisco comparison, and mocks FireClean. The same is true for a Google search of "FireClean Crisco" or "FireClean Canola Oil." FireClean's reputation and its business have been severely and permanently damaged.

COUNT I (Defamation Relating to the Spectroscopy Article)
(Defendant Tuohy)

146. Plaintiff FireClean repeats and re-alleges each and every allegation contained in the preceding paragraphs.

147. Defendant Tuohy published the Spectroscopy Article to a worldwide audience on the internet on September 12, 2015. A true and correct copy is attached as Exhibit C.

148. The Spectroscopy Article contained the following false and defamatory statements concerning FireClean, set forth in *haec verba* as follows:

(a) "Lies, Errors and Omissions; Infrared Spectroscopy of FireClean and Crisco Oils."

(b) "FireClean is probably a modern unsaturated vegetable oil virtually the same as many oils used for cooking."

(c) "[g]iven that people in the military are often exposed to both UV and oxygen (such as when they go outdoors) and also need corrosion protection for their firearms, I would not recommend FireClean be used by members of the military."

(d) Finally, the Spectroscopy Article, read as a whole, conveys the false and disparaging notion that FIREClean® is nothing more than a common household product; that FireClean has simply re-packaged a cheap and common household product and deceived the public into thinking that the product is somehow different or special; and that FIREClean® may not be suitable for its intended use, including for military use, because it is nothing more than simple and re-packaged cooking oil. This is false.

149. The statements enumerated in the prior paragraph are of and concerning FireClean.

150. These statements are false and disparaging, respectively, as follows:

(a) FireClean has not lied about its formulation or performance of its product.

(b) FIREClean® is not a single vegetable oil, nor is it "virtually the same as many oils used for cooking." Rather, FIREClean® is a proprietary formulation, specifically, as the patent application states, of at least three "natural, non-petroleum, non-synthetic oil[s] derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or flower or tree nut." The total composition has a smoke point above 200°F, and the combined volumes of the at least three vegetable oils is at least 25% of the total volume of the oil composition. (Ex. A.) Tuohy's statement is disparaging because, in the context of the article as a whole, it equates FIREClean® to a common household product; implies that the company has repackaged a pre-existing

product, and implies that FIREClean® will not function properly or is not fit for its intended or advertised purposes.

(c) This statement conveys that FIREClean® will lead to corrosion. This is false. FTIR Spectroscopy is not a sufficient test to make this determination. This statement also falsely conveys that FIREClean® is not fit for its intended use, and implies that FIREClean® may lead to weapon malfunction. These assertions are false and disparaging. FIREClean® will not impede firearm function and in fact will enhance it by reducing carbon fouling and providing lubrication. FIREClean® is suitable for military use because it is specifically made to handle heat and carbon overload which are often found in military use, notably with suppressed or silencer equipped arms or fully automatic weapon fire.

(d) The article as a whole conveys the false and disparaging implication that FireClean has re-packaged a common grocery store cooking product and deceived the public; it conveys that FIREClean® is not suitable for its intended use, including military use, because it is "virtually the same" as many oils used for cooking. FIREClean® is specially formulated to perform precisely the functions for which it is advertised; FIREClean® is not comprised of a single oil, and is not a repackaged grocery store cooking product.

151. By publishing the Spectroscopy Article to the internet, Defendant Tuohy caused injury to FireClean's reputation and revenues.

152. At the time he published the Spectroscopy Article to the internet, Defendant Tuohy knew these statements were false, and his knowing publication of these false statements amounts to actual malice.

153. Defendant Tuohy had, or should have had, serious doubts as to the truth of these statements and a high degree of awareness that they were false or probably false, and therefore was required to investigate their veracity before publishing them. Defendant Tuohy's failure to do so amounts to actual malice. In the alternative, Defendant Tuohy's publication of these false statements was negligent at a minimum.

154. Defendant Tuohy purposefully avoided the truth in order to attract attention to his publication and his Facebook page, and to harm FireClean.

155. Defendant Tuohy's actions were malicious, willful, and wanton, and evidence a conscious disregard for FireClean's rights. Therefore, FireClean is entitled to punitive damages.

156. As a direct and proximate result of these false statements by Defendant Tuohy, FireClean has suffered damages including, inter alia, injury to its reputation and revenues.

157. Each of the defamatory statements enumerated in this Count are, on their face, inherently defamatory and damaging to FireClean's reputation and business, and substantial injury to FireClean is readily apparent. Therefore FireClean is also entitled to presumed damages for defamation per se.

COUNT II (Defamation Relating to the Smoke/Liar Article)
(Defendant Tuohy)

158. Plaintiff repeats and re-alleges each allegation contained in the preceding paragraphs.

159. Defendant Tuohy posted the Smoke/Liar Article to a worldwide audience on the internet on September 14, 2015. A true and correct copy is attached as Exhibit E.

160. The Smoke/Liar Article contained the following false and defamatory statements concerning FireClean, set forth in haec verba as follows:

(a) "http://www.vuurwapenblog.com/general-opinion/lies-errors-and-omissions/where-theres-smoke-theres-liar/."

(b) "Lies, Errors and Omissions, Severe Problems with Vickers Tactical Video"

(c) "I made a discovery which calls into question any claim or statement made by FireClean as a company and Ed and Dave Sugg as individuals."

(d) "No honest person with a basic understanding of the scientific method would use handloaded or +P ammunition in a comparison with standard pressure bargain priced ammunition if the comparison was meant to show differences between lubricants and their effect on how much smoke comes out of the chamber during firing."

(e) "Different ammunition was selected for the FireClean portion of the demonstration to give the appearance of more smoke and thus a cleaner gun. . . . All the information required to judge the integrity of statements made by FireClean is contained in that Vickers Tactical video."

(f) Read as a whole, the Smoke/Liar article conveys that FireClean and its representatives have rigged a demonstration test to falsely demonstrate that FIREClean® is a superior product to CLP, and superior to not using gun lubricant.

161. The statements enumerated in the prior paragraph are of and concerning FireClean.

162. These statements are false and disparaging, respectively, as follows:

(a) FireClean has not lied about or omitted material information regarding its formulation or performance. It has not deceived the public or consumers in regards to the filming illustrated in the Vickers video.

(b) See section (a) above.

(c) This statement falsely implies that FireClean and its managers are not trustworthy.

(d) This statement implies that FireClean dishonestly portrayed the FIREClean® firing by using handloaded or +P ammunition for those rounds, compared to the standard pressure ammunition for the other rounds. The ammunition used for the FIREClean® portion of the demonstration was not materially different from the ammunition used for the other portion of the demonstration. The casings may have differed in primer color or headstamp, which is not unusual for inexpensive factory remanufactured rounds, but the ammunition itself was not materially different in such a way as to create more smoke for the FIREClean® testing. The ammunition used for all three tests was factory-produced, including factory remanufactured, standard velocity ammunition. FireClean's representatives, Ed Sugg and Dave Sugg, who participated in the video production, understood and believed that there was no material difference among the ammunition used for the various demonstrations in the video.

(e) See (d) above.

(f) These suggestions are false for the reasons stated in sections (a) through (e) above. Neither FireClean or its representatives altered the test in order to make FIREClean® appear more effective. The suggestions are disparaging because they impute dishonesty and disrepute to the company.

163. Defendant Tuohy's related Facebook post contained a link to the Smoke/Liar Article stated: "Deliberately misleading the consumer in an effort to sell a product. Is there a word for that?" A true and correct copy is attached as Exhibit F.

164. This statement is of and concerning FireClean.

165. This statement falsely and disparagingly conveys that Plaintiff is defrauding consumers and the public.

166. By attaching the link to his Smoke/Liar Article, Defendant Tuohy re-published all of the defamatory statements previously enumerated in this Count.

167. By publishing the Smoke/Liar Article to the internet, and the related Facebook comment and re-publication, Defendant Tuohy caused injury to FireClean's reputation and revenues.

168. At the time he published the Smoke/Liar Article to the internet and to his Facebook page, Defendant Tuohy knew the above-mentioned statements were false, and Tuohy's knowing publication of these false statements amounts to actual malice.

169. At a minimum, Defendant Tuohy had, or should have had, serious doubts as to the truth and accuracy of the statements as described in this Count, had or should have had, a high degree of awareness that they were probably false, and therefore was required to investigate their veracity before publishing them. Defendant Tuohy's failure to do so amounts to actual malice.

170. In the alternative, Defendant Tuohy's publication of these false statements was negligent at a minimum.

171. Defendant Tuohy purposefully avoided the truth in order to attract attention to his publication and his Facebook page, and to harm FireClean.

172. Defendant Tuohy's actions were malicious, willful, and wanton, and evidence a conscious disregard for the Plaintiff's rights. Therefore, FireClean is entitled to punitive damages.

173. As a direct and proximate result of these false statements by Defendant Tuohy, FireClean has suffered damages including, inter alia, injury to its reputation and revenues.

174. Each of the defamatory statements enumerated in this Count are, on their face, inherently defamatory and damaging to FireClean's reputation and business, and substantial injury to FireClean is readily apparent. Therefore, FireClean is also entitled to presumed damages for defamation per se.

COUNT III (Defamation Relating to the Closer Look Article)
(Defendant Tuohy)

175. Plaintiff repeats and re-alleges each allegation contained in the preceding paragraphs.

176. Defendant Tuohy published the Closer Look Article to a worldwide audience on the internet on October 23, 2015. A true and correct copy is attached as Exhibit J.

177. The Closer Look Article, and Vuurwapen Blog's Facebook post regarding that article contained the following false and defamatory statements concerning FireClean, set forth in haec verba as follows:

> (a) "Lies, Errors and Omissions; A Closer Look at FireClean and Canola Oil"
>
> (b) "According to every PhD who looked at the NMR results, FireClean and Canola oil appear to be 'effectively' or 'nearly' identical."
>
> (c) "However, it would be difficult to argue that vegetable oil possesses 'extreme heat resistance' when it is known to degrade in the presence of heat and oxygen....If you are comfortable with this on your firearms' internal components, then this would be a good product to use, otherwise a more thermally stable product might be in order."
>
> (d) "FireClean is, as stated previously on this blog, a common vegetable oil, with no evidence of additives for corrosion resistance or other features. The science is solid in this regard."
>
> (e) "I have absolutely no issue with the concept of making money (I applaud those who make money hand over fist) or taking a

product from one sphere and introducing it to another. I think a certain amount of "finder's fee" is absolutely reasonable . . . .

(f) "That said, I don't think I could look someone in the eye and tell them that a bottle of vegetable oil was the most advanced gun lube on the planet, but those who can? Well, they're good salesman, I guess."

(g) "What I do take issue with are attempts to mislead consumers and distort the facts. There is a line between being an aggressive and effective salesman and not being entirely truthful about your product, the way it works, or what it contains. It is my belief that FireClean crossed that line long ago-and that many of their recent statements are simply egregious."

(h) "A few weeks ago, FireClean said that putting canola oil on your firearm could have catastrophic results. Some people believed that, probably because they are stupid. I don't like it when people in political arguments call the other side stupid and I don't throw around the word stupid lightly. However, if you think that putting canola oil - an oil with a long history of use as an industrial lubricant for metal-to-metal contact -on your rifle is dangerous, but that putting FireClean on your rifle is safe, then you're stupid. There is no other way to define your level of intelligence and critical thinking."

(i) "More power to [FireClean] for having been able to sell something at a 100x markup for three years, but they had to know the gravy train would come off the rails at some point. I admire their gusto for having done it and part of me wonders if I could look people in the eye and tell them they needed to spend $7.50 an ounce on some sort of cooking oil for their gun. I don't think I could."

(j) "But knowing that FireClean has been willing to manipulate testing to make themselves look good, why would you trust anything they say?"

(k) The Closer Look Article, read as a whole, conveys the false and disparaging notion that FIREClean® is nothing more than a common household product; that FireClean has simply re-packaged a cheap and common household product and deceived the public into thinking that the product is somehow different or special; and that FIREClean® may not be suitable for its intended use because it is nothing more than simple and re-packaged cooking oil.

178. These statements enumerated are of and concerning FireClean.

179. These statements are false and disparaging, respectively, as follows:

(a) FireClean has not lied about nor omitted any material information regarding its product to Defendant Tuohy, nor to any member of the public.

(b) FIREClean® is not canola oil, nor is it "effectively" or "nearly" identical to it. FIREClean® is a proprietary blend of at least three "natural, non-petroleum, non-synthetic oil[s] derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or flower or tree nut," (Ex. A at 1 & 5) where each oil has a smoke point above 200 degrees Fahrenheit, and the total volume of the oils is at least 25% of the total volume of the oil composition. (*Id.*) Tuohy's statement is disparaging because it equates FIREClean® to a common household product, implies that FIREClean® will not function properly or is not fit for its intended or advertised purposes, and implies that the company has deceitfully repackaged a pre-existing product.

(c) This statement implies that FIREClean® does not possess "extreme heat resistance," is thermally unstable, and is not suitable for its intended use. In this context, that statement is false. Although the term "extreme" may appear subjective, in this case, the contention as a whole is provably false because FIREClean® will withstand temperatures as high

as a firearm can withstand while still functioning and not self-destructing. Thus, because FIREClean®, with a flash point of 325 degrees Celsius, or 617 degrees Fahrenheit, will not become unstable or impede firearm function at temperatures as hot as a firearm can withstand, this statement is false.

(d) FIREClean® is not a single or common vegetable oil. This statement is false and disparaging for the reasons stated in section (b) above. Moreover, FIREClean® does have anti-corrosive properties, as Tuohy saw from his own two-year storage experiment with corrosive ammunition.

(e) FIREClean® is not a pre-existing product that has been repackaged or introduced from one "sphere" of commerce to another. FIREClean®'s price does not represent a "finder's fee." This statement, overall and in its context, conveys that FIREClean® is not trustworthy and/or is of disrepute, that it has deceived consumers or the public, and that its product not fit for its intended or advertised purposes.

(f) FireClean has never stated that its product is the "most advanced gun lube on the planet," and to suggest that FireClean has said this is damaging to its reputation.

(g) FireClean has not misled consumers nor distorted any facts about its product's function or formulation. In fact, FireClean has never disclosed its formulation to the public. This statement is disparaging

because it conveys that FireClean has acted dishonestly and misrepresented its product.

(h) Use of FIREClean® on a rifle, or other firearm, is not dangerous, as this statement conveys or implies. Such an assertion is disparaging to FireClean because it conveys that the company has manufactured a product that is harmful to consumers, and that is not fit for its intended or advertised purposes. It also implies dishonesty and/or disrepute to FireClean.

(i) This statement falsely conveys that FIREClean® is common supermarket cooking oil. It is not, for the reasons stated above and throughout this complaint. To the contrary, FIREClean® is a proprietary blend of at least three "natural, non-petroleum, non-synthetic oil[s] derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or flower or tree nut," where each oil has a smoke point above 200 degrees Fahrenheit, and the total volume of the oils is at least 25% of the total volume of the oil composition. (Ex. A at 1&5.) This patent application has been publicly available since September of 2013. The statement is disparaging for this reason, because it conveys that the product is not fit for its intended or advertised purposes, and also because it conveys that FIREClean® has deceived or defrauded its consumers or the public by "marking up" common cooking oil. FireClean does not mark-up its product by 100-fold, or anything remotely

near that figure. FireClean has never made public representations regarding the cost of its product, and therefore has never deceived the public regarding its cost.

(j) FireClean has not manipulated any testing of its product, nor deceived consumers, the public, or Mr. Tuohy, in relation to the testing of its product. This statement is disparaging because it conveys that the company has deceived its consumers or the public.

(k) As described in detail throughout this complaint, each of these assertions are untrue. FIREClean® is specially formulated to perform precisely the functions for which it is advertised, is a proprietary, patent-pending formulation, is not comprised of a single oil, and is not a repackaged common household item.

180. By publishing the Closer Look Article to the internet, Defendant Tuohy caused injury to FireClean's reputation and its revenues.

181. At the time he published the Closer Look Article to the internet, Defendant Tuohy knew these statements were false, and his knowing publication of these false statements amounts to actual malice.

182. At a minimum, Defendant Tuohy had, or should have had, serious doubts as to the truth of these statements and a high degree of awareness that they were probably false, and therefore was required to investigate their veracity before publishing them. Defendant Tuohy's failure to do so amounts to actual malice. In the alternative, Defendant Tuohy's publication of these false statements was negligent at a minimum.

183. Defendant Tuohy purposefully avoided the truth in order to attract attention to his publication and his Facebook page, and to harm FireClean.

184. Defendant Tuohy's actions were malicious, willful, and wanton, and evidence a conscious disregard for FireClean's rights. Therefore, FireClean is entitled to punitive damages.

185. As a direct and proximate result of these false statements by Defendant Tuohy, Fireclean has suffered damages including, inter alia, injury to its reputation and revenues.

186. Each of the defamatory statements enumerated in this Count are, on their face, inherently defamatory and damaging to FireClean's reputation and business, and substantial injury to FireClean is readily apparent. Therefore, FireClean is also entitled to presumed damages for defamation per se.

COUNT IV (Defamation Relating to the January 18, 2016 Facebook Post)
(Defendant Tuohy)

187. Plaintiff repeats and re-alleges each allegation contained in the preceding paragraphs.

188. Defendant Tuohy published the January 18, 2016 Facebook post to a worldwide audience on the internet, via Facebook.

189. The January 18, 2016 post contained the following false and defamatory statements concerning FireClean, set forth in haec verba as follows:

> (a) "People lie for the strangest reasons but one of the more common reasons is to separate you from your money. Question people when they make statements you find hard to believe. Don't be a fool. Be an educated consumer."
>
> (b) In response to a picture of Crisco and the question, "Speaking of FireClean, is this a good deal?" Tuohy responds: "Canola oil."

190. The statements enumerated in the prior paragraph are of and concerning FireClean.

191. These statements are false and disparaging, respectively, as follows:

(a) FireClean has not lied or deceived regarding about its product. It has not repackaged a pre-existing product or common oil.

(b) As previously described in this Complaint, FIREClean® is not canola oil. To the contrary, FIREClean® is a patent-pending formulation made of at least three "natural, non-petroleum, non-synthetic oil[s] derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or flower or tree nut," (Ex. A at 1 & 5) where each oil has a smoke point above 200 degrees Fahrenheit, and the total volume of the oils is at least 25% of the total volume of the oil composition. (*Id.*) This patent application has been publicly available since September of 2013. The statement is disparaging because it conveys that FireClean has deceived consumers or the public by repackaging a supermarket product, and that FIREClean® is not fit for its intended or advertised purposes.

192. By publishing the January 18 post to the internet, Defendant Tuohy caused injury to FireClean's reputation and revenues.

193. At the time he published the January 18 post to the internet and to his Facebook page, Defendant Tuohy knew these statements were false and his knowing publication of these false statements amounts to actual malice.

194. At a minimum, Defendant Tuohy had, or should have had, serious doubts as to the truth and accuracy of these statements and a high degree of awareness that they were probably false, and therefore was required to investigate their veracity before publishing them. Defendant

Tuohy's failure to do so amounts to actual malice. In the alternative, Defendant Tuohy's publication of these false statements was negligent at a minimum.

195. Defendant Tuohy purposefully avoided the truth in order to attract attention to his publication and his Facebook page, and to harm FireClean.

196. Defendant Tuohy's actions were malicious, willful, and wanton, and evidence a conscious disregard for the Plaintiff's rights. Therefore, FireClean is entitled to punitive damages.

197. As a direct and proximate result of these false statements by Defendant Tuohy, FireClean has suffered damages including, inter alia, injury to its reputation and revenues.

198. Each of the defamatory statements enumerated in this Count are, on their face, inherently defamatory and damaging to FireClean's reputation and business, and substantial injury to FireClean is readily apparent. Therefore, FireClean is also entitled to presumed damages for defamation per se.

COUNT V (Defamation)
(Defendant Baker)

199. Plaintiff repeats and re-alleges each allegation contained in the preceding paragraphs.

200. In reference to Defendant Tuohy's Closer Look Article, Defendant Baker published the following comment to a worldwide audience on the internet on October 26, 2015: "I'd love to see this make people question things. I hope I don't make you distrust lubricant companies, but question claims before you blindly believe things. I spent way too much on Fireclean at one time too. Don't be mad about it, it still works as a lubricant, so use it for that. And when you go to buy more just know you can get it for less in the cooking section."

201. A true and correct copy of this statement is attached as Exhibit P.

202. The statement quoted in the prior paragraph is of and concerning FireClean.

203. The statement is false and disparaging, in that it conveys that FIREClean® is a single cooking oil that can be purchased at a grocery store, for less than the cost of FIREClean®. It implies that FireClean has misrepresented its product and deceived its consumers or the public by repackaging and marking up a supermarket product.

204. Defendant Baker purposefully avoided the truth in order to attract attention to his publication and his Facebook page, and to harm FireClean.

205. At the time he published the above-referenced statement to the internet, Defendant Baker knew these statements were false, or he recklessly disregarded the truth.

206. At a minimum, Defendant Baker had, or should have had, serious doubts as to the truth of these statements and a high degree of awareness that they were probably false, and therefore was required to investigate their veracity before publishing them. Defendant Baker's failure to do so amounts to actual malice. In the alternative, Defendant Baker's publication of these false statements was negligent at a minimum.

207. Defendant Baker's actions were malicious, willful, and wanton, and evidence a conscious disregard for FireClean's rights. Therefore, FireClean is entitled to punitive damages.

208. By publishing these statements to the internet, and as a direct and proximate result thereof, Defendant Baker caused injury to FireClean's reputation and its revenues.

209. Each of the defamatory statements enumerated in this Count are, on their face, inherently defamatory and damaging to FireClean's reputation and business, and substantial injury to FireClean is readily apparent. Therefore, FireClean is also entitled to presumed damages for defamation per se.

COUNT VI (Violation of the Virginia Business Conspiracy Act, Va. Code § 18.2-499 & 500, et seq. (Defendants Tuohy and Baker)

210. Plaintiff repeats and re-alleges each allegation contained in the preceding paragraphs.

211. As described in this Complaint, Defendants Tuohy and Baker combined, associated, agreed, mutually undertook, and concerted together for the purpose of willfully and maliciously injuring FireClean in its reputation, trade, and business, by defaming the company.

212. Specifically, after Baker read the Spectroscopy Article, by his own admission, he contacted Tuohy to offer to run more tests on FIREClean®.

213. Baker and Tuohy arranged for Tuohy to send the test samples to Baker.

214. Both Tuohy and Baker had predetermined that the conclusions of the testing would be that "FIREClean® is Canola Oil."

215. Baker ran NMR and spectroscopy testing on FIREClean® and Canola Oil.

216. Despite being told by a professor, who Baker quoted, that his testing was not sufficient to draw the conclusion with certainty, Baker concluded that FIREClean® is Canola Oil.

217. Defendant Tuohy published this fact and other defamatory statements, as set forth in Count III, regarding FIREClean®, in the Closer Look article.

218. Defendants Tuohy and Baker acted through a mutual plan and undertaking to defame FireClean with the Closer Look Article.

219. Defendant Tuohy used Defendant Baker's supposed findings, in part, to injure FireClean by publication of false and disparaging statements in the Closer Look Article, as described in Count III.

220. Defendants, as described above, acted intentionally, purposefully, and without lawful justification to injure FireClean.

221. As a proximate result of Defendant's concerted and malicious actions, FireClean has been damaged in its business, reputation, and trade.

222. FireClean has suffered substantial damages, including but not limited to lost sales, lost revenues, lost profits, and severe injury to its reputation and goodwill.

223. Defendants' actions were willful, malicious, and intended to harm FireClean.

224. FireClean is entitled to an award of damages against Defendants, including compensatory damages and lost profits, attorneys' fees, costs, and treble damages, and further relief as the Court deems appropriate.

COUNT VI (Common Law Conspiracy)
(Defendants Tuohy and Baker)

225. Plaintiff repeats and re-alleges each allegation contained in the preceding paragraphs.

226. As described in this Complaint, Defendants Tuohy and Baker combined, associated, agreed, mutually undertook, and concerted together for the purpose of willfully and maliciously injuring FireClean in its reputation, trade, and business, by defaming the company.

227. Specifically, after Baker read the Spectroscopy Article, by his own admission, he contacted Tuohy to offer to run more tests on FIREClean®.

228. Baker and Tuohy arranged for Tuohy to send the test samples to Baker.

229. Both Tuohy and Baker had predetermined that the conclusions of the testing would be that "FIREClean® is Canola Oil."

230. Baker ran NMR and spectroscopy testing on FIREClean® and Canola Oil.

231. Despite being told by a professor, who Baker quoted, that his testing was not sufficient to draw the conclusion with certainty, Baker concluded that FIREClean® is Canola Oil.

232. Defendant Tuohy published this fact and other defamatory statements, as set forth in Count III, regarding FIREClean®, in the Closer Look article.

233. Defendants Tuohy and Baker acted through a mutual plan and undertaking to defame FireClean with the Closer Look Article.

234. Defendant Tuohy used Defendant Baker's supposed findings, in part, to injure FireClean by publication of false and disparaging statements in the Closer Look Article, as described in Count III.

235. Defendants, as described above, acted intentionally, purposefully, and without lawful justification to injure FireClean.

236. As a proximate result of Defendant's concerted and malicious actions, FireClean has been damaged in its business, reputation, and trade.

237. FireClean has suffered substantial damages, including but not limited to lost sales, lost revenues, lost profits, and severe injury to its reputation and goodwill.

238. Defendants' actions were willful, malicious, and intended to harm FireClean.

239. FireClean is entitled to an award of damages against Defendants, including compensatory damages and lost profits, attorneys' fees, costs, and treble damages, and further relief as the Court deems appropriate.

WHEREFORE, Plaintiff respectfully requests that the Court enter judgment against Defendants and each of them as follows:

(a) For equitable relief, including an order enjoining continued publication and dissemination by Defendants of the false and defamatory statements identified in the Complaint, and requiring Defendants to remove all previously-published defamatory statements;

(b) For compensatory damages, in an amount to be determined at trial or otherwise in this action;

(c) For presumed damages for defamation per se, in an amount to be determined at trial or otherwise in this action;

(d) For punitive damages, as permitted under applicable law, in an amount to be determined at trial or otherwise in this action;

(e) For all damages recoverable under to Virginia Code § 18.2-500 *et seq.*, including lost profits, treble damages and reasonable attorneys' fees and costs;

(f) For attorneys' fees and costs, as provided by applicable law; and

(g) For any further or other relief as this Court may deem just and proper.

JURY DEMAND

Plaintiff demands a trial by jury on all causes of action so triable.

Dated: March 17, 2016

Respectfully submitted,
FIRECLEAN LLC

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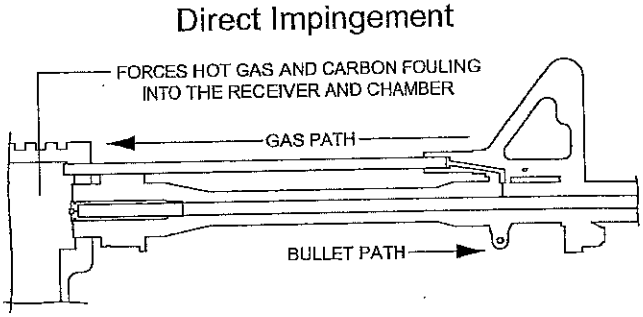

Fig.1

(57) Abstract: An oil composition including at least three vegetable oils, each vegetable oil being distinct from the other and each having a smoke point above 200F,wherein the combined volume of the at least three vegetable oils is at least about 25% of the total volume of the oil composition. A method of removing or preventing carbon fouling on a mechanical component of a device, comprising depositing a vegetable oil composition on the mechanical component of the device, wherein the vegetable oil composition comprises at least one vegetable oil having a smoke point above 200F, wherein the at least one vegetable oil is present in an amount of at least about 25% by volume of the total volume of the oil composition and wherein operation of the device deposits carbon on the mechanical component.

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EXHIBIT A

VEGETABLE OILS, VEGETABLE OIL BLENDS, AND METHODS OF USE THEREOF

[0001] This application claims priority to U.S. Provisional Application No. 61/612,685, titled "VEGETABLE OILS, VEGETABLE OIL BLENDS, AND METHODS OF USE THEREOF," filed on March 19, 2012, the entirety of which is hereby incorporated by reference herein.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] Aspects of the present invention relate to vegetable oils, vegetable oil blends, and various uses thereof. More particularly, aspects of the present invention relate to vegetable oils and their uses with mechanical components, for example, firearms.

Background

[0003] It is known in the related art to use cleaners or, less preferably, cleaner/lubricant/protectant (CLP) oils to remove carbon fouling from mechanical parts. In particular, in the area of firearm operation, such as AR-15 or M-16 firearms, when a round is fired, the combustion process deposits carbon within the firearm, as shown in Figure 1. The depositing of carbon leading to fouling is a well known problem in the art, an example of which is shown in the photostat Figure 2. Carbon fouling requires a time-consuming cleaning process that take up to three days for sufficient removal of carbon to allow proper operation of the firearm. When the carbon fouling becomes too great, the firearm will malfunction or cease operation

entirely, which is a critical problem in battle or defensive situations, for example, and a significant nuisance to civilian shooters.

[0004] Currently, various lubricant compositions are known for use on firearms to remove carbon fouling from the firearm. However, known compositions do not satisfactorily remove carbon, especially at temperatures above 160°F. Ambient temperatures in current combat zones can often reach 120°F. The sun can heat black metal objects another 40°F or more before the weapon is even fired. Tests have shown that critical moving parts of the weapon can reach 70°F above ambient temperature in even modest firing cadences, which are further magnified in battle conditions. Furthermore, some known compositions are synthetic and harmful when exposed to the human body. For example, several known lubricant compositions include: Mobil 1® 10W-30 sold by Mobil, SLIP2000™ Carbon Killer sold by SPS Marketing, FrogLube® sold by AUDEMOUS INC, Gunzilla® sold by TopDuck Products, LLC, Hoppe's Elite® Gun Cleaner sold by Bushnell Outdoor Products, and Break Free® sold by SAFARILAND. Each of these commercial compositions has significant flaws. For example, Mobil 1® 10W-30 synthetic is hydrocarbon based, creates a sludge when contacted with carbon fouling, and is not polar. SLIP2000™ Carbon Killer does not lubricate, strips metal of oils, and damages anodized aluminum and blued steel. Stripping oils from metals in a firearm can cause the firearm to seize. FrogLube® is only functional in a very narrow temperature range. It solidifies at 48°F, and smokes at 150°F. After smoking, it leaves behind a sticky gummy residue. Gunzilla® is harmful or fatal if swallowed, and is a very poor performing cleaner. Hoppe's Elite® does not act as a lubricant and removes oils and contains hazardous diethylene glycol monobutyl ether. Break Free® contains petroleum distillates. Petroleum distillate products contain harmful,

carcinogenic components and are treated as hazardous materials both in shipment and disposal.

[0005] U.S. Patent No. 6,534,454 is directed to a biodegradable vegetable oil composition comprising a triglyceride oil, an antioxidant, and other oils. The other oils may be synthetic ester base oil, polyalphaolefin, or unrefined, refined, or rerefined oils. The triglyceride oils are vegetable oils.

[0006] U.S. Patent No. 6,383,992 is directed to biodegradable vegetable oil compositions having at least one triglyceride oil, a pour point depressant, an antioxidant, and other oils. The triglyceride oils are vegetable oils.

[0007] U.S. Patent No. 6,919,302 is directed to the use of an oil composition for temporary treatment of metal surfaces.

[0008] There remains a need in the art for natural, safe, oil compositions and methods of using the compositions for avoiding and removing carbon fouling in mechanical components, and providing highly heat-resistant lubrication and a fouling resistant environment.

SUMMARY OF THE INVENTION

[0009] Aspects of the present invention provide, among other things, vegetable oil compositions and methods of use thereof to avoid and reduce carbon fouling on mechanical components, lubricate mechanical components, and provide long-term carbon fouling protection.

[0010] In one example variation, a pure vegetable oil or blend of vegetable oils may be applied to a mechanical component of a device that is used in an environment where carbon fouling should be avoided or removed to improve performance, such as on various parts of firearms, bicycles, chain saws, and

engines. The oil compositions may also be used as a lubricant, such as in fishing equipment.

[0011] In another variation, a blend of vegetable oils includes at least three two distinct vegetable oils, each having a smoke point above 200°F.

[0012] In another variation the method of removing or preventing carbon or other contaminant fouling on a mechanical component of a device, comprises depositing a vegetable oil composition on the mechanical component of the device, wherein the vegetable oil composition comprises at least one vegetable oil having a smoke point above 200°F, wherein the at least one vegetable oil is present in an amount of at least about 25% by volume of the total volume of the oil composition ; and wherein operation of the device deposits carbon on the mechanical component.

[0013] In another variation, the vegetable oils may be applied to a mechanical component using various methods, such as depositing, heat treating, pressure treating, and immersing, or applying onto operating surfaces of the device and its subsequent operation.

[0014] In another variation, the oil composition, comprises at least three vegetable oils, each vegetable oil being distinct from the other and each having a smoke point above 200°F,wherein the combined volume of the at least three vegetable oils is at least about 25% of the total volume of the oil composition.

[0015] Additional advantages and novel features of various aspects of the present invention will be set forth in part in the description that follows, and in part will become more apparent to those skilled in the art upon examination of the following or upon learning by practice thereof.

BRIEF DESCRIPTION OF THE FIGURES

[0016] In the drawings:

[0017] FIG. 1 shows a prior art firearm schematic showing where carbon deposits occur;

[0018] FIG. 2 shows a prior art firearm fouled with carbon;

[0019] FIG. 3 shows pictures of a fouled bowl before testing; and

[0020] FIGS. 4-12 show pictures of experimental results from foul removal testing, including in conjunction with use of products and methods in accordance with aspects of the present invention.

DETAILED DESCRIPTION

[0021] Aspects of the present invention include a method of removing or preventing carbon fouling on a mechanical component of a device by depositing a vegetable oil composition on the mechanical component. Aspects of the present invention also include components and makeup of various vegetable oil compositions. As used herein, the term "about" means ± 10%, more preferably ± 5%, still more preferably ± 1% of the given value.

[0022] Vegetable oils, as used herein, means any single natural, non-petroleum, non-synthetic oil derived from a plant, vegetable or fruit or shrub or flower or tree nut, or any combination of natural, non-petroleum, non-synthetic oils derived from a plant, vegetable or fruit or shrub or tree nut. In an aspect of the present invention it has been surprisingly found that pure vegetable oils and various vegetable oil blends are superior to commercially available products in removing or avoiding carbon fouling on mechanical components. In addition, the vegetable oils act as a lubricant. Example methods include the application to a mechanical

component that is part of device where operation of the device results in carbon being deposited on the mechanical component, including devices that are used in an environment where carbon fouling should be avoided or removed to improve performance. For example, the vegetable oils and blends may be applied to portions of firearms, bicycles (for example mountain bikes), and engines. The vegetable oils may also be used as a lubricant, for example in fishing equipment.

[0023] In an aspect of the present invention, the vegetable oils may be used to form a carbon resistant film by applying the oils to mechanical components, and allowing the oil to oxidize, such as by exposing the oil to heat, air, or UV light, which forms a hard dry film. This resulting dry film or wet oil layer is resistant to carbon and other fouling. In addition, in some variations, the film or wet oil layer may enhance lubrication and/or other properties. The mechanical component is preferably a component of a device that, when the device is operated, carbon is deposited on the mechanical component. This method is discussed in more detail below. Once applied to a mechanical component, the oil composition has proven to be highly resistant to water and resistant to soap sand other cleaning agents, as compared to known petroleum based or synthetic oils tend to wash off when exposed to water spray or rain.

[0024] The oil compositions may be applied to carbon steel parts, including bare steel, phosphate coated steel, chrome coated steel, ceramic coated steel, and the like, stainless steel parts, titanium parts, aluminum parts, including anodized or other coated aluminum, and nickel alloys. When used in a firearm, the parts of the firearm that may be coated include the parts that are subject to fouling as the result of gunpowder combustion, or having reciprocating or frictional contact surfaces. For example, such parts may include fire control group parts, including

triggers, hammers, disconnectors, and trigger pins, firing pins, chambers, bolts, bolt faces, bolt carriers, breach faces, camming pins, pistons, operating/piston rods, gas tubes, barrels, slides and retention rails on pistols, upper and lower receivers, charging handles, feed trays, and magazine followers. When used on a bicycle, the oil compositions may be applied to bicycle chains and gears, such as derailleur gears, for example, and on control mechanisms such as shift and brake cables. When used in an engine, the oil compositions may be applied to any of the moving parts of the engine including valves, pistons, and ball bearings, for example. When used in fishing equipment, the oil compositions may be applied to reels and gears, for example.

[0025] A single vegetable oil or vegetable oil blend that is suitable for the above uses includes any single oil or blend that sufficiently reduces carbon or other contaminant fouling or avoids carbon or other contaminant build up. In an aspect of the present invention, the composition that may be used in the above manner may include at least about 25% vegetable oil, more preferably at least about 50% vegetable oil, still more preferably at least about 75%, and most preferably about 100% or 100% vegetable oil, by volume. Preferably, for some applications, the vegetable oil should have a smoke point higher than 200 °F, more preferably above 300°F, and yet more preferably more 400°F, in order to maintain the oil integrity even at very high operating temperatures, which often occurs in firearms. Additionally, oils that have a high smoke point are desirable due to their inherent heat resistance. Highly refined vegetable oils are also useful for some applications. It has been found that the mixture of constituent oils disclosed herein provides a synergistic effect in which the combination of oils (the oil composition) has and higher smoke point than any of the individual oils by themselves.

[0026] Higher refined vegetable oils are purer as compared to unrefined vegetable oils. In another aspect of the present invention, at least one of or all of the vegetable oils may be high oleic. High oleic oils have a high degree of oleic acid, for example approximately 80% by weight oleic acid or greater, preferably 86% or greater, more preferably 90% or great, and even more preferably 95% or greater. By using high oleic acid oils that have a high monounsaturated to polyunsaturated fat ratio, oxidation can be reduced. It has been found that the oxidation of the vegetable oils in accordance with aspects of the instant invention yields a hard, lubricious or slick surface that is resistant to carbon fouling, which is discussed below. Generally, the desired ratio of monounsaturated to polyunsaturated fats in accordance with aspects of the present invention is at least about 3:1, and for some applications, preferably greater than 3:1. At least one or all of the oils in the oil composition may be high oleic. Reducing the polyunsaturated fats also enhances the temperature range (pour point to smoke point range) as well as the storage stability.

[0027] In accordance with aspects of the present invention, some variations of vegetable oil also reduce waxes and other contaminants, which ensures improved characteristics at low temperatures and also reduces gumming of oil in the firearm or other mechanical devices. Improved characteristics include improved oxidative stability and lower pour point. Accordingly, for some variations of the present invention, the oil composition may remain in liquid form at temperatures as low as about -35°F and as high as about 500°F. The oil compositions may have a pour point of about -40°F to about 25°F, a cloud point of about 5°F to about 70°F, and flash point of at least 450°F, more preferably at least 500°F, still more preferably

at least 550°F. In an aspect of the present invention, the vegetable oil compositions may include one or more of the above properties.

[0028] Also, vegetable oils have a polar nature, which is not a characteristic found in petroleum-based products. The polarity ensures that the oil attracts strongly and penetrates deeply into the host metal and adheres better than non-polar oils, a feature that is highly desirable in a mechanical device that is blasted by gases, carbon, high heat, and extreme gravitational forces. The reciprocating bolt carrier on an M-16, for example, accelerates from 0 to over 40 miles per hour in only 20 milliseconds, in a distance of approximately one inch. This feature of oils in accordance with aspects of the present invention keeps the gun running long after a conventional lubricant has burned off and allowed carbon overload to occur. Because known petroleum-based products do not have this quality, the products do not have the attraction and penetration of the oil compositions.

[0029] It has been surprisingly found that any single oil or a combination of oils selected from the following group are suitable for the above uses: almond (smoke point 430°F), avocado (smoke point 520°F), canola (smoke point 450°F or higher), corn (smoke point 450°F), cottonseed (smoke point 420°F), flax seed (smoke point 250°F), hazelnut (smoke point 430°F), hemp seed (smoke point 330°F), grapeseed (smoke point 485°F), jojoba (smoke point 570 F), macadamia nut (smoke point 389°F), olive (smoke point 460°F), peanut (smoke point 450°F), rapeseed (smoke point 438°F), rice bran (smoke point 490°F), safflower (smoke point 490-510°F), sesame (smoke point 350°F), soybean (smoke point 495°F or higher), sunflower (smoke point 450°F or higher), and walnut (smoke point 400°F). Any one of these oils or combination thereof has been found to improve carbon fouling and carbon and other contaminant resistance without the problematic side

effects discussed above, as compared to existing products on the market. As discussed above, high oleic versions of these oils are preferable, for some applications. To demonstrate the unexpected benefit of using the above oils to reduce or prevent carbon fouling, various oils and market products have been tested according to the following procedures. A 6" porcelain bowl is fouled with an oxy-acetalyne torch, with a rich flame to maximize carbon deposits. The flame is applied for 35 seconds (+/- 5 seconds) at a distance of 4 inches (+/- 2 inches) from the bowl to apply sufficient heat without overheating the bowl. This process heats the bowl to approximately 150-250 °F without cracking the bowl. The bowl is allowed to sit at room temperature 70°F (+/- 5 °F). Then, 5 ml (+/- .5ml) of a sample is applied to the fouled bowl. The fouled bowl containing the sample sits for 5 minutes. Next, the fouled bowl containing the sample is scrubbed by hand, using both sides of a 100% cotton round patch (2.20" circular, .200" thick- +/- 10%) until the patch is fully soiled and unable to absorb any more carbon fouling. Remaining residue in the bowl is further scrubbed with a 100% cotton flannel patch (3.10" square, .020" thick- +/-10%) until fully soiled and unable to absorb any more carbon fouling. The bowl is rated on scale of 1 to 5, where 1 represents the most fouled, least effective and 5 represents the least fouled, most effective. Figure 3 is a photostat of an example bowl that has been fouled prior to application of an example composition to simulate the U.S. Army's firing residue removal test. The above tests measure the ability of the oil composition to remove carbon. Carbon overload is a central reason that firearms run sluggishly (improperly) or cease operating entirely (lock up). Figures 4-6 are photos of the resulting bowls after application of vegetable oils is accordance with the present invention, illustrating the degree of fouling. Figures 7-12 are photos of

the resulting bowls after application of various existing market compositions, illustrating the degree of fouling.

[0030] The results of the testing is organized in the following table:

TABLE 1 – Fouling Test

Oil Comp (by volume)	Rating 1-5 (1= least effective, 5= most effective)	Corresponding Figure
Example 1 – 100% Soybean	2.75 (average of two samples)	Figure 4
Example 2- 100% Canola	1.5	Figure 5
Example 3 – 80% Canola, 20% Soybean	3.5	Figure 6
Comparative Example 4 – Mobil 1 10W-30	3.0	Figures 7
Comparative Example 5 – FrogLube	1.5	Figure 8
Comparative Example 6 – SLIP2000 Carbon Killer	4.5	Figure 9
Comparative Example 7 – Hoppe's Elite	4.0	Figure 10
Comparative Example 8 – Gunzilla	1.0	Figure 11
Comparative Example 9 – Break Free	2.0	Figure 12
Example 10 –	2.5	No Figure

100% Rice Bran		
Example 11 – 100% Walnut	3.5	No Figure
Example 12 – 100% Sesame	3.0	No Figure
Example 13 – 50% Rice Bran, 50% Soybean	4.0	No Figure
Example 14 – 33.3% Rice Bran, 33.3% Walnut, 33.3%	Between 4.0 and 4.5	No Figure

[0031] Table 1 demonstrates that pure vegetable oil compositions and blended vegetable oil compositions satisfactorily remove carbon fouling, without exhibiting the problems of the market lubricants. Notably, the natural vegetable oils in accordance with aspects of the invention were found to remove fouling without stripping oils from metal and can be used at a wide range of temperatures. Furthermore, it was found that a blend of vegetable oil (soybean and canola) was superior to a single oil. It should be noted that while pure vegetable oils are primarily discussed herein, it is within the scope of the invention that other components may be present (such as synthetic oils or additives) in amounts that do not substantially interfere with the above described properties. Thus, in an aspect of the present invention, the oil composition consists essentially of vegetable oils. In another aspect of the invention, the oil composition consists of vegetable oils.

[0032] Aspects of the present invention further include vegetable-based oil compositions. The vegetable oil composition may include a first vegetable oil having a smoke point above 200°F, a second vegetable oil, distinct from the first vegetable oil, having a smoke point above 200°F, and a third vegetable oil, distinct from the first and second vegetable oils, having a smoke point above 200°F. For example, each of the first, second, and third vegetable oils may have a smoke point of about 300°F, or yet more preferably for some applications, each may have a smoke point of about 400°F. In an aspect of the invention, each oil in the blend may include one or more of the properties discussed above. Each of the first, second, and third vegetable oils may be selected from the group consisting of: sesame oil, canola oil, sunflower oil, soybean oil, peanut oil, olive oil, corn oil, grapeseed oil, jojoba oil, cotton seed oil, almond oil, safflower oil, walnut oil, avocado oil, rice bran oil, and flaxseed oil. The composition may include, by volume, about 1% to about 80% of each of the first, second, and third vegetable oils, more preferably for some applications about 5% to about 60% of each vegetable oil, and most preferably for some applications about 7% to about 30% of each vegetable oil. The composition may further include any number of additional vegetable oils distinct from the first, second, and third vegetable oils, each being selected from the above list and being present in the above ranges. For example, the composition may include fourth, fifth, sixth, etc., vegetable oils.

[0033] As used herein, the term "distinct" means not the same as another vegetable oil and/or derived from a different plant, vegetable, fruit, shrub, flower, or tree nut. For example, canola oil is distinct from soybean oil.

[0034] In aspect of the present invention, the combined volume of the vegetable oils is at least about 25% of the total volume of the oil composition, more

preferably at least about 50% of the total volume of the oil composition, still more preferably at least about 75% of the total volume of the oil composition, and most preferably about 100% or 100% the total volume of the oil composition.

[0035] In an aspect of the present invention, the composition may include, by volume, about 1% to about 80%, and more preferably for some applications about 5% to about 60% of each vegetable oil, and most preferably for some applications about 7% to about 30% of each of these vegetable oils. The composition may consist only of these oils. As noted above, the composition may include other components such as synthetic oils and other additives that don't substantially interfere with the above-described properties of the overall composition. As indicated by Table 1, it has been unexpectedly found that that certain combinations of vegetable oils are superior to both individual oils and commercial products in avoiding and removing carbon fouling from mechanical components without the problems associated with market compositions.

[0036] As shown in Table 1, it was surprisingly found that blends of vegetable oils are superior at removing carbon fouling than a single vegetable oil. See example 3, as compared to examples 1 and 2. Additionally, it was surprisingly found that a blend of vegetable oils sufficiently removes carbon fouling, without having the problems of the commercial products. See example 3, as compared to examples 4-9.

[0037] Any of the above-described oils may be applied to a mechanical component using the following methods. The composition may be deposited onto a surface. This deposition may be performed via brushing, dropping, spraying, or any other suitable delivery method such as applying with a paper towel or single pack moistened towelette, and spreading the applied oil evenly on the surface. The

deposited composition may be allowed to air dry. Alternatively, the deposited composition may be heated to about 100 to about 400°F to dry. The drying may be performed via convection oven, furnace, or any other suitable drying method such as for a period of time between 10 minutes and 12 hours, depending on the heat and material being treated. The treatment duration and temperature may depend on the size and material being treated. Certain metals may only withstand certain temperatures and exposure time, and, therefore, the precise time and temperature will vary. For example, a small aluminum piece, such as a charging handle that weighs 1.6 ounces, cannot withstand the same temperature intensity as a 16-ounce piece of ordnance-grade steel. The composition on the surface in the aluminum piece, for example, may be exposed to UV light (natural sunlight or lamp) to promote oxidation of the applied composition. In another aspect of the present invention, the mechanical component may be immersed in a tank containing the vegetable oil composition at a temperature of 100 to 400°F for a period of time between 10 minutes and 24, hours depending on the material and/or the composition. In yet another aspect of the present invention, a pressure of about 1-5 ATM may be applied to the to the vegetable oil composition on the mechanical component via a pressure cooker, for example. The time of pressure application may vary from 10 minutes to 24 hours, depending on the material and composition. Furthermore, the application method may include any combination of the above steps.

[0038] The above step of depositing the composition on the surface of a mechanical component may include placing the composition in a container having a coating delivery system. For example, the container may have a pump spray, a trigger spray, or a dropper dispenser, each of which would assist a user in depositing the composition onto a mechanical component. The container may also be

pressurized to allow for aerosol spraying of the composition inside. In another aspect of the present invention, the oil composition may be applied to a mechanical via a wipe, wherein the wipe contains the oil composition. For example, the wipe may be provided in a sealed package that may be opened when a user is ready to apply the oil composition to the mechanical component. Once removed from the sealed package, the user can then rub the wipe against the mechanical competent, thereby applying the oil composition onto the mechanical component. Alternatively, a sealed container may include a plurality of wipes, wherein each wipe contains the oil composition. The composition may be contained in a sealed, one-time use liquid only packet.

[0039] Example aspects have been described in accordance with the above advantages. It will be appreciated that these examples are merely illustrative of aspects of the invention. Many variations and modifications will be apparent to those skilled in the art.

Claims:

1. An oil composition, comprising:

at least three vegetable oils, each vegetable oil being distinct from the other and each having a smoke point above 200°F,

wherein the combined volume of the at least three vegetable oils is at least about 25% of the total volume of the oil composition.

2. The oil composition of claim 1, wherein the combined volume of the at least three vegetable oils is at least about 50% of the total volume of the oil composition.

3. The oil composition of claim 1, wherein the combined volume of the at least three vegetable oils is at least about 75% of the total volume of the oil composition.

4. The oil composition of claim 1, wherein the combined volume of the at least three vegetable oils is about 100% of the total volume of the oil composition.

5. The oil composition of claim 1, wherein at least one of the at least three vegetable oils has 80% by weight or greater oleic acid.

6. The oil composition of claim 1, wherein each of the at least three vegetable oils are selected from the group consisting of: almond oil, avocado oil, canola oil, corn oil, cottonseed oil, flax seed oil, hazelnut oil, hemp seed oil, grapeseed oil, jojoba oil, macadamia nut oil, olive oil, peanut oil, rapeseed oil, rice bran oil, safflower oil, sesame oil, soybean oil, sunflower oil, and walnut oil.

7. The oil composition of claim 1, wherein each of the at least three vegetable oils are selected from the group consisting of: sesame oil, canola oil, sunflower oil, soybean oil, peanut oil, olive oil, corn oil, grapeseed oil, jojoba oil, cotton seed oil, almond oil, safflower oil, walnut oil, avocado oil, rice bran oil, and flaxseed oil.

8. The oil composition of claim 1, wherein each of the at least three vegetable oils are present in an amount from about 5% to about 60% by volume.

9. The oil composition of claim 1, wherein each of the at least three vegetable oils are present in an amount from about 10% to about 50% by volume.

10. The oil composition of claim 1, wherein the oil composition is a liquid at about -35°F to about 500°F, has a pour point of about 5°F to about 70°F, and a flash point of about 480°F to about 580°F.

11. A method of removing or preventing carbon fouling on a mechanical component of a device, comprising:

depositing a vegetable oil composition on the mechanical component of the device,

wherein the vegetable oil composition comprises at least one vegetable oil having a smoke point above 200°F,

wherein the at least one vegetable oil is present in an amount of at least about

25% by volume of the total volume of the oil composition; and

wherein operation of the device deposits carbon on the mechanical component.

12. The method of claim 11, wherein the at least one vegetable oil is present in an amount of at least about 50% by volume of the total volume of the oil composition.

13. The method of claim 11, wherein the at least one vegetable oil is present in an amount of at least about 75% by volume of the total volume of the oil composition.

14. The method of claim 11, wherein the at least one vegetable oil is present in an amount of about 100% by volume of the total volume of the oil composition.

15. The method of claim 11, where the depositing step comprises one of spraying, immersing, or brushing the oil composition on the mechanical component of the device.

16. The method of claim 11, further comprising drying the deposited oil composition by heating at a temperature of about 100°F to about 400°F.

17. The method of claim 11, further comprising exposing the deposited composition to ultraviolet light.

18. The method of claim 15, wherein the mechanical component is immersed at a temperature of about 100°F to about 400°F for a period between about 10 minutes to

about 24 hours.

19. The method of claim 11, wherein the depositing step comprises applying a pressure of about 1 to about 5 ATM.

20. The method of claim 11, wherein the mechanical component is a component of a firearm.

21. The method of claim 18, wherein the mechanical component of the firearm is selected from the group consisting of: a trigger, a hammer, a disconnector, a trigger pin, a firing pin, a chamber, a bolt, a bolt face, a bolt carrier, a breach face, a camming pin, a piston, an operating rod, a gas tube, a barrel, a slide, a retention rail, an upper receiver, a lower receiver, a magazine follower, a suppressor mount, a compensator, a flash hider, charging handle, feed tray, and a baffle.

22. A pressurized container comprising the composition of claim 1.

23. A sealed package comprising an absorbent wipe having the oil composition of claim 1 absorbed therein.

24. A container comprising the composition of claim 1, the container including a pump for releasing the oil composition from the container.

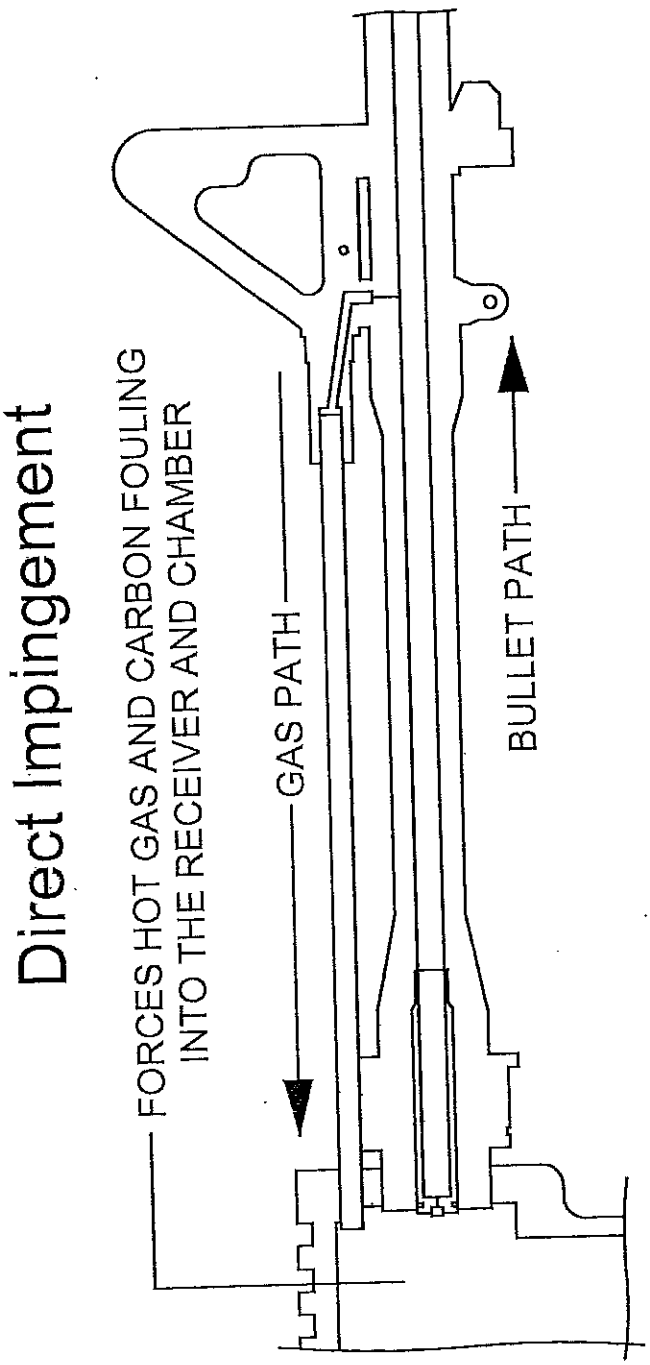

Direct Impingement
FORCES HOT GAS AND CARBON FOULING INTO THE RECEIVER AND CHAMBER
GAS PATH
BULLET PATH

Fig.1

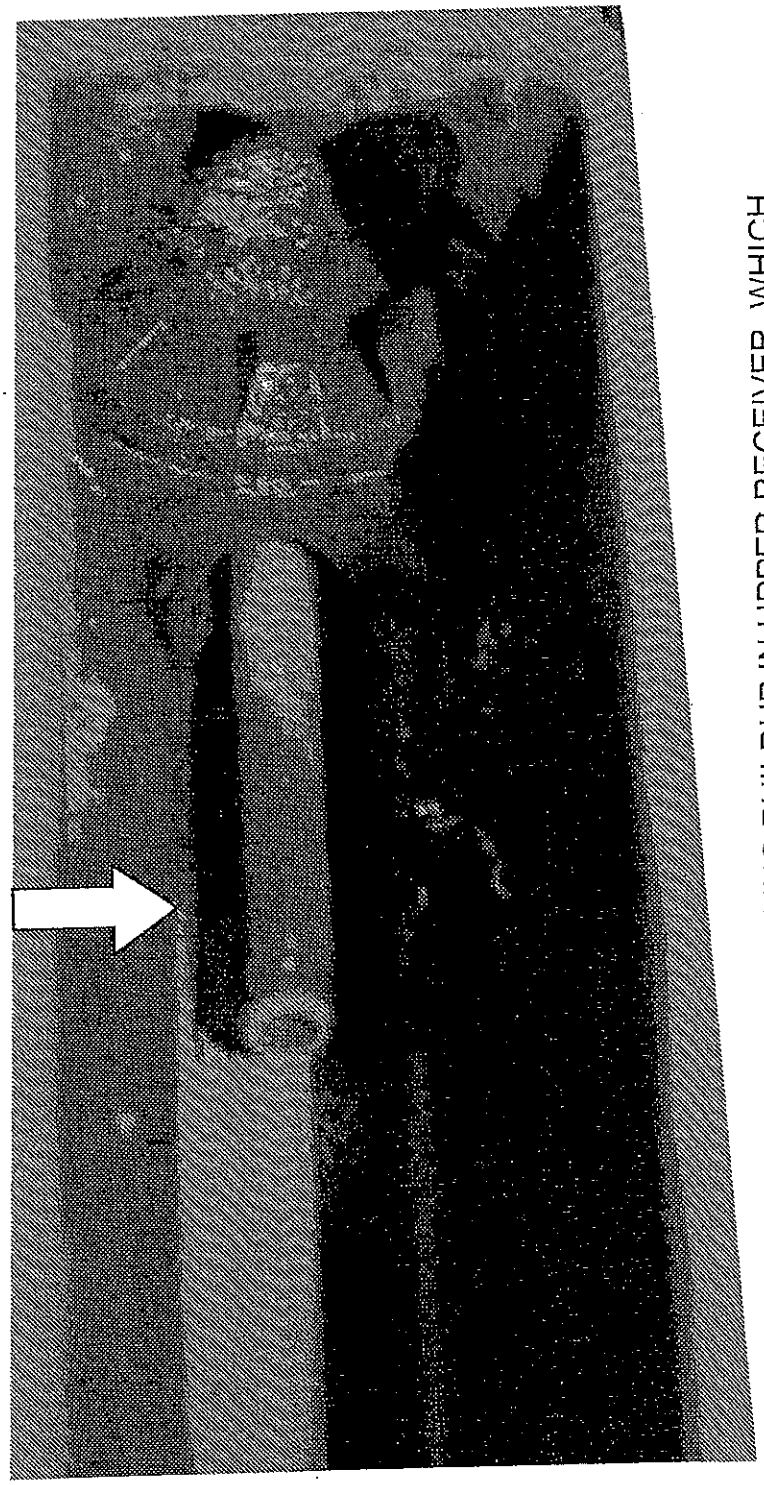

GAS BLOWN BACK THROUGH GAS TUBE INTO
RECEIVER. SEE PROTRUDING GAS TUBE AND FOULING
HEAVY FOULING BUILDUP IN UPPER RECEIVER, WHICH
LEADS TO MALFUNCTIONS AND STOPPAGES

Fig.2

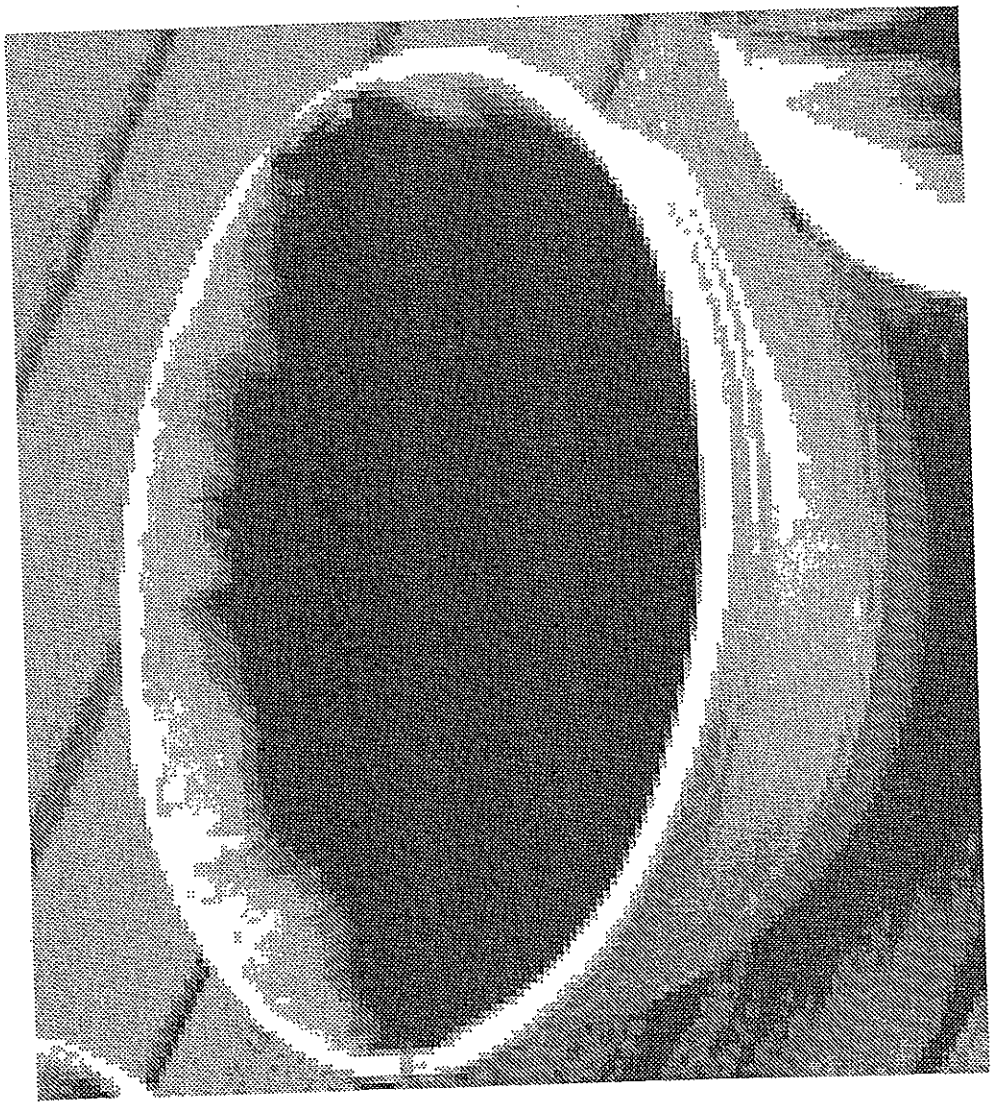


Fig.3

Fig.4

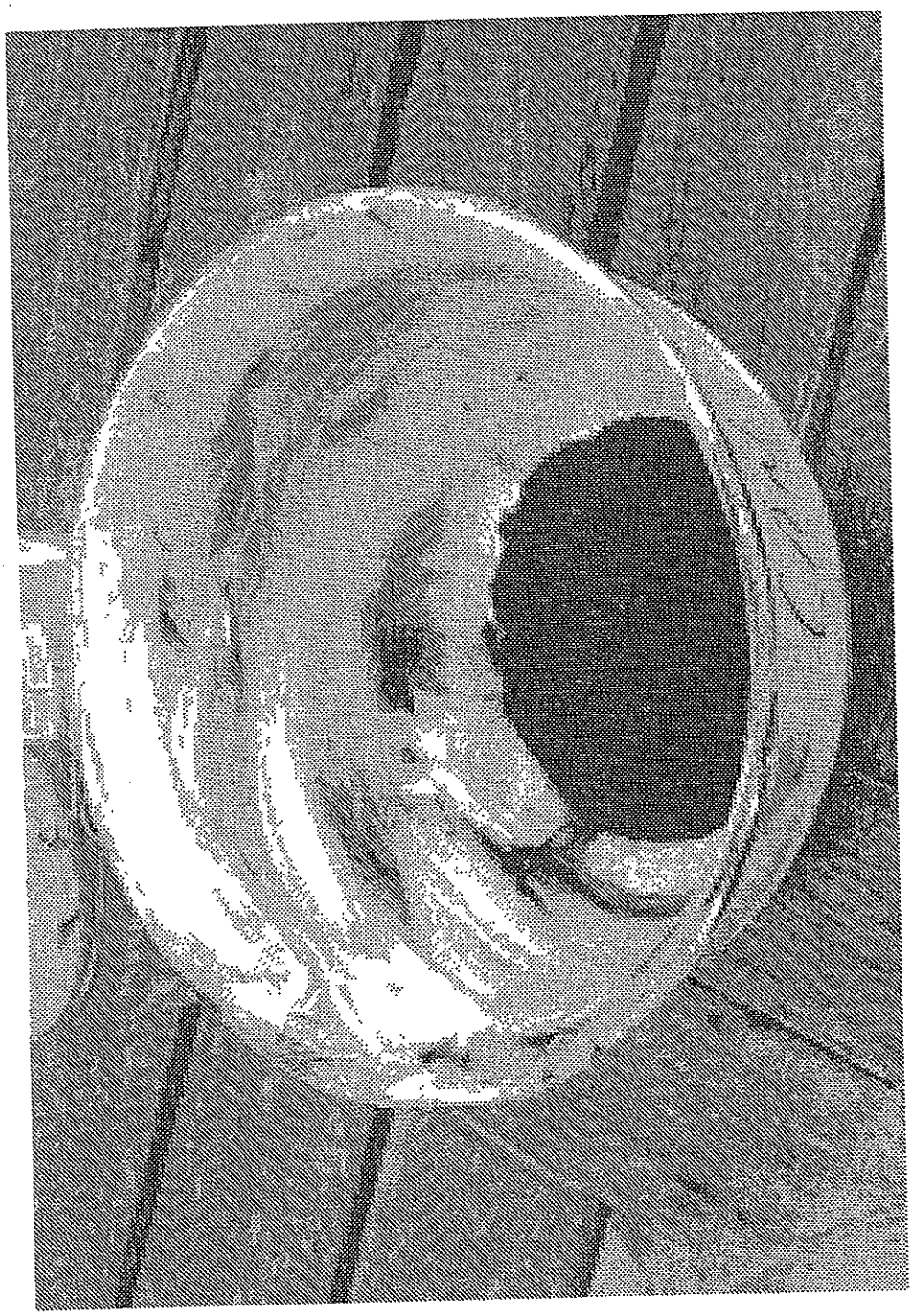


Fig.5

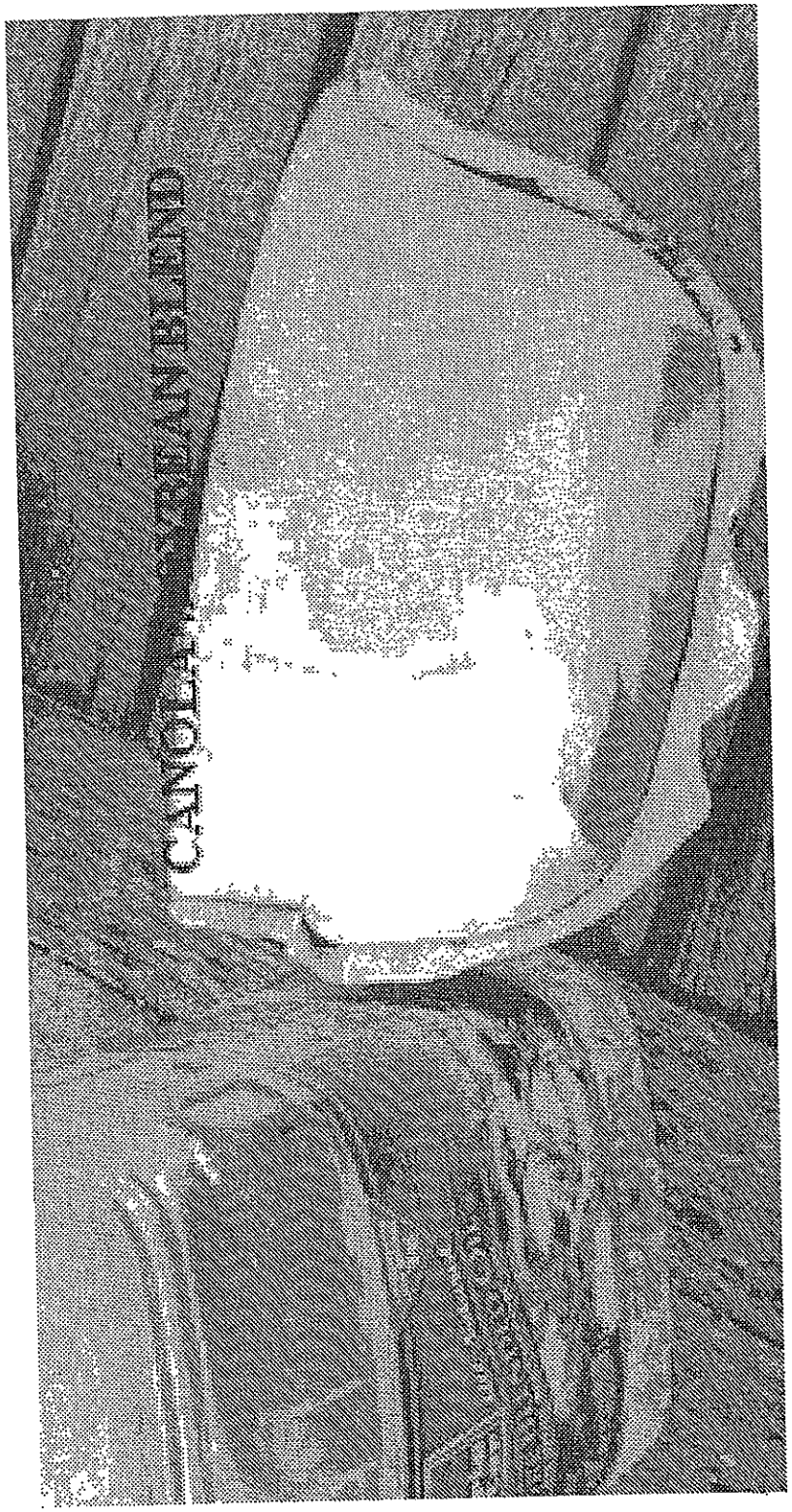


Fig.6

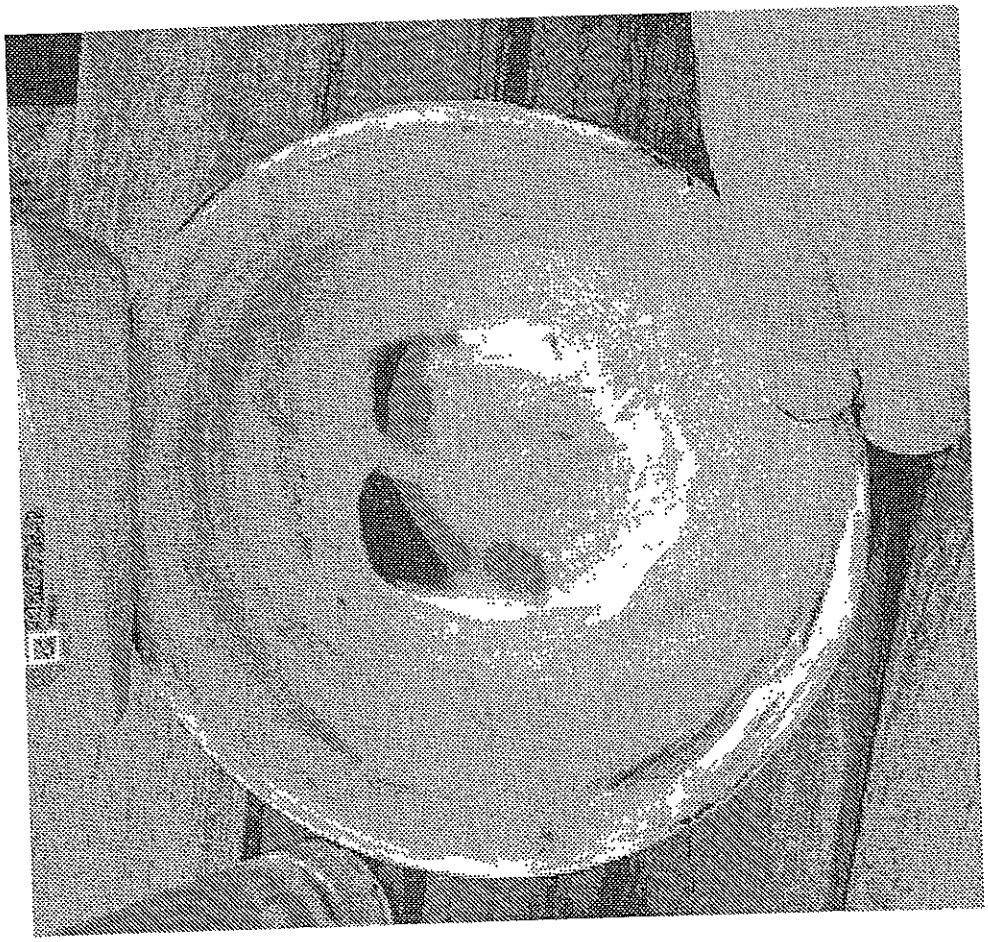


Fig.7

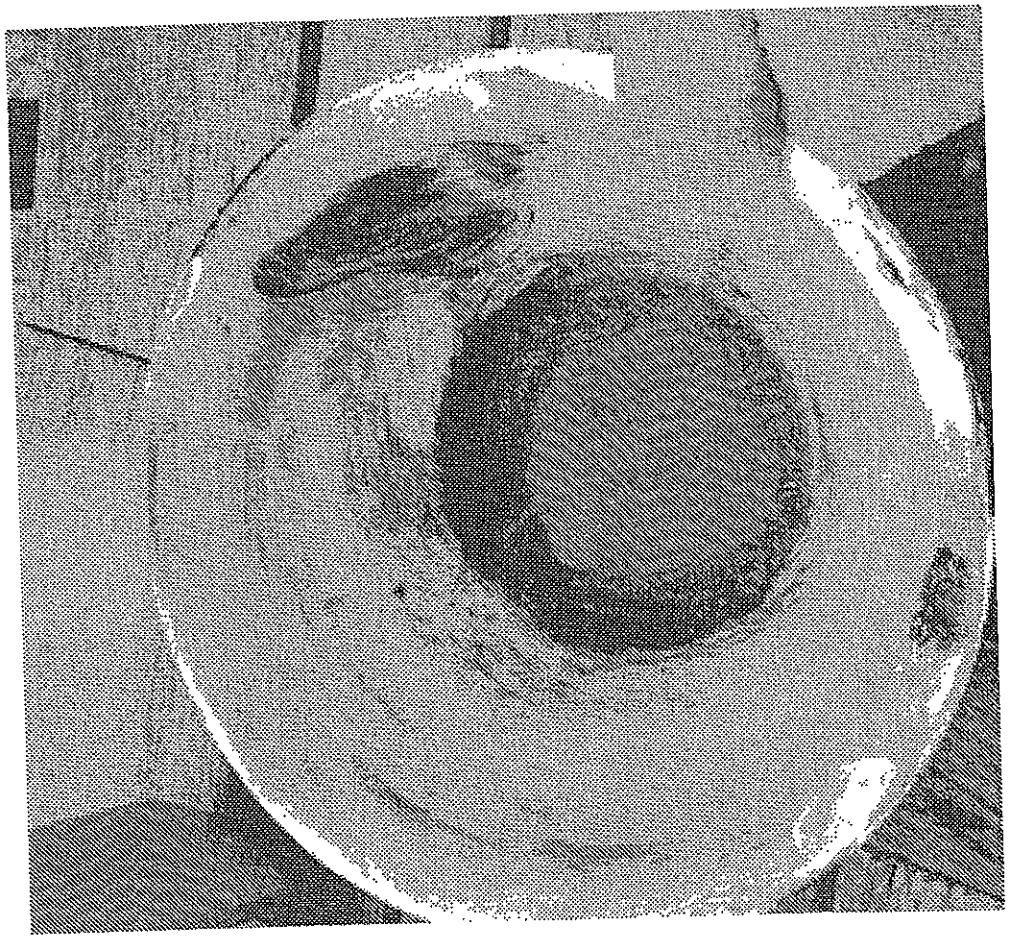


Fig.8

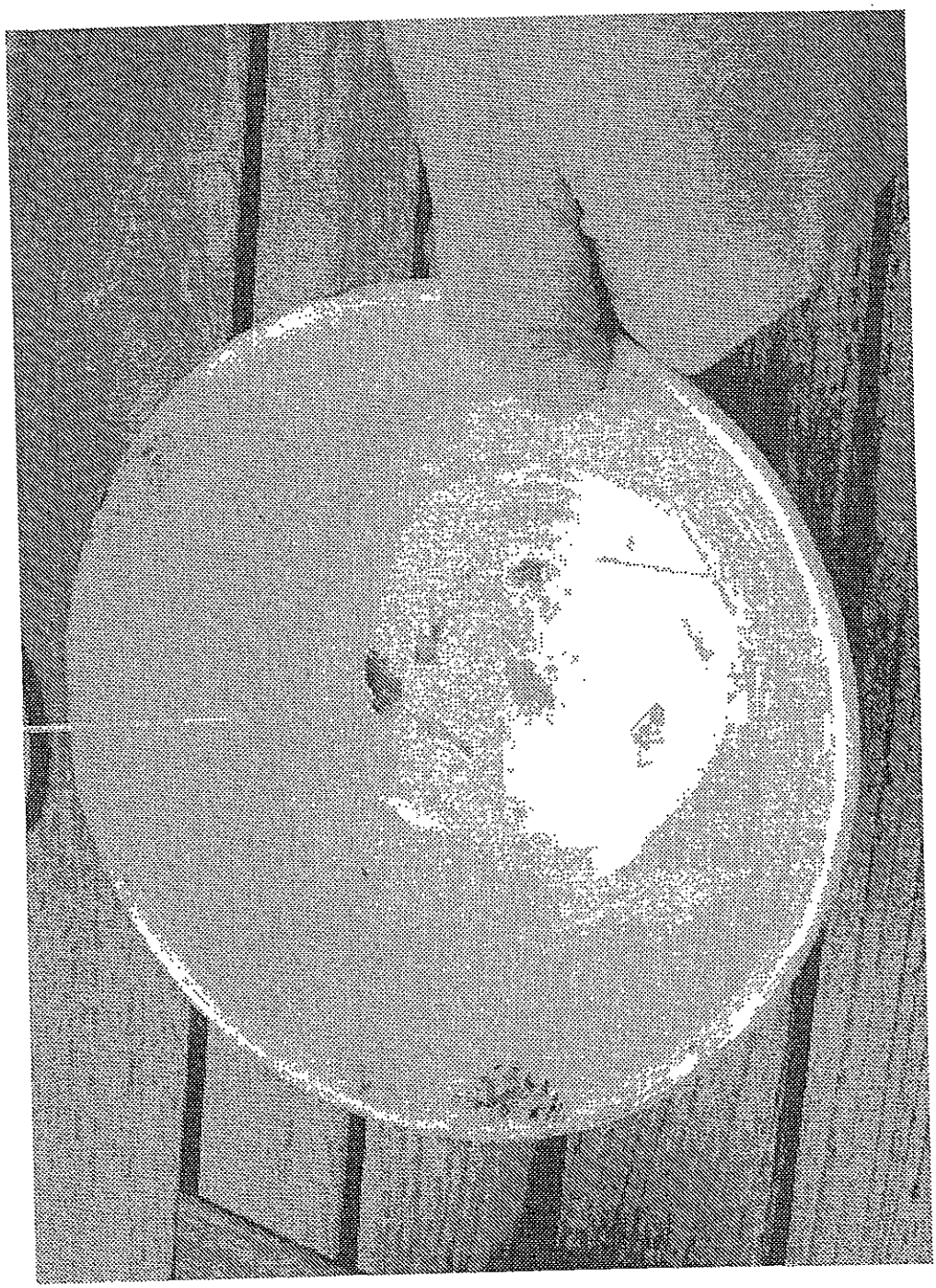


Fig.9

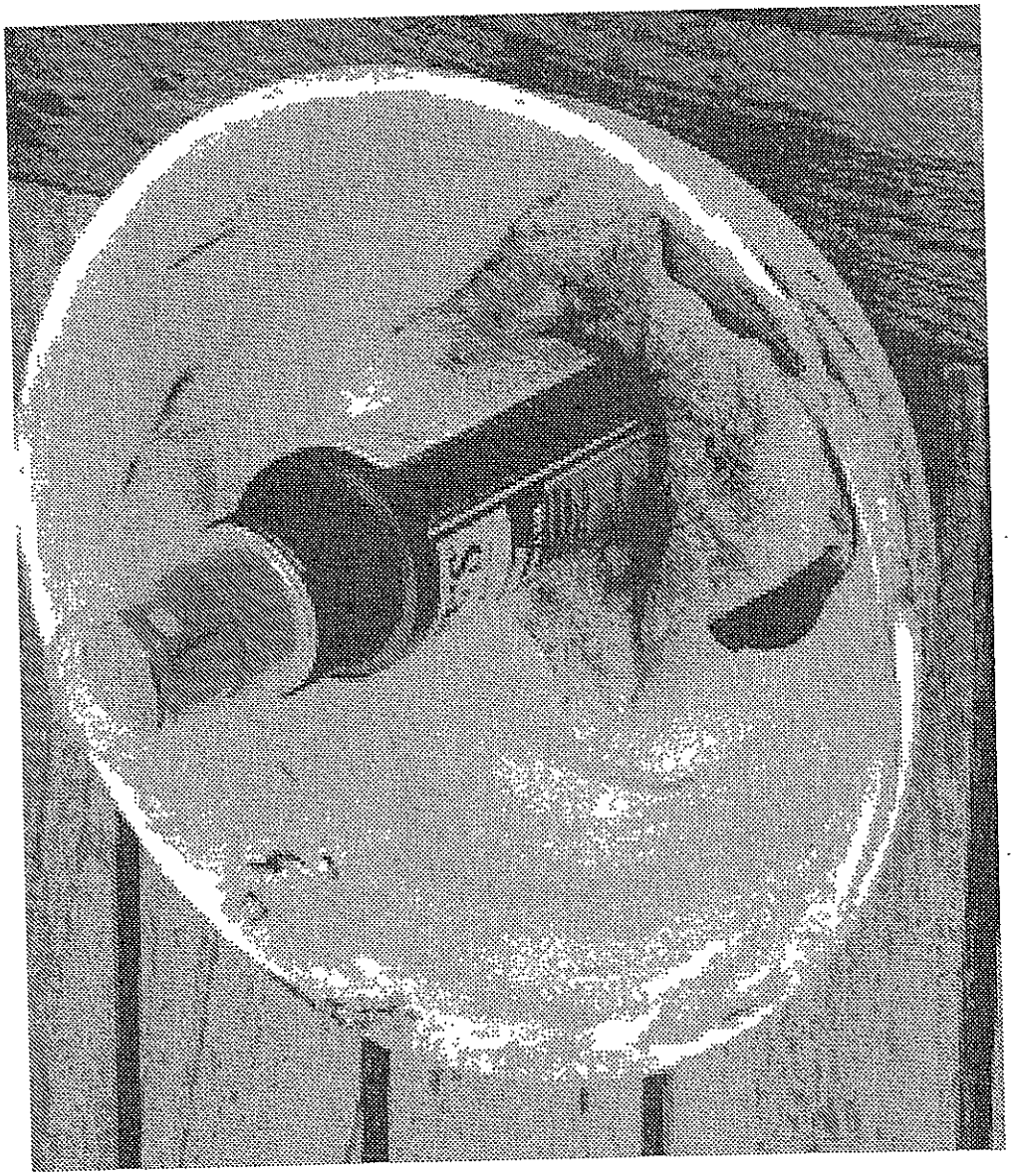


Fig.10

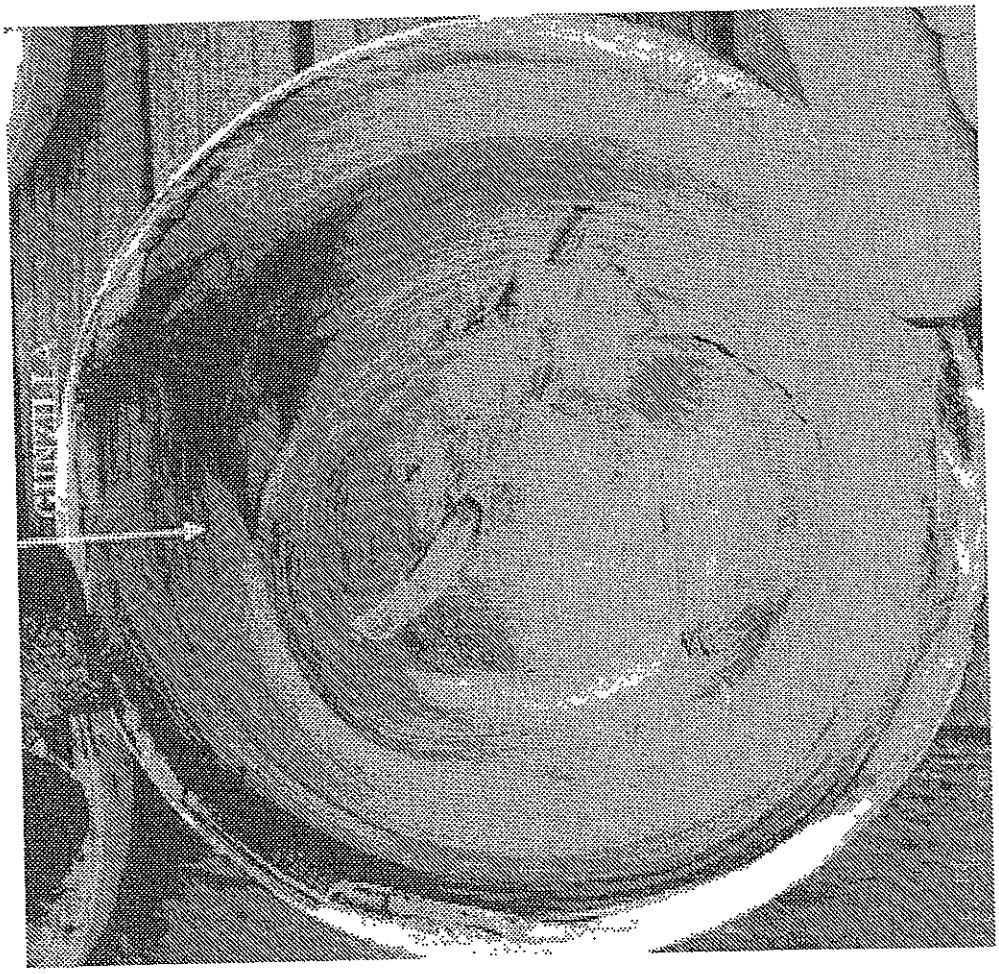


Fig.11

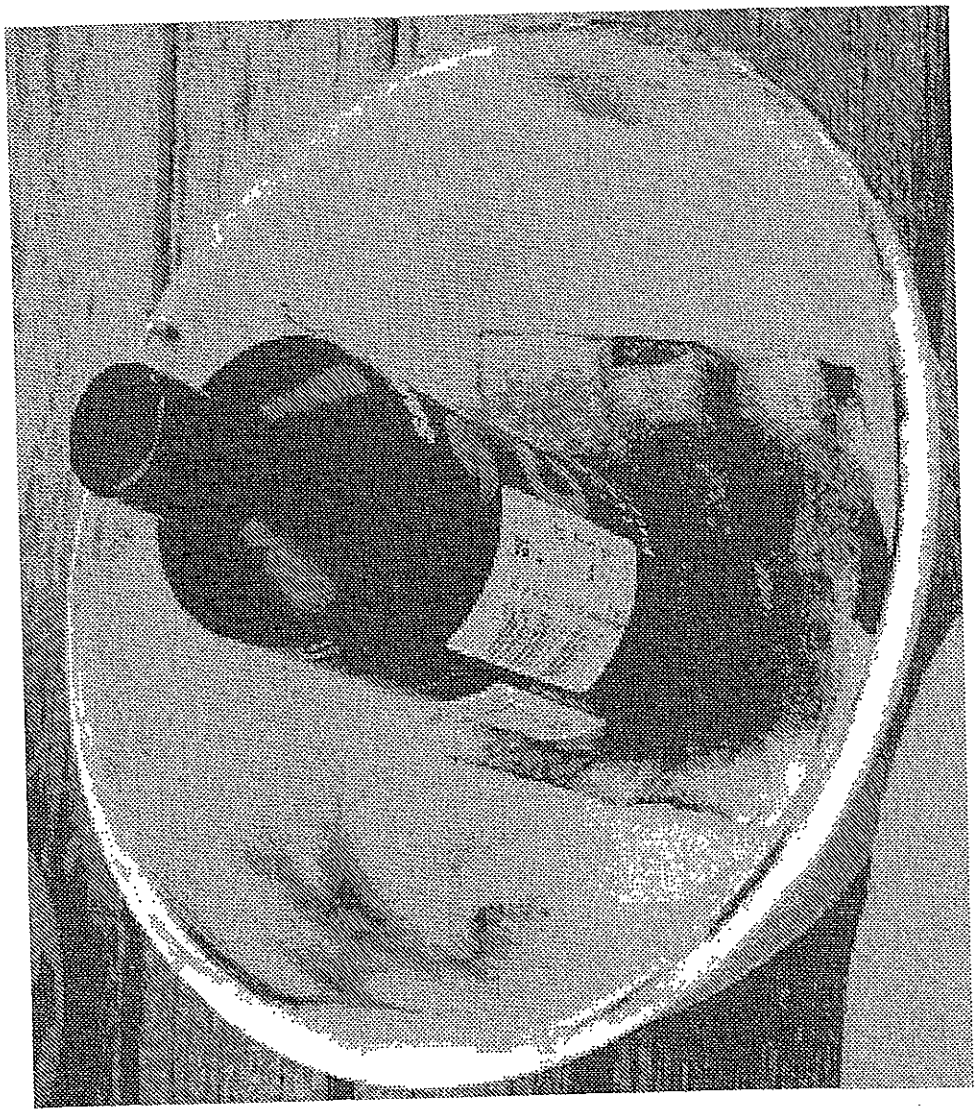


Fig.12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/032351

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - C09K 8/52 (2013.01)
USPC - 134/39
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - B08B 7/00, C01M 101/04, 105/04, 111/02, 129/10, 161/00, 169/00 (2013.01) - see extra sheet for additional classes searched
USPC - 134/34, 39, 41, 94.1, 198; 508/308, 433, 436, 437, 473, 486, 491, 591; 510/190, 245, 254, 463.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - B08B 7/00, C01M 101/04, 105/04, 111/02, 129/10, 161/00, 169/00; C01N 30/02, 30/08; C09K 8/52, 8/528; C10M 163/00; C11D 3/382; C23F 11/08 (2013.01)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Patbase, Google Scholar

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/0059562 A1 (GARMIER) 17 March 2005 (17.03.2005) entire document	1-9, 11-24
Y	US 2,998,319 A (BABAYAN) 29 August 1961 (29.08.1961) entire document	1-9, 11-24
Y	US 4,627,192 A (FICK) 09 December 1986 (09.12.1986) entire document	5
Y	US 6,153,571 A (KOMOCKI et al) 28 November 2000 (28.11.2000) entire document	11-21
Y	EP 1 464 913 A2 (RODIGHIERO) 06 October 2004 (06.10.2004) entire document	15, 18, 21
Y	US 2006/0289087 A1 (LACHANCE) 28 December 2006 (28.12.2006) entire document	16
Y	US 2004/0166340 A1 (CAIRNS et al) 26 August 2004 (26.08.2004) entire document	17
Y	US 4,408,960 A (ALLEN) 11 October 1983 (11.10.1983) entire document	19
Y	US 3,211,346 A (MESHBERG) 12 October 1965 (12.10.1965) entire document	22, 24
Y	US 2011/0190176 A1 (PERDUK et al) 04 August 2011 (04.08.2011) entire document	23

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 May 2013	10 JUN 2013
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/032351

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - C01N 30/02, 30/08; C09K 8/52, 8/528; C10M 163/00; C11D 3/382; C23F 11/08 (2013.01)

[redacted] Bob Curtis

Vuurwapen Blog

[redacted]

Hi! Great info. Ed.

[redacted]

Ed

Do you guys have a response to the claims that FireClean is just Crisco?

Andrew

> Hi Andrew- categorically deny. If you let me know where you are hearing it I would appreciate it. If it's a competitor it will generate a strong response. Thanks! Ed

Ed

This video - [redacted]

EXHIBIT

tabbies

B

LIES, ERRORS, AND OMISSIONS

INFRARED SPECTROSCOPY OF FIRECLEAN AND CRISCO OILS

SEPTEMBER 12, 2015 ANDREW TUOHY 138 COMMENTS

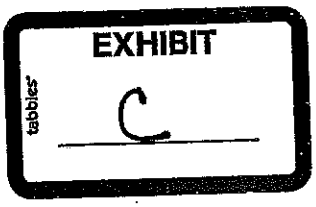
If you have been on the internet and have visited a sampling of firearm related blogs or social media sites in the last few weeks, you have most likely come across reports or claims that FireClean is nothing more than Crisco vegetable oil. I had heard it from two people in the industry whom I respect around the same time it started being mentioned all over the place (I had previously been aware that it was a food grade oil, but did not know anything more than that).

The first real attention-grabber was this video, which has since been removed. It showed FireClean and Crisco vegetable oil smoking and burning off at the same time on a stovetop (my friend Brett replicated this test and saw the same results). Still, this wasn't the sort of conclusive proof that would sway me one way or the other. It's possible that two oils could have the same smoke point and not share other properties.
I did not – and still do not – believe that FireClean is Crisco, but not for the reason you might think. Although such statements make for shocking arguments, it wouldn't really make sense to buy a name brand product at a high price if the goal was to resell and make money.

Still, the claim that FireClean is nothing more than Crisco is not one to be taken lightly by anyone – not by consumers and certainly not by the company. I spoke at length with one of the makers of FireClean, Ed Sugg, and he assured me that not a single drop of Crisco has ever been part of their formulation, even during initial testing with various mixtures. Interestingly enough, he specifically mentioned that soybean oil had not been part of their testing.

Despite these assurances, which I was inclined to believe, I sought to undertake my own testing to determine whether or not these claims are true about FireClean. Trust, but verify.

I also contacted the man who seems to have originated the "FireClean is Crisco" claim. George Fennell of WeaponShield posted on his personal Facebook page that FireClean was Crisco several weeks back (I am told that this has been removed, but I cannot view his Facebook page any more).



It was claimed by various people, including the guy who first posted that now-removed stovetop video, that he had scientific proof of this claim. I asked Mr. Fennell if he would provide a copy of the analysis, which he refused to do. He told me all I needed to do was look at FireClean's patent application to see that it was Crisco and/or other vegetable oils. When I asked again, rather politely in my opinion, he sent a very long and agitated message again refusing to supply the test before blocking me on Facebook.
Mr. Fennell was the developer of FP-10, a gun oil which, I should mention, I have recommended in the past and said I would purchase over FireClean for reasons of cost. He has since left the company which produces FP-10 and started at WeaponShield. Since then, he has criticized FP-10 as well as FireClean and other oils. I will reiterate that FP-10 provides excellent lubrication characteristics at a competitive price, if you're looking to buy a gun oil.
But the question of the day is about FireClean and Crisco. There was clearly only one way to settle this, and that was to engage in some science.

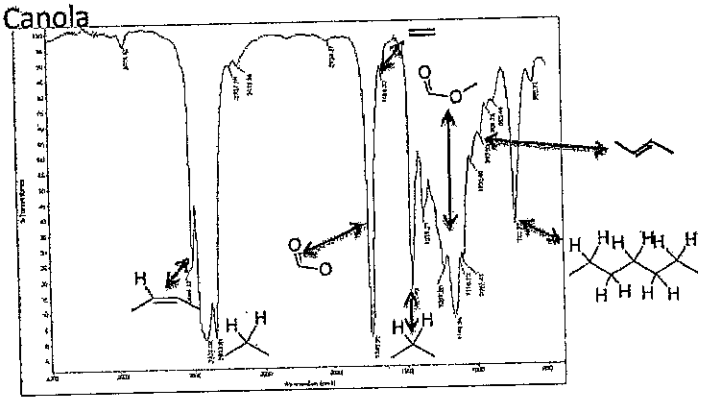
I contacted a professor at the University of Arizona – a very nice man with a Ph.D. in organic chemistry – and he agreed to help with an infrared spectroscopy test of FireClean and two types of Crisco.

Two types, you ask? Not generally using anything other than olive oil in my cooking, I was somewhat surprised to find a wall of various types of cooking oils at my local grocery store. There were two types of Crisco oils prominently featured in the display – Pure Vegetable, and Pure Canola. I stood there in the aisle for quite some time, trying to figure out which one to buy. Sensing my puzzlement, a helpful lady asked me if I needed assistance deciding which oil was right for whatever it was I wanted to cook. Suddenly, I understood what it must be like for girls who visit gun stores.

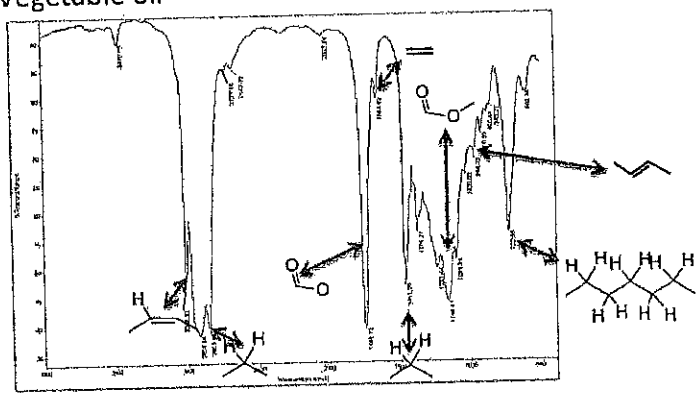
Remembering the earlier comment about soybean oil, I determined with the help of the label that Crisco Pure Vegetable oil is made from soybean oil. Crisco Pure Canola is made from, you guessed it, canola. There were also probably half a dozen other brands of canola oil on the shelf. I decided to take both types of Crisco for testing.

The test took a week, and here are the results.

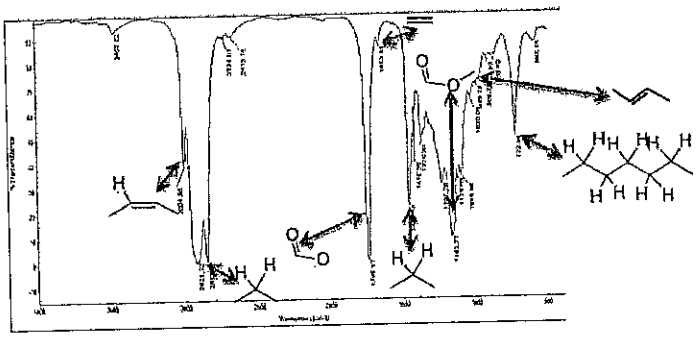
Crisco Pure Canola



Crisco Pure Vegetable oil



Fire Clean



What did the tests show?

FireClean is probably a modern unsaturated vegetable oil virtually the same as many oils used for cooking.

The professor had something to say about the formulation and its relevance as a gun oil. *"I don't see any sign of other additives such as antioxidants or corrosion inhibitors. Since the unsaturation in these oils, especially linoleate residues, can lead to their oligomerization with*

exposure to oxygen and light, use on weapons could lead to formation of solid residues (gum) with time. The more UV and oxygen, the more the oil will degrade."

In my 2013 article about gun oils, I mentioned that FireClean wasn't advertised as protecting against corrosion. Given the results of this test, I suppose that makes sense.

When I fired this AR which had been sitting for years with FireClean on the internals, it hadn't been exposed to UV, although it certainly saw some oxygen. Since that test, several friends told me privately that their 1911s did not function properly after sitting for six months with FireClean on the internals. It would seem that these results are highly dependent on the weapon.

Given that people in the military are often exposed to both UV and oxygen (such as when they go outdoors) and also need corrosion protection for their firearms, I would not recommend FireClean be used by members of the military.

I offered FireClean a chance to respond to the findings of this test, and, among other things, they asked to review the draft of this article for a few days before it was published. That is not how this blog works. I assume they will be publishing a response through other channels.

138 THOUGHTS ON "INFRARED SPECTROSCOPY OF FIRECLEAN AND CRISCO OILS"

1. **Dan B.**
SEPTEMBER 12, 2015 AT 12:45

I'm going to take a wild guess and say it's probably generic, non food grade rapeseed oil.
REPLY

1. **Dave**
SEPTEMBER 12, 2015 AT 15:26

Close. It's a subspecies: wallet-rapeseed oil.
REPLY

2. **Chris**
SEPTEMBER 12, 2015 AT 22:28

Wasn't rapeseed oil used to lubricate warships and other machinery during WWII, before they decided to start feeding it to people?
REPLY

1. **Medicfrost**
SEPTEMBER 13, 2015 AT 10:42

I know it's popular with Bill Cosby for lubrication.
REPLY

1. **Bill**
SEPTEMBER 14, 2015 AT 13:17

Well played worthy adversary, well played indeed.
REPLY

2. **Mattias**
SEPTEMBER 13, 2015 AT 22:30

Rapeseed oil tastes awful, and is usually not used in cooking. Canola is a Canadian GMO of Rapeseed that produces oil that doesn't taste bad.
REPLY

1. **Tom**
SEPTEMBER 14, 2015 AT 02:53

EXHIBIT
tabbies
D

Canola's wasn't a GMO originally, according to Wikipedia.
REPLY

1. 
ScottS
SEPTEMBER 17, 2015 AT 00:18

one of the few times wikipedia is correct

2. 
ScottS
SEPTEMBER 17, 2015 AT 00:17

Sorry but WRONG. it was known as canola long before the development of GMO's. You are comparing raw rapeseed oil that is a health food supplement to filtered and refined rapeseed oil that is known as canola
REPLY

3. 
Robert Bradley
SEPTEMBER 14, 2015 AT 06:37

Wouldn't surprise me but if I were to use a vegetable oil for a base for a weapons grade lubricant I would use JoJoba oil.

Why you ask? Because many excellent (no longer available gun lubricants) originally were made using Sperm Whale oil gunsmiths and watchmakers prized it as a lightweight lubricant that did not gum or solidify and was excellent in extreme temperature situations.

From Wikipedia: https://en.wikipedia.org/wiki/Sperm_oil
"Sperm oil was a popular lubricant. It worked well for fine, light machinery such as sewing machines and watches because it is thin, doesn't congeal or dry out and doesn't corrode metals. It was also used in heavy machinery such as locomotives and steam-powered looms because it can withstand high temperatures.[31] In the late 20th century, Jojoba oil was discovered to be a better substitute for high-friction applications because it is even more stable at high temperatures. This caused sperm oil's price to collapse to a tenth of its previous value.[32]
Because of its very low freezing point, sperm oil saw widespread use in the aerospace industry.[33]

Sperm oil was used to protect metals from rust. A coat of sperm oil provided a temporary protection for the metal components in firearms, because it did not dry out or gum up.[34][35] It was the basis of the original (but not current) Rust-Oleum."

Jojoba oil is the closest thing to Sperm Whale Oil…in fact superior in some aspects…https://en.wikipedia.org/wiki/Jojoba_oil
REPLY

1. **The Old Coach**
SEPTEMBER 14, 2015 AT 18:45

Castor oil ("bean oil") is still widely recognized as a superior oil for two-stroke engines that run gas/oil mix. It's only drawback is that the mix must be fresh. Leave it stand for a day or two and the oil breaks down. Been there, done that, to my sorrow. The old-timers ran castor oil in their four-stroke race engines. Clean your entire oiling system completely before converting from petroleum, or you get cottage cheese in the tank. Been there, too. Yeah, I'm that old.
REPLY

1. **Dan Schmidt**
SEPTEMBER 14, 2015 AT 22:41

No Coach, that is not it's only drawback. It's true that it has a higher "shear strength" than most oils, and thus provides more protection under extreme pressures. But it also has a high pour point, making it impractical to use in some motorsports like snowmobiling, and it also doesn't burn clean, causing a lot of carbon deposits on power valves (variable exhaust port height) which nearly all modern two-strokes have.
REPLY

2. **ArmsVault**
SEPTEMBER 12, 2015 AT 12:47

Great article! I'm certainly looking forward to their response!
REPLY

3. **Tacticaltshirts.com**
SEPTEMBER 12, 2015 AT 12:56

Very interesting article. While I don't claim to know everything about all these new "green" gun-lubes, we have stayed away for one reason.

An acquaintance who was running FireClean on a rifle in a very cold environment has his weapon freeze shut. Completely.

We figured if it's eatable, it's plant based. And if it froze, it's got lots of water in it.

Good post, Andrew.

Marky
http://www.john1911.com
REPLY

1. **Ryan**
SEPTEMBER 12, 2015 AT 23:05

Fats are hydrophobic.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 12, 2015 AT 23:58

Is that why chubby guys float better than skinny guys?
REPLY

1. **Vitor**
SEPTEMBER 13, 2015 AT 06:50

They float better because fat is less dense than water.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 13, 2015 AT 07:32

It was a joke.

2. **MikeW**
SEPTEMBER 29, 2015 AT 06:08

I'm guessing you can't float at all… amiright?

2. **A. Fatguy**
SEPTEMBER 13, 2015 AT 07:58

Yer damn right it is! !!!!!

REPLY

2. **Chris**
SEPTEMBER 13, 2015 AT 10:20

How about other green cleaners like froglube, rand CLP and others alike.

Is this only against fire clean?
REPLY

1. **Dirk W**
SEPTEMBER 14, 2015 AT 18:32

Froglube freezes. I suppose that is fine if you live in some place where it never gets cold.
REPLY

2. **Lars**
OCTOBER 10, 2015 AT 15:10

I love Rand. I used to use all the other ones mentioned. The fact that it is odorless and lets me do my cleaning while watching tv is a big plus. Rand cleans better than Froglube and is just as good as a lubricant.http://thefiringline.com/forums/showthread.php?t=546316
I also like the fact they've done their own tests and there's more than just oil in it. In fact, I pulled up one page and it looks like there's rainbow trout oil and bug juice (flea) in it (see bottom of page 3 and top of page 4)? It's definitely not just 1 kind of vegetable oil in it.https://cdn.shopify.com/s/files/1/0196/0282/files/randbrands_MSDS_CLP_1.pdf
REPLY

1. **Lars**
OCTOBER 10, 2015 AT 16:29

Never mind, it was tested for oxidation using those standard tests, those are not ingredients. I wish the ingredients were listed, but I get the trade secret aspect as well.
REPLY

3. **Dr. Wylie**
SEPTEMBER 13, 2015 AT 14:06

All lipids are hydrophobic by definition and could not have water as part of the lubricant or the parts would completely separate like oil and vinegar salad dressing.
REPLY

1. **ScottS**

SEPTEMBER 17, 2015 AT 00:25

what everyone is missing is water is not the only thing that solidifies in cold. Waxes for example, go through liquid to solid ranges just as water does, and most non petroleum lubricants are in fact, waxes, and not fats.
REPLY

2. **MikeW**
SEPTEMBER 29, 2015 AT 06:12

True dat, Doc. As far as you took it, that is.
Addition of an emulsifier allows 'oil and water' to stay mixed. In the case of edible materials, egg yolk or mustard can play that role.
REPLY

1. **Dr. Wylie**
SEPTEMBER 29, 2015 AT 07:40

"Jim, I'm a doctor not a miracle-worker" or cook.....
REPLY

4. **Avi**
SEPTEMBER 12, 2015 AT 12:56

Guess I have to oil al my shit with a proper gun oil now. Snake oil won't do.
REPLY

1. **Thomas M**
SEPTEMBER 12, 2015 AT 18:16

Ironically enough there is actual a gun lubricant with the commercial name, Snake Oil, that is sold by Dillion Precision.
REPLY

5. **bulldog76**
SEPTEMBER 12, 2015 AT 13:03

now iw ant to see what froglube is made of
REPLY

1. **Oliver**
SEPTEMBER 12, 2015 AT 22:59

I stopped using Frog Lube several months ago because I noticed that the actions on my firearms that had say fr a while became very "gummy." I wouldn't be surprised if Frog Lube turned out to have the same results.
REPLY

1. **McThag**
SEPTEMBER 13, 2015 AT 10:15

I've had the same experience with Froglube if I left any visible amount on the gun.

If I wiped off all I could see it'd still feel slippy.

The problem for me is oil has to get into places where it can't be wiped on some guns. So I've reverted to good ol' LSA (because I have gallons of it).
REPLY

2. **Cymond**
SEPTEMBER 13, 2015 AT 17:59

I used FrogLube on some rimfires before storage (a 10/22 and a CMMG 22lr upper). When I got them out again, they had gummed up so badly that the bolts wouldn't fully close under their own spring power. I had to clean the FrogLube out before shooting.
REPLY

3. **Lars**
OCTOBER 10, 2015 AT 15:18

I have an HK P30 and their armorers in the forums have flat out said not to use products like Frog Lube. I thought that was interesting. It was based on people sending in their weapons and finding that the malfunctioning was no longer an issue after simply de-greasing the firearm.

In my handbook it also says, "Do not use lubricants that boast of their ability to penetrate metal as these substances may deaden primers."
REPLY

2. **Mac**
SEPTEMBER 13, 2015 AT 07:12

Exactly what I was thinking. I'd be willing to bet its also a food grade oil too. They've always advertised that its safe for humans to eat. It works great on my guns though.
REPLY

1. **Joe**
SEPTEMBER 13, 2015 AT 16:46

I watched a frog lube rep drink some of it, I assume he survived.
REPLY

1. **Mike Butler**
SEPTEMBER 24, 2015 AT 22:08

That reminds me of a Master Jack drain cleaner talking about how safe it was (Oil of Vitrol or sulphuric acid) he poured some in his hand to show safe it was. I ask him to go pour a little water in his hand, I don't think that he ever used that as part of his sales pitch anymore. I burnt the crap out of his hand.
REPLY

6. **Chris**
SEPTEMBER 12, 2015 AT 13:13

IR is a qualitative measure. All I am seeing is that we have 3 oil like substances there. It would also be helpful to have an overlay instead of the 3 spectra separately.

When can we expect the GC-MS data?
REPLY

1. **Andrew Tuohy**
SEPTEMBER 12, 2015 AT 13:21

Feel free to download the image and adjust transparency/overlay on your own.

I'm not terribly interested in determining the exact composition of the oil; the IR data is enough to satisfy the question at hand.
REPLY

1. **Chris**
SEPTEMBER 12, 2015 AT 15:09

Not really. We know nothing about the length of the carbon chains or their structure. All we know is that the functional groups are similar to crisco, which any oil-like, plant based product would have.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 12, 2015 AT 18:03

Well, you are most welcome to foot the bill for your own testing.
REPLY

1. **Jerry**
SEPTEMBER 12, 2015 AT 22:06

You've begun an investigation which could have fruitful results stating what each of these oils even are, but stopping at IR data isn't sufficient. Many of us who read your articles also work in the chemical industry or at least perform analytical chemistry in laboratory settings for a living. While it is not my specific field of expertise, it seems agreeable that more testing is needed to make any conclusion. As of right now your viewership is likely to take this sole IR data as comprehensive evidence that Fireclean is indeed vegetable oil.

2. **Andrew Tuohy**
SEPTEMBER 13, 2015 AT 09:42

I don't have a degree in chemistry and it would take me about four years to get one. About ten to earn the PhD of the man who helped with this, and from whom the significant conclusions were drawn. We discussed doing GC/MS at the outset, but the IR data was sufficient for him to draw the conclusions in the article.

3. **The Best Chris**
SEPTEMBER 13, 2015 AT 07:38

Or you could, you know, actually perform a test that produces valid results? Your results are incomplete and misleading. You are not very good at "engaging in science" as much as you like to express that.

This is almost as bad as your comparison between steel and brass jacketed ammunition.

4. **Andrew Tuohy**

SEPTEMBER 13, 2015 AT 09:36

Sounds like you had your mind made up before you started reading.

7. **James P**
SEPTEMBER 12, 2015 AT 13:15

Andrew I like how you don't take anyone's shit.
REPLY

8. **Joshua**
SEPTEMBER 12, 2015 AT 13:16

This is why I run a 75/25 mix of motor oil to atf.

It just works and its non toxic.
REPLY

1. **M. Sage**
SEPTEMBER 13, 2015 AT 21:11

Motor oil and ATF are toxic… Not horribly, but toxic.
REPLY

1. **Synchronizor**
SEPTEMBER 21, 2015 AT 20:55

Technically, everything can be toxic. Water and oxygen are toxic in the right quantities.
REPLY

2. **Mike Butler**
SEPTEMBER 24, 2015 AT 22:12

So is lead, but that doesn't seem to bother you.
REPLY

9. **NeoGeo630**
SEPTEMBER 12, 2015 AT 13:21

Great article. Knowing that it may be costly, but would love to see the same type of tests on other lubrication/cleaning products e.g. Frog Lube.
REPLY

1. **Andrew Tuohy**

SEPTEMBER 13, 2015 AT 09:44

I was quoted a price of $350 per sample by a commercial testing lab for GC/MS data.
REPLY

1. **Benjamin**
SEPTEMBER 14, 2015 AT 22:04

I'll do the GC MS analysis for free, maybe some NMR. If you're interested in me sending the data, let me know. If not, I won't bother doing a writeup.
REPLY

10. **Jonathan**
SEPTEMBER 12, 2015 AT 13:50

What was ever wrong with some good Mobile 1 or MilComm Tw25? Hey, at least we could still bake cookies in a pinch.
REPLY

11. **Mark A.**
SEPTEMBER 12, 2015 AT 13:51

I am testing Lucas Oil products right now. They understand high heat, high abrasion and am seeing great results from their weapons line of oils.
REPLY

1. **ScottS**
SEPTEMBER 17, 2015 AT 00:32

Dont waste your time testing the Lucas firearms oils Just use them. they are in fact some of the highest rated lubricants made and those are the START of their specialized firearms lubricants…
REPLY

12. **Michael**
SEPTEMBER 12, 2015 AT 14:02

I really enjoy your videos and your posts. Straightforward, insightful, and to the point.
REPLY

13. **Bill McReynolds**
SEPTEMBER 12, 2015 AT 14:53

I have long used a mixture of common canola oil mixed with cheap ATF. While not a tribologist, I am assuming that the ATF adds corrosion resistance and anti-oxidation properties to the canola, which makes a decent lubricant on its own.

I use this for range use only, and not for serious purposes. I am satisfied with its performance, (mostly because of its low price), and I intend to keep on using it.

I am not selling it, however. And I would not without full disclosure of what it is. (which is why it wouldn't sell, even if it works).
REPLY

14. **J.w.wilson**
SEPTEMBER 12, 2015 AT 15:16

There is no such thing as canola. Canola oil is rapeseed oil made from rapes that have been bred for low uluric acid content. Canola ia actually an acronym for CANada Oil Low Acid. I would not use vegetable oil on my guns or knives. All vegetable oils are acidic.
REPLY

1. **ScottS**
SEPTEMBER 17, 2015 AT 00:36

made from RAPES? get a life and get real! And as for canola being an acronym that bs started long after canola was being used and known as canola, over 1oo years to be exact. Especially since it came from the french speaking provinces of Canada where they would not even USE an american language Acronmn!
REPLY

15. **Joe**
SEPTEMBER 12, 2015 AT 15:57

I only use it to protect against carbon build-up these days (on non-rubbing parts like inside a suppressor–where heat would melt it if it did gum up).
Rand CLP seems to be better at cleaning and lubricating the inside, and Frog Lube seems best at corrosion protection on the outside (it's done well in lubricity studies, but also is rumored to get a bit gummy if not applied perfectly, etc.).
REPLY

16. **Green Ops**
SEPTEMBER 12, 2015 AT 16:00

As you point out, "trust, but verify", and that should include results from ANY test. Results should always be subject to challenge from experiment and I'm somewhat disappointed that there weren't more of a hands on challenge here. I like the charts, but would love to see some experimentation showing video.

I've been using FireClean for years without any issues to include overseas in most parts of Afghanistan. I'll keep using FireClean until I find something better. Scientific results means nothing when actual experiences show something different. According to science,

hummingbirds, bees and helicopters can't fly
REPLY

1. **Andrew Tuohy**
SEPTEMBER 12, 2015 AT 17:00

Feel free to look at my past experiences with FireClean. I'm not saying it doesn't work as a lubricant for the AR platform – it does.
REPLY

2. **Ian**
SEPTEMBER 13, 2015 AT 15:49

According to science, hummingbirds, bees and helicopters can fly.

http://www.nature.com/news/hummingbird-flight-has-a-clever-twist-1.9639
http://www.explainthatstuff.com/helicopter.html
http://www.livescience.com/528-scientists-finally-figure-bees-fly.html
REPLY

3. **js**
SEPTEMBER 14, 2015 AT 08:06

Hogwash. At some point in the past, some scientist admitted that he didn't understand how bees fly. Turns out bee muscles are a lot stronger and more efficient than the mammalian muscles he was familiar with.

"Science" as such (the generalized group opinion of experts in whatever field) has NEVER thought such gibberish.

REPLY

4. **Mike Butler**
SEPTEMBER 24, 2015 AT 22:17

Helicopters can't fly they just flail the air into submission.
REPLY

17. **Matt**
SEPTEMBER 12, 2015 AT 16:29

Thanks for the interesting info – how do you regard Slip2000EWL, any opinion on it?
REPLY

1. **Mike Yeager**
SEPTEMBER 14, 2015 AT 08:43

I have not found a better lubricant than Slip2000EWL. It has never gummed up and keeps all my guns running. If anyone wants to test this product against others, please keep me posted on the results.
REPLY

18. **Frank**
SEPTEMBER 12, 2015 AT 16:30

if you're concerned about UV, do you actually think that UV rays penetrate the exterior of a gun and impact the oil inside of it? Maybe a concern if you're open carrying a High Point. I doubt many lubricant manufacturers care about UV- it's not going to penetrate an engine block, either.

Seems like Fireclean did just fine in the Brass vs. Steel Cased Ammo – An Epic Torture Test you published a while back, and that was in the Arizona desert.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 12, 2015 AT 17:01

Yes it did. That test took place over three to four weeks.
REPLY

2. **ScottS**
SEPTEMBER 17, 2015 AT 00:43

ummm UV can get in MANY places that are not expected, being that it IS in a different wavelength than you can see it is reflected in sorter angles than visible light meaning it can get into the locking lugs on an ar if the dust cover is open, the container it is in can come in contact with UV and the final kill stage can be the oxygen in the air when its applied… too many probable cases to deny the possibilities
REPLY

19. **Michael Borske**
SEPTEMBER 12, 2015 AT 17:10

I've been using Fireclean for two years now. It has made my AR's MUCH easier to clean. Generally just a swipe with a solvent soaked rag and the end of the bolt wipes clean. The outside of the BCG comes as clean with just a rub of the cloth. BUT, I've also found it has minimal rust inhibiting characteristics. For long term storage I still use Valvoline 0-30 synthetic motor oil. FYI synthetic motor oils do NOT .thicken till about -50
REPLY

20. **JimS**
SEPTEMBER 12, 2015 AT 18:06

Thanks for taking a close look at Fire Clean.

Anecdotal, but, Pat Rogers has reported great reliability using lubricants ranging from crankcase oil to KY jelly in the AR-15s used in his classes. IIRC, his take was the rifle needs something, and only "cares" that there is enough of it.

My best bud could tell us all about the wonders high oleic canola oil, he built a successful company around frying potato chips in the stuff circa 1999.
REPLY

1. **ScottS**
SEPTEMBER 17, 2015 AT 00:46

I'm sitting here laughing my tail off, what everyone is missing here is this appears to be a lube that has a minimum operating temperature, and they need to not use it below that temp.
REPLY

21. Pingback: Infrared Spectroscopy of FireClean and Crisco Oils | Vuurwapen Blog - Guns Over Texas RadioGuns Over Texas Radio
22. Pingback: Vuurwapen Blog Compares FireClean to Common Vegetable Oil |
23. Pingback: FIREClean-Bad News-Good News - MP-Pistol Forum
24. **Antoine Hythier**
SEPTEMBER 12, 2015 AT 22:22

    To those adding ATF to their "oil mix", I assume that means you understand the effects the friction modifiers have on how the firearm operates.
    REPLY

    1. **ScottS**
    SEPTEMBER 17, 2015 AT 00:51

    I assume you realize that ATF LACKS friction modifiers? In the OLD days GM's trannies required it, but no longer do. This is why certain full time 4wd transfer cases that have internal clutches require the addition of friction modifiers to the ATF that they use for lubrication
    REPLY

25. **Logan**
SEPTEMBER 12, 2015 AT 22:35

    Please Please Please do a test on FrogLube
    REPLY

26. **POD™**
SEPTEMBER 13, 2015 AT 04:00

    Wow, this is awesome!

    Is there a comparable analysis for Froglube? Or is Froglube so 2013 and we all jumped the Fireclean bandwagon? Because I still use Froglube (at least for my AR and Glock, my IMI Jericho needs to run wet with PTFE gun grease or it will produce FTE every 20 or so rounds) and still like it…
    REPLY

27. **Ben Wong**

SEPTEMBER 13, 2015 AT 04:35

CLP FTW !! nuff said.. if its good enough for the Corps then its good enough for me
REPLY

28. **John**
SEPTEMBER 13, 2015 AT 04:36

Well everyone has an opinion on this one…and alot of stuff works…some maybe a little better than others. I have heard several times frog lube is nothing more than roller coaster lube that has a mint smell added to it…..
REPLY

29. **Michael**
SEPTEMBER 13, 2015 AT 04:39

I don't care if it's crushed up kitty's or unicorn tears… I just did a valor ridge class with a pre clean of fire clean. 1200-1500 rounds of the cheapest cramp ammo I could find over two days. Not a single malfunction and we had them red hot. Today, I went to clean it and I was surprised. The damn thing cleaned up in no time, easily and to be honest, I would run it another 2000 -3000 rounds based on how clean it was. This was my first experience with the stuff. I'm sold.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 13, 2015 AT 09:38

Yes, FireClean works very well as a lubricant for the AR platform. That is not in dispute, at least not by me.
REPLY

30. **Chris**
SEPTEMBER 13, 2015 AT 06:30

This controversy came to our attention just today thanks to one of our LE friends who is a lead firearms instructor with an agency here in Florida. We are in development of a technology that is similar in function but very different in process to the infrared approach used by the labs at Univ of Ariz. We also have PhD chemists as well as PhD physicists on our team. To put it in simple terms, we are in the same technology development space as the company that engineered and manufactures the actual spectroscopy equipment used in this test so I know something of what I am talking about from the technical side. We have a college engineering intern term (some are ex MIL) who are excited to investigate the claims in this story primarily as a learning exercise, but

also as an opportunity to prove out some assumptions of our intellectual property. We are standing by and at the ready to do this and would like to enlist anyone else's participation that is curious as we are. We are not seeking controversy or to take sides with any company or individual. This purely about science and the work we are doing as a startup technology company.

Thank you for your time

Shoot straight, watch your six.

We are on FB so anyone can check my claims.
REPLY

31. **Mike Schmitt**
SEPTEMBER 13, 2015 AT 06:41

This document may be their U.S. Publication of their Patent Application. It details vegetable oil on carbon deposits.

https://patentimages.storage.googleapis.com/pdfs/US20150017346.pdf
REPLY

32. **Hank**
SEPTEMBER 13, 2015 AT 08:06

I never understood all this business with expensive high tech gun oils. I've always used a sparing amount of a petroleum based oil like Hoppes and never felt the need for anything else. It's just a gun fer cripesakes, not a Swiss watch.
REPLY

1. **Dr. Wylie**
SEPTEMBER 13, 2015 AT 14:51

Amen. There is a lot of BS and snobbery in the AR world.
REPLY

1. **The Old Coach**
SEPTEMBER 17, 2015 AT 03:46

That should be in 98 point type, bold, underlined.
REPLY

2. **The Old Coach**
SEPTEMBER 14, 2015 AT 18:59

Another Amen.

My fisherman son-in-law says that most all fishing lures are designed to catch fishermen, not fish. I think that's applicable here.

Me, I've used Ed's Red for at least a decade. Gun lube, bore cleaner, (cast bullets), penetrating oil….never a problem, except that the acetone evaporates unless it's stored in metal cans with tight seals. I feel no anxiety that I might be missing out one something, because I haven't read a supermarket gun tabloid in years.
REPLY

33. **Mike**
SEPTEMBER 13, 2015 AT 09:44

I second the desire to see gas spectrometry results interpreted by someone in the know. I can't imagine it costs that much we used one a ton in undergrad organic chemistry, any university will have one and any chem student or at the very least TA/grad student should be able to run it for you in 2 minutes. Just ask if you can go in when some undergrads are doing a lab and they are already running various samples through one and have them run and print your sample as well.

Mike
REPLY

34. **Jason**
SEPTEMBER 13, 2015 AT 10:03

Why all the weird combinations of motor oil and ATF. I was in the Marines from 1987 to 1993. We used CLP. I use it to this day. It cleans, it lubricates & it preserves.
REPLY

1. **The Old Coach**
SEPTEMBER 14, 2015 AT 19:00

Several authorities have pointed out that mil-spec CLP and the civilian product are not the same thing.
REPLY

1. **ScottS**
SEPTEMBER 17, 2015 AT 00:57

and the first thing you need to do is check those "authorities" credentials… a company will produce one product and two labels to maximize profit even if the product costs more, they will pass the extra cost to the government contract. thats how it has always been done and will be done, its basic business 101
REPLY

1. **The Old Coach**
SEPTEMBER 17, 2015 AT 03:51

Yes indeed companies will and DO produce variations of a basic product tailored to specific markets. They sell the name, but with cheaper ingredients. Levis is an excellent example.
REPLY

---

35. Pingback: Fireclean is Vegetable Oil?

36. **Michael P.**
SEPTEMBER 13, 2015 AT 11:19

The ultimate test would be to make a batch of fried chicken in FireClean and see how it tastes….
REPLY

1. **Andrew Tuohy**
SEPTEMBER 13, 2015 AT 11:56

I did fry some eggs in FireClean and they were delicious.
REPLY

37. **photograpgher762**
SEPTEMBER 13, 2015 AT 12:26

Lubriplate and STFU…no veggie oil in my weapons…thats for my french fries…
REPLY

1. **ScottS**
SEPTEMBER 17, 2015 AT 01:01

Ive been using Lubriplate since 77, never had an issue, stainless, nickle plated, anodized, boron, blued you name it, it works and none of this "run it wet" nonsense either, just common sense lubrication
REPLY

38. **Joshua**
SEPTEMBER 13, 2015 AT 12:57

Looks like Fireclean posted a rebuttel on their Facebook with hints of pressing charges for Libel against those who speak out against their product. Watch your six.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 13, 2015 AT 14:13

Yes, they made similar vaguely worded statements to me prior to the publication of this article.
REPLY

39. **Bu T. Fcker**
SEPTEMBER 13, 2015 AT 14:14

KY hot and cool is the only lube for me.
REPLY

40. **derek**
SEPTEMBER 13, 2015 AT 16:00

Suing over this or any other report, unless (a) done for a financial gain by a competitor, and (b) with at least reckless disregard in publishing something demonstrably false, isn't going to work out well for Fireclean. First, they would likely lose. Second, I strongly suspect that they would face the wrath of gun owners, website and store owners and forum posters in the form of negative publicity, limited boycotts and loss of shelf space.
REPLY

1. **Dr. Wylie**
SEPTEMBER 13, 2015 AT 17:57

Agreed. Also, if it turns out that Fireclean is Canola oil or similar substance/mix, not only do they have zero grounds to sue anyone, but they will have lost all credibility with gun owners worldwide.
REPLY

41. **john**
SEPTEMBER 13, 2015 AT 16:51

Suddenly, I understood what it must be like for girls who visit gun stores.

Why did you need to add the sexist and uneducated comment? It did nothing to add to your article.
REPLY

1. **HAROLD**
SEPTEMBER 13, 2015 AT 17:19

John, your attitude is what is wrong with the world. Please leave.
REPLY

2. **Davan**
SEPTEMBER 13, 2015 AT 19:11

Is there Anything else that has offended you today?
REPLY

3. **Thatguy**
SEPTEMBER 13, 2015 AT 23:36

Wow. Get your little b***ch ass out of here. How do you even get through the day without breaking down in tears?

You want to see sexism? Travel off CONUS and you will see a lot of sexism.
REPLY

4. **tritam**
SEPTEMBER 14, 2015 AT 10:31

Thanks john.... i felt the same way. And if one more MFer tries to show or sell me a pink gun i think ill explode.
REPLY

5. **ScottS**
SEPTEMBER 17, 2015 AT 01:02

what are you a tranny John? you seem to have your panties in a bunch!
REPLY

42. Pingback: The AK Forum

43. **Brian**
SEPTEMBER 13, 2015 AT 19:09

I love lamp.
REPLY

44. **Lifeisdeath**
SEPTEMBER 13, 2015 AT 19:51

Well, if they did try to sue anyone for libel; the discovery phase would be interesting.
REPLY

45. **Yuri Pavlenkov**
SEPTEMBER 13, 2015 AT 20:07

I use cosmoline on Mosin for make great glory for mother Russia. It works like charm to make boat paddle/tent pole/gun continue to function without needing of anything more than large rock and bottle of vodka to close bolt!
REPLY

46. **Dbcooper.**
SEPTEMBER 14, 2015 AT 00:42

Please Someone
Test EWL SLIP 2000 it is what I have been using the last few years and love the results.
wondering if I should just use organic olive oil instead…
seriously test SLIP
REPLY

47. **Edward Jones**
SEPTEMBER 14, 2015 AT 07:09

At $2/quart modern Automatic Transmission fluid (of any type in general use) meets or exceeds the requirements for a weapons oil/lubricant/cleaner.

A modern vehicle transmission is composed of iron, aluminum, steel, and polymer parts all operating in close proximity at high speed under high temperatures.

Just like many firearms…
REPLY

1. **Warmachinist**
SEPTEMBER 14, 2015 AT 14:00

I switched to ATF from gear oil after a winter in the frozen north. ATF does basically anything I could want a gun oil to do, AND I happen to make good use of it as well for Ed's Red as cheaper-and-better CLP.
REPLY

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48. Pingback: FireClean | The Weapon Blog

49. **Vermits**
SEPTEMBER 14, 2015 AT 09:58

How about an spectrum analysis of another labeled gun oil? Since all oils are hydrocarbons and contain very similar molecules it would be interesting to see how different different can be.
REPLY

1. **ScottS**
SEPTEMBER 17, 2015 AT 01:07

no not all oils are hydrocarbons. this entire thread is based on a vegetable oil, Animal oils are not hydro carbons many waxes are oily and are not hydrocarbons
REPLY

1. **Fintan**
SEPTEMBER 21, 2015 AT 21:04

ScotS, lipids are indeed hydrocarbons. Biological oils are, yes, hydrocarbons.

They're composed of long chains of carbon and hydrogen… you know, hydro-carbon.

You struggled in high-school didn't you? Here's a basic biology link:
http://biology.clc.uc.edu/courses/bio104/lipids.htm
From the above: "The 'tail' of a fatty acid is a long**hydrocarbon** chain…"
Also:
" The terms saturated, mono-unsaturated, and poly-unsaturated refer to the number of hydrogens attached to the **hydrocarbon** tails of the fatty acids…"

REPLY

50. Pingback: All You Need To Know FireClean, And Nothing You Don't - Classified Listings for Guns and Hunting Equipment

51. **St8kout**
SEPTEMBER 14, 2015 AT 16:14

Secretly we are all just jealous that we didn't discover it and make a fortune with this 'secret formula.'

Usually in this info age, normal people share valuable tips with the public. This guy discovered that canola oil works great and capitalized on it. Of course, he couldn't just say, "Hey guys, you can save money and just use canola oil on your guns instead of all those expensive gun oils."
REPLY

1. **Dr. Wylie**
SEPTEMBER 14, 2015 AT 16:25

In fact many honest people would have done just that, instead of deceive MANY customers you are supposed to serve.
REPLY

52. Pingback: A Conspiração da Canola estava correta! (a outra)
53. Pingback: Anonymous
54. Pingback: FireClean gun oil=rip off - Page 2 - Hipoint Firearms Forums
55. Pingback: Snake-Oil Salesman? | Guffaw in AZ

56. **mikeyanxu**
SEPTEMBER 15, 2015 AT 09:09

Please do the followingn test:
froglube vs vegitable oil.
Froglube vs tracklube
I can provide froglube samples. I highly suspect that froglube is nothing more than tracklube with mint additive. Tracklube is highly likely to be vegitable oil based material.
REPLY

57. Pingback: Results of gun care product evaluation - Page 7 - Shooters Forum

58. **ken**
SEPTEMBER 15, 2015 AT 18:28

I know I dislike gunzilla and bore butter as a preservative oil. Their rust inhibiting claims are BS! I lost the condition of a beatifully crafted un issued polish rifle using these products. My bore rusted and pitted!

A caution to those using synthetic oils, the oil is synthesized from etsters of alcohol and an in organic acid.. In certain conditions the oil can break down and cause a corrosive situation much the same as organic oils do.
REPLY

LIES, ERRORS, AND OMISSIONS

SEVERE PROBLEMS WITH VICKERS TACTICAL FIRECLEAN VIDEO

SEPTEMBER 14, 2015 ANDREW TUOHY 84 COMMENTS

Over the weekend, I posted an article which showed the results of some infrared spectroscopy tests comparing FireClean and two types of Crisco cooking oils. I was not expecting the firestorm of controversy that has erupted.
However, none of that controversy matters.

It doesn't matter if FireClean is pure canola oil or a mixture of astroglide and peanut butter.

I made a discovery which calls into question any claim or statement made by FireClean as a company and Ed and Dave Sugg as individuals. As for Larry Vickers… did he have knowledge of this? Which is worse, him knowing, or him not knowing?

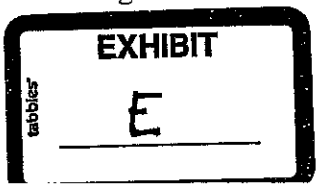
Some people – a lot of people – are probably rolling their eyes right now. Well, check this out.

On December 26, 2014, Vickers Tactical uploaded a video to YouTube called "FireClean Lube Test." I watched this video in its entirety for the first time today. In the video, the Sugg brothers are interviewed by Larry Vickers about their product. Larry then proceeds to shoot a Beretta M9 and a BCM carbine with three different configurations:
– Dry (no lube)
– CLP
– FireClean

The weapons were reportedly cleaned between each firing.

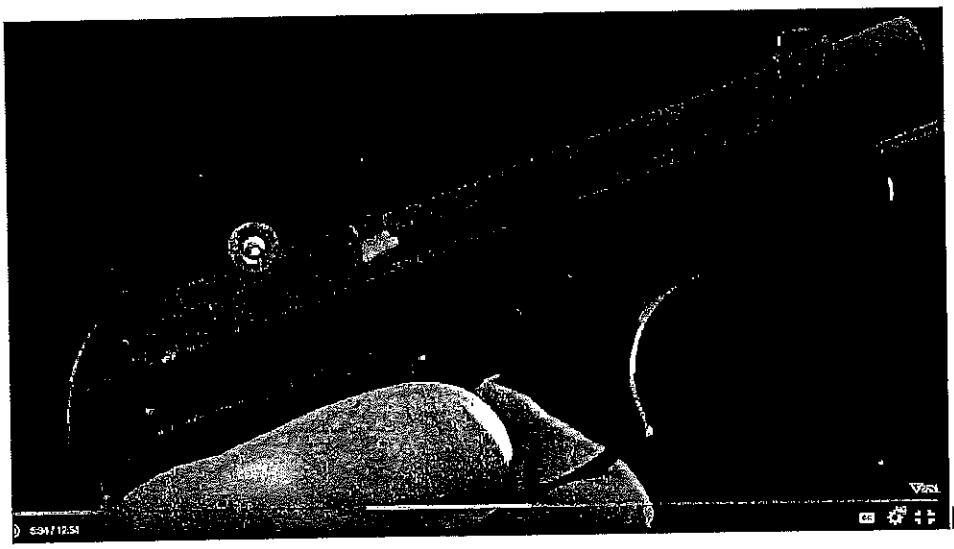
The video purports to show minimal amounts of smoke coming from the firearms when dry and lubricated with CLP, but excessive amounts of smoke when lubricated with FireClean. The smoke, we are told, is carbon being pushed away from the weapon by the super effective FireClean formulation, which is composed of (redacted).

Now, Vickers Tactical has some awesome cameras and production equipment of which I am quite jealous. Don't get me wrong, I have nice stuff. But I don't have something that shoots high



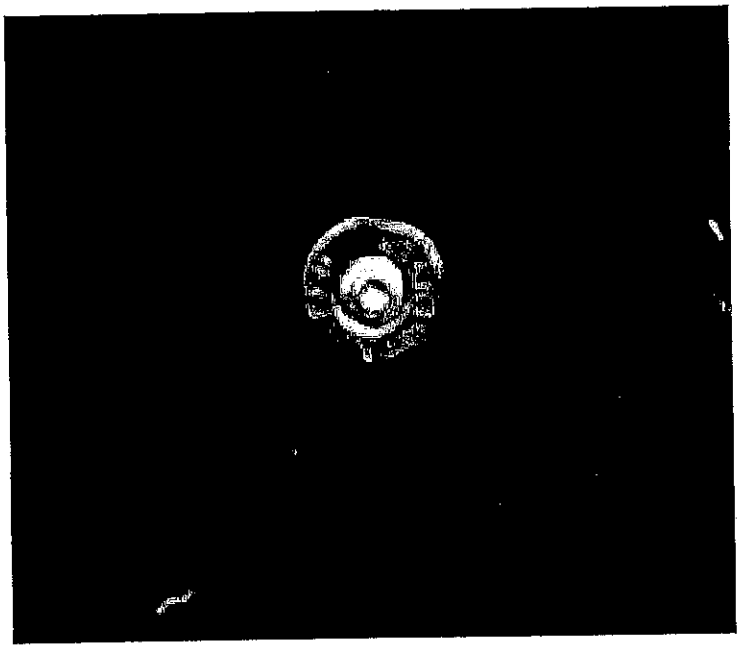
speed frame rates in 1080p, like Vickers Tactical. That's the sort of equipment I enjoy seeing in use, especially when firearms are the subject, and I am likely to rewind and watch several times in order to see things I missed.

Things like this.



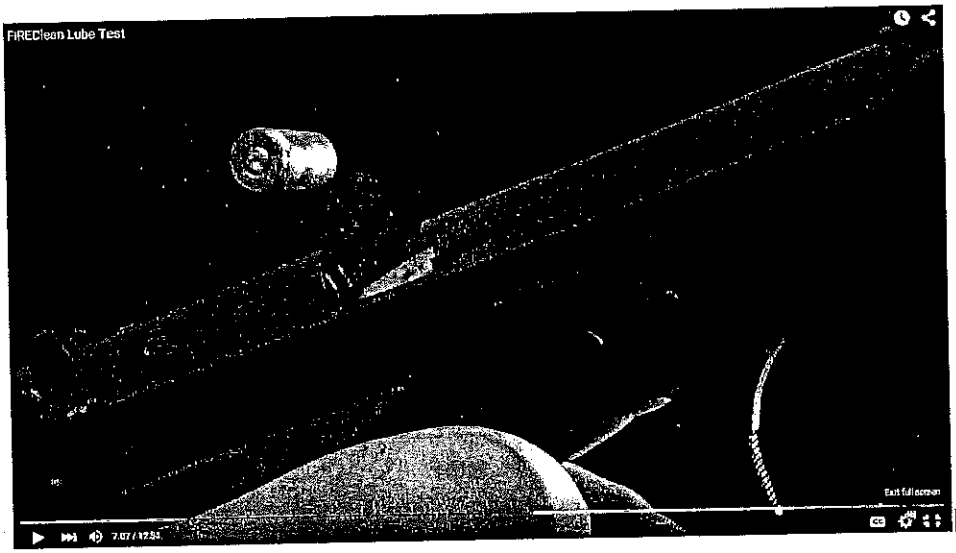
Beretta M9, dry, brass colored primer, PPU headstamp

This is a screenshot of the Beretta M9 being fired, dry, at approximately 5 minutes and 30 seconds into the video. It shows minimal smoke and a 9mm case with a PPU headstamp and a brass colored primer being ejected from the firearm.



PPU 9MM LUGER

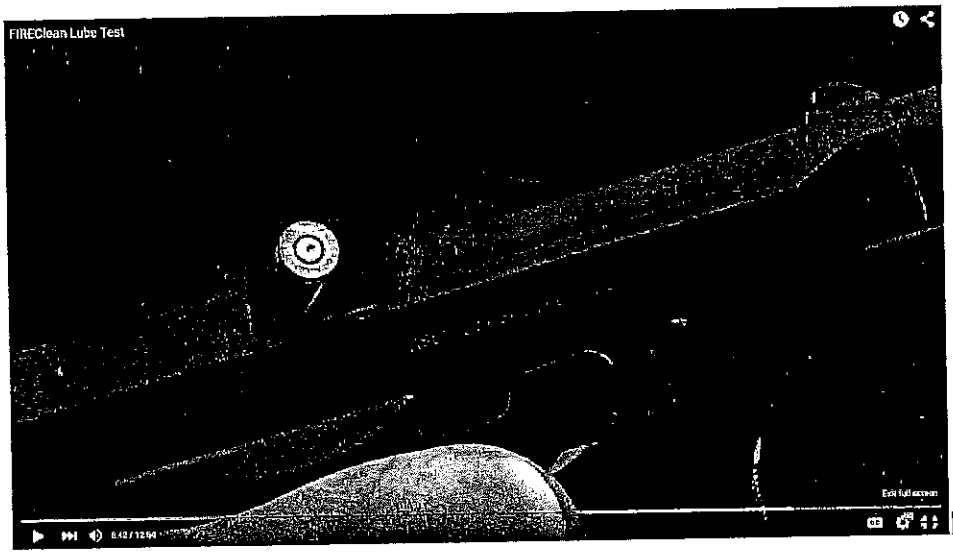
After some discussion, the Beretta is fired again with CLP applied. This can be found at about 7 minutes into the video.



Beretta M9, CLP, PPU headstamp, brass colored primer, what appears to be a shiny projectile, likely FMJ

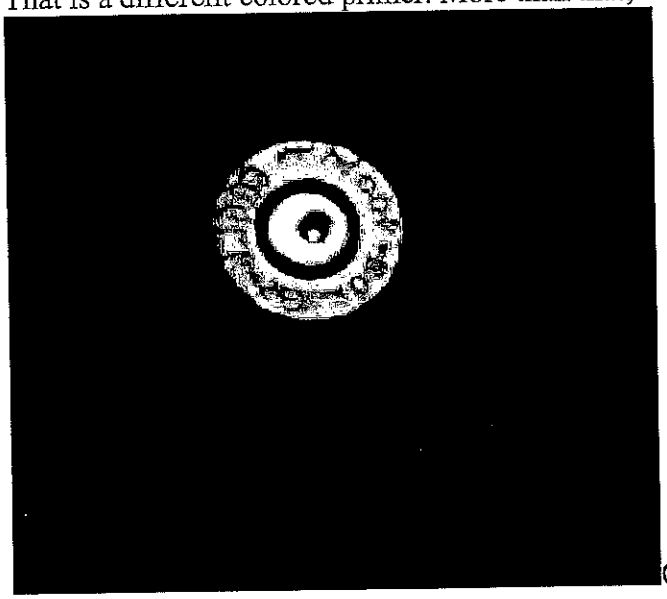
Again we see a PPU case with a brass primer ejecting. There is a little more smoke and we are told it is because of the CLP. We can see the projectile of the subsequent round and it appears to be shiny, as we would expect a factory FMJ projectile to be.

Finally, at approximately 8 minutes and 30 seconds, Larry fires the M9 again, this time having been cleaned and lubricated with FireClean. Immediately upon ejection, the spent case emits quite a lot of smoke – much more than the previous two rounds. And then the case spins around and the headstamp comes into view…



Beretta M9, FireClean, Cor-Bon case, nickel colored primer

That is a different colored primer. More than that, it's a Cor-Bon 9mm Luger +P headstamp.


COR-BON 9MM LUGER +P

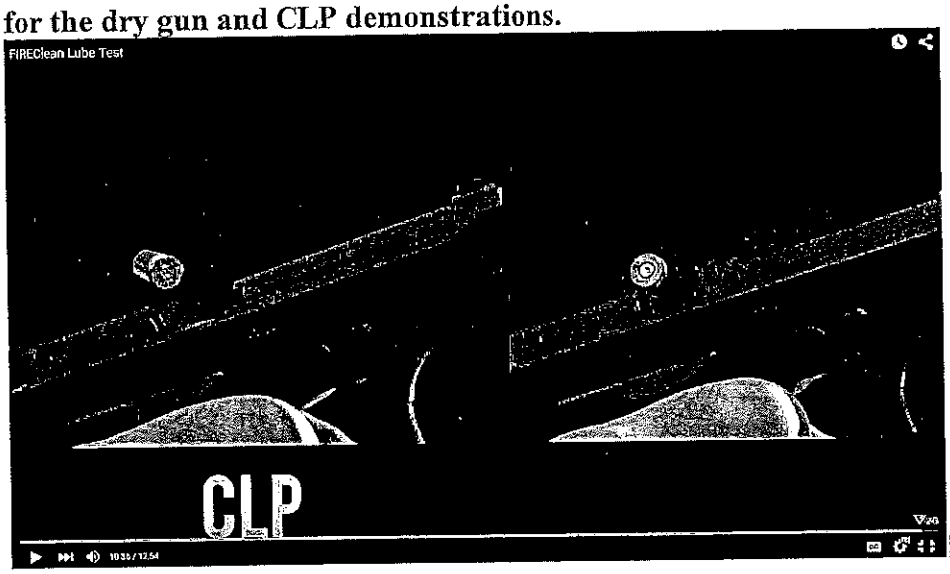
And when the projectile of the subsequent round comes into view, we can see that it has a more matte finish, as we would expect, say, a copper *plated* bullet to have (if you're not a handloader, the projectile differences may not be as apparent to you). Alternately it could be a DPX bullet which is used by Cor-Bon in its +P line.

Cor-Bon case. Nickel primer, with a little more space between the primer and the case than the PPU. Super smoky powder. Possibly a plated bullet.

I'll bet you four bottles of FireClean that was a factory +P Cor-Bon load; +P loads being hotter and having more powder than standard, bargain ammunition like Prvi Partizan. Barring that, it was a handload, with a smoky powder selected for maximum effect.

I have major concerns with the rifle ammunition used in the BCM carbine as well, but due to the design of the AR, the depth of field of the camera, and the length of the 5.56 case, my suppositions would be much harder to prove. Still, the pistol evidence is so overwhelming as to make the rifle almost irrelevant.

Whether it was a handload or a factory Cor-Bon round, it is indisputable that the cartridge fired for the FireClean demonstration was significantly different than the cartridges fired for the dry gun and CLP demonstrations.



Indisputable differences.

No factory Prvi Partizan (made in Serbia) ammunition would ship with a random Cor-Bon (not made in Serbia) case and a different primer.
No honest person with a basic understanding of the scientific method would use handloaded or +P ammunition in a comparison with standard pressure bargain priced ammunition if the comparison was meant to show differences between lubricants and their effect on how much smoke comes out of the chamber during firing.

Smoke after firing is put forth as evidence of a cleaner gun. The cleaner gun concept is central to the ethos of FireClean; it's even their URL. Different ammunition was selected for the FireClean portion of the demonstration to give the appearance of more smoke and thus a cleaner gun.
As I said at the beginning, the "FireClean Is or Is Not a Common Vegetable Oil Used for Cooking" controversy matters not. All the information required to judge the integrity of statements made by FireClean is contained in that Vickers Tactical video.

View From The Porch

September 15 at 9:50am

Vuurwapen Blog The emitter is a G2 so figure... 300 lumens, or so? On the 3 D cell runtime is almost 6 hours at full output, and each cell increases runtime by 2-3 hours. They have a higher output cell for the 3-4D batteries but the normal one works with the 2-6D lights.

2 · September 15 at 9:55am

View more replies

View 16 more comments

Vuurwapen Blog
September 14 at 6:31am ·

Deliberately misleading the consumer in an effort to sell a product. Is there a word for that?

Where There's Smoke, There's Liar

Over the weekend, I posted an article which showed the results of some infrared spectroscopy tests comparing FireClean and two types of Crisco cooking oils. I was not expecting the firestorm of con...

VUURWAPENBLOG.COM

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84 THOUGHTS ON "SEVERE PROBLEMS WITH VICKERS TACTICAL FIRECLEAN VIDEO"

1. **Tierlieb**
SEPTEMBER 14, 2015 AT 05:08

Awesome, man. I remember laughing out loud when a hacker named Starbug used a camera to clone a politicians fingerprints.

But this is much more entertaining to me. Good use of HD video^^

Thanks for your dilligence!
REPLY

2. **MatKep**
SEPTEMBER 14, 2015 AT 05:13

Glad you are back researching, writing and posting. Keep up the good work. Best wishes.
REPLY

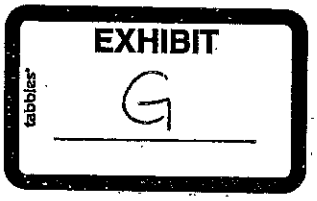
3. **DGR**
SEPTEMBER 14, 2015 AT 05:24

How is that supposed to work? Smoke means carbon is leaving the gun? Um….. huh? Because my first thought is smoke = bad because it means something is burning. So is there a super scientific and hard to understand explanation for why smoke would be a good thing and why it means carbon is being pushed away from the gun? I just always thought more smoke meant more carbon because more things are burning and carbon is burnt remnants of things….
REPLY

1. **WedelJ**
SEPTEMBER 14, 2015 AT 06:28

The idea is this: If you shoot the same rounds out of a gun, they both produce the same amount of carbon fouling. If the lube you use makes more fouling leave (in the form of smoke) that means less carbon is left that can build up inside. The video shows the FireClean-ed gun with more smoke leaving. The problem is they used different ammo for the FireClean gun, making the test completely irrelevant and the makers of the video liars.
REPLY

1. **Daniel**



SEPTEMBER 14, 2015 AT 09:45

The problem with claiming more smoke = less carbon deposits is that the smoke is likely from the lubricant burning off. It's possible to have more smoke *and* more carbon deposits, even if the test was scientific.
REPLY

2. **Eli**
SEPTEMBER 14, 2015 AT 13:49

More smoke (carbon) leaving the gun less carbon staying on parts. Or so they say.
REPLY

3. **Mike V.**
SEPTEMBER 14, 2015 AT 16:58

When I went through the police academy (admittedly in the late 70s), we fired .38 caliber reloads that were VERY SMOKY. If the theory that gunsmoke = a cleaner gun were true, we wouldn't have spend hours cleaning our pistols. I've always understood smoke to indicate a slower, burning powder which will leave more carbon and gunk to clean. Most modern ammo has fast burning (cleaner) powder. My knee jerk reaction it that the Cor Bon case was reloaded.
REPLY

1. **NDS**
SEPTEMBER 15, 2015 AT 07:53

I have some old Cor-Bon "Pow'r Ball" 9mm +P that is super dirty, and anything shorter than a G19 shoots burning chunks of propellant from the muzzle. Doesn't necessarily mean this is a factory load in the video, but I would believe it.
REPLY

4. **Blake**
SEPTEMBER 21, 2015 AT 20:37

Read my mind
REPLY

4. **MatKep**
SEPTEMBER 14, 2015 AT 05:38

So… Either LV cannot tell the difference between +P and Std. P, or he is not familiar with the scientific method (or truth in advertising).
REPLY

5. **Mark**
SEPTEMBER 14, 2015 AT 05:47

"Oh sh@$!!"

– Sugg bros. & probably LAV
REPLY

1. **Ben**
SEPTEMBER 14, 2015 AT 12:30

I assume LAVs response will be his standard "Remember who you're talking to" .
REPLY

1. **DAN V**
SEPTEMBER 15, 2015 AT 01:23

"Jou wanna go to war?!" – Tony Montana
REPLY

2. **11b**
SEPTEMBER 15, 2015 AT 06:22

"You've been warned."
REPLY

3. **zackmars**
NOVEMBER 4, 2015 AT 12:58

" *stay in your lane* "
REPLY

6. **txJM**
SEPTEMBER 14, 2015 AT 06:43

Ho lee shit.
REPLY

7. **Dr. Wylie**

SEPTEMBER 14, 2015 AT 06:53

At face value, the criticism regarding the "science" used in the referenced video, seems to be quite valid. You cannot call something science, and claim a cause & effect relationship between two identified variables, when you have failed to isolate even the most basic of relevant variables. I certainly welcome more scientific information from either side.
REPLY

8. **Aaron**
SEPTEMBER 14, 2015 AT 07:31

FireClean has responded, but they refute nothing from this post or the other. They basically just say:

"blah blah blah, support our troops, freedom, America." and if you didn't believe them when they said "freedom. America" they followed it up with proof.. Veiled threats of lawsuits. The American way!
REPLY

1. **Prickist**
SEPTEMBER 16, 2015 AT 17:46

you scared brah?

I'm shocked at the snakeoilerie
REPLY

9. **The Observer**
SEPTEMBER 14, 2015 AT 08:01

All of you are printer repairmen and followers of SpongeBob Squarepants.

http://www.ar15.com/forums/t_2_382/195644_.html&page=1

The LAV has spoken. So shall it written, so shall it be done.
REPLY

1. **The Observer**
SEPTEMBER 14, 2015 AT 08:06

The above comments had portions deleted due to HTML problems.

The intention was a sarcastic swipe at the "LAV", not the author or respondents.

Sorry for any confusion this may have caused.
REPLY

10. **towerclimber37**
SEPTEMBER 14, 2015 AT 08:19

I don't have a dog in this fight but I posted that it was ok to use crisco, just be honest about it, on their FB page. they deleted the comment. apparently, the only thing allowed on their page is 100% support for their product and you should give them all your money now.
I wouldn't use that stuff if you paid me to.
REPLY

11. **Karl K**
SEPTEMBER 14, 2015 AT 08:52

This is superb work, bravo!
REPLY

12. **TrojanMan**
SEPTEMBER 14, 2015 AT 08:59

The rifle "test" is very easy to explain. They applied the oil to the bolt and carrier, and then fired a single round. Disassembly introduced oxygen, and the application of FireClean introduced oil.

The bolt and carrier are a piston and cylinder, respectively, and when hot gasses are introduced (through the gas port-tube-key), into a closed environment containing oxygen and oil, the process and products of combustion can be seen.

The additional products of combustion seen venting from the carrier's exhaust ports are exactly what you think they are: FireClean burning off following exposure to a high temperature and pressure environment. Given that canola oil smokes at around 400*F, the video makes perfect sense.

Subsequent shots, where the carrier is already filled with mostly inert gasses and much of the lubricant has had a chance to cook off, should show a lower volume of products of combustion.

Though all that is largely irrelevant. Lubricant used in any machine needs to resist the operating temperatures involved. If the lubricant is burning off, then it won't be there to do its job.
REPLY

13. **Raymundo**
SEPTEMBER 14, 2015 AT 09:00

LAV's response will be that he had nothing to do with administering the firearms used in the video, and that he didn't notice the +P round when firing the pistol, because of all the production related distractions.

Even though this statement tarnishes his image as a firearms expert/operator/trainer he has to say it to avoid being labeled a fraud.

Then, to try and sure up his firearms expert/operator/trainer status, he'll tell his doubters (as he always does) to "check his resume". Unfortunately for him, his involvement in this video is part of that resume.
REPLY

14. **Cody H.**
SEPTEMBER 14, 2015 AT 09:09

Who really cares how much damn smoke comes out of the firearm after a round is fired. Biggest thing about cleaning a weapon is how easy is it to clean after it's fired. Does Fireclean make it easier to clean than CLP? Does Fireclean offer better lubrication during firing than CLP? Those are the things that we should be worried about rather than debating on how much smoke comes out of anything after firing. We're not talking black powder here. The whole less smoke thing is a marketing gimmick and nothing more.
REPLY

1. **Dr. Wylie**
SEPTEMBER 14, 2015 AT 09:22

I agree, but I think you missed the point; they are claiming that Fireclean is a superior product because it produces more smoke AND that the smoke is not the oil burning but rather the carbon being magically flung away from the gun.
REPLY

2. **Raymundo**
SEPTEMBER 14, 2015 AT 10:00

Yeah, as unbelievable as it may seem, they are actually trying to say that more smoke is better. LOL

However, Andrew's point wasn't about the quantity of smoke, it was that the test appears to be rigged.
REPLY

15. **JaredN**
SEPTEMBER 14, 2015 AT 09:30

More smoke with Fireclean doesn't mean that less carbon is being deposited on the gun. It just means that their low temperature lubricant is burning off.
REPLY

16. **Asher**
SEPTEMBER 14, 2015 AT 09:32

Invite the fireclean guys on your podcast! Their lawyers would never allow it, but it would be good.
REPLY

17. **Guy Schlachter**
SEPTEMBER 14, 2015 AT 09:57

I think the gun community needs more investigative journalism. For to long, forum hearsay has become the de facto standard on product quality when it's often only based in inferred and biased reasoning (because they spent their money on it and must defend it). It's really sad what this has all come to. People paying a mark up on vegetable oil and gumming up their guns with it.
REPLY

1. **Dr. Wylie**
SEPTEMBER 14, 2015 AT 10:23

I agree, but this situation is symptomatic of the screwy AR-15 culture that dictates if you don't have the newest trendy thing or the most expensive thing you suck. How did a gun culture, full of ex-military and gun enthusiasts of both genders get to be more similar to women's fashion or high school drama than any other sport?? Sad…
REPLY

2. **Raymundo**
SEPTEMBER 14, 2015 AT 10:40

I agree 100%, Guy.

I think the most untested yet often repeated conventional wisdom of the firearms industry is that cold hammer forged barrels are superior to button rifled barrels. Everyone says this is true, yet I've never seen anyone site quantifiable proof.

To me, anything that can't be measured has no value. It's just marketing hype at that point.
REPLY

1. **Warmachinist**
SEPTEMBER 14, 2015 AT 13:47

WRT cold hammer forged barrels:

Hammer forging for rifling barrels really "took off" in wartime europe, because it could make use of existing heavy industry (especially the kind that fed the early-war German war machine) to produce good enough barrels very fast. And it does that very well, it lets you make "good enough" barrels, cheaply and extremely consistently. This is a great thing for MG barrels (where good enough is good enough, and in wartime production you probably want a lot of barrels), or for modern pistol barrels (where the stresses in the barrels are largely irrelevant, due to short length and that pistols are seldom shot very far anyway).

Unfortunately, "cold hammer forged" barrels will never shoot as well as a cut rifled or button rifled barrel. The process produces stresses in the barrel through work hardening, and does so much moreso than any other manufacturing process. Barrels may be extremely straight and concentric when cold, but upon heating they will deflect more than barrels rifled through other methods will. The claim that the stresses "are uniform" is pure BS. My own personal hypothesis regarding at least part of the G36's claimed accuracy problems (POI shift when hot, wandering zero when hot) is that this is the case, especially on such a thin barrel.

Most of the reason these barrels are talked up for rifles is because as a result of the wartime production and the resulting massive shift in weapon manufacturing culture in post-war Europe, other rifling methods fell into disuse as being "small time" so to speak. In the face of superior heavy industry, obviously the shop-level process that is cut rifling has to be less effective, right? And so hammer forged barrels are marketed as superior, with no regard for the fact that the barrels are /inferior/ to cut or button rifled barrels

produced by equally quality firms. This is borne out by the scarcity of CHF barrels in the benchrest and varmint worlds.
REPLY

2. **Guy Schlachter**
SEPTEMBER 18, 2015 AT 08:10

Not all CHF barrels are made equal. I have no proof, but I'd gather that an Austrian CHF barrel far exceeds the quality of the CHF barrels made here in the US. Some things are still considered trade secrets.
REPLY

1. **WedelJ**
SEPTEMBER 18, 2015 AT 10:07

Australian CHF barrels still have to abide by the laws of physics.
REPLY

2. **Warmachinist**
SEPTEMBER 21, 2015 AT 22:47

They don't really. That's marketing. There are processes that produce better barrels, but those are processes that aren't CHF.

Echoing WedelJ, it's a metallurgy thing. There's some things you simply can't change (this is one of them), and there's very little untrod territory in the realm of processes used for the forming of metals, and if they really were better, you'd see benchresters and gunsmiths for benchrest and varmint guns shooting them and building them. There's big money in it, and unfortunately big marketing and big snake oil too.
REPLY

3. **Rog Uinta**
SEPTEMBER 14, 2015 AT 13:36

"Investigative journalism"? Like the "journalism" provided by all of the dead-tree media about how awesomely reliable the Remington R51 was?
REPLY

1. **Guy Schlachter**
SEPTEMBER 18, 2015 AT 08:04

The Remington R51 was an old gun re-released as "new" and it couldn't hang with the modern designs of today. That's it. I have no idea what issues they actually had with them other than the YT'rs who claimed it was never reliable. I think it was more a "design" issue than the fault of the QC and that was simply a mistake in cost-benefit analysis on behalf of Remington. They tried to bring something old and brand it as "new" to the market, got an immediate negative backlash because it wasn't good and then pulled it. Nothing there was "investigative", it was just a bunch of whining forum goers circle-jerking how awful the gun was when 99% of them never shot one.
REPLY

1. **Scott Wylie**
SEPTEMBER 18, 2015 AT 08:22

Hmmm, that sounds an awful lot like what goes on every day in AR forums about every possible add-on, but most annoyingly with optics. EOtech sucks, you need a Triji…blah, blah, blah
REPLY

2. **WedelJ**
SEPTEMBER 18, 2015 AT 10:02

The original 51 was a fine pistol. A friend of mine (and I mean in real life, not on a forum) actually owns an original and shoots it. Never had any problems like the R51 had. The R51 fired out of battery (look up MAC on YouTube for video). Maybe if one guy had that happen it would be a fluke or lemon, but everyone who shot one had the same experience. I don't believe in coincidences that large.
REPLY

18. **Cody H.**
SEPTEMBER 14, 2015 AT 10:12

What company doesn't rig their tests? They want the business and your money. I really do find the whole more smoke thing funny. The only time more smoke should be advertised as a good thing would be for smoking meats in my opinion.
REPLY

19. **paul**
SEPTEMBER 14, 2015 AT 10:19

If I recall the basics of fire science, smoke is the result of incomplete combustion, the more smoke the lesser amount of fuel is being consumed efficiently. The more complete combustion of fuel will result in lesser amounts of smoke. Advertising gimmicks don't alter the basic scientific principles do they?
REPLY

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20. Pingback: Did FireClean And Larry Vickers Rig A Product Testing Video? | The Right News Network

21. **Steve Sanders**
SEPTEMBER 14, 2015 AT 11:00

If you really want your spectroscopic experiment to prove anything, you need to repeat it with many other brands as controls to show that other brands, CLP, FP-10, Hoppes, Froglube, etc…are any different than the Fireclean. All oils are just that and share many of the same components and properties. All a spectroscopy shows is the chemical makeup of a substance. So all you've done is show that, like vegetable oil, Fireclean is an oil. Woohoo! Now prove that other gun oils are different. Then you will have done some real science.
REPLY

1. **Warmachinist**
SEPTEMBER 14, 2015 AT 13:58

As TFB's article's link showed (see below), the spectroscopy data for FireClean and Vegetable oils are a lot closer to eachother than to other common lubricants and fluids, in my opinion sufficiently different from then, and sufficiently similar to eachother, to indicate that there's likely little to no adulterants in FireClean separating it from vegetable oil.

http://www.jascoinc.com/docs/application-notes/IR_03_03.pdf

P.S. – I may post a youtube video in the near future of myself frying pancakes and frybread in FireClean, if I can scrape enough wasteable cash to buy overpriced vegetable oil.
REPLY

22. **VDMAShooter**
SEPTEMBER 14, 2015 AT 11:02

You'll probably want to hire a good lawyer who is an expert in defending clients against charges of libel. Good luck and let us know how it all turns out.
REPLY

23.  **ArmsVault**
SEPTEMBER 14, 2015 AT 12:29

Quite a fiasco you've found yourself in the middle of! Keep up the good work!!
REPLY

24.  **Rusty**
SEPTEMBER 14, 2015 AT 13:10

Up to the point The LAV got canned from their employment, VT did not own a high-speed camera, they use Daniel Defenses.
REPLY

25.  **James P**
SEPTEMBER 14, 2015 AT 13:12

ENHANCE
REPLY

26.  **David G**
SEPTEMBER 14, 2015 AT 15:14

LAV claims this was reloaded ammo.

Oops
REPLY

1.  **Andrew Tuohy**
SEPTEMBER 14, 2015 AT 15:36

Which is what I said in the article.
REPLY

2.  **Guy Schlachter**
SEPTEMBER 18, 2015 AT 08:12

Reloaded yet the primers are different….
REPLY

27.  **Tracy**
SEPTEMBER 14, 2015 AT 15:18

Whether a +P round or not, I know for a fact that Fireclean does produce more smoke during shooting. At least with a suppressor. Though I do not personally believe it is the fouling that is going out the barrel, but most likely the oil smoking, or something like that. I have used Fireclean on an AAC Ti-rant. I pulled the entire thing apart, and lubed it up. On the first shot, it smoked like crazy. Had I done a test with one round like was done in the video spoken of above, it would show that it may indeed spit out a bunch of the carbon and other junk that fouls up a gun during shooting. However, we shot a whole magazine through it. The first shot had the most smoke, then it dwindled quite a bit after that. After maybe 5 shots, the smoke level was on par with a regular shooting.

I have noticed that with putting oil in a suppressor, the first few shots are more smokey than all the others. Fireclean is more smokey right off the bat than other gun oils that I have used. But after a few shots, it's just like the others. So their claim that it's more smokey because it gets rid of all of the junk in the gun, to me at least, is a bit off. Your mileage may vary.

REPLY

28. **Bill**
SEPTEMBER 14, 2015 AT 15:36

Just get some military lube (widely available) for a lot cheaper and burn some rounds down-range. I like machine gun lube for my SIG M11-A1 and it's just fine.

REPLY

29. **Aaron A.**
SEPTEMBER 14, 2015 AT 15:40

This is far from the first time I have seen something of this nature. It becomes easy to catch when you are in the industry. One that comes to mind is this video from Ted Nugent.

https://youtu.be/GmfLZ4TnW7E

At 1:49 he has a pretty clear FTF and they just edit away and make believe it never happened. So much for a perfect 10 (I have found 10mm to run without issue in 1911's I made…but those were single stack :-/)

https://youtu.be/ATpeX3XBuuw

This is a heavily edited video showing some hard to even see Russian hardware. To this day I have been unable to find slow motion video of the the action of a two round burst of an AN-94 (if anyone can find some I would love to see it). I am pretty sure the Russian government asked

to not show that footage. The FTX/double feed also was heavily cut out as it would show just how overly complicated that firearm is.
REPLY

1. **NDS**
SEPTEMBER 15, 2015 AT 08:00

LAV had a video in the last few months detailing the AN-94 action. I'm sure it's up on his YouTube channel – it was fascinating, and super unreliable.
REPLY

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30. Pingback: SayUncle » More on fireclean

31. **Colin Baird**
SEPTEMBER 14, 2015 AT 16:28

Chances are that there were range reloads and mixed head stamp and primers.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 14, 2015 AT 17:02

The first two rounds were consistent with PPU factory ammunition in terms of appearance and primer pocket/primer fit.

The last round looked quite like it had had the primer pocket swaged pretty thoroughly.

I'm not buying it.
REPLY

1. **Haunted Puppeteer**
SEPTEMBER 14, 2015 AT 21:06

Yeah, it's bullshit.

Their press release was a study in logical fallacies.

They're on damage control. They're going to turtle up, and threaten people with legal action. Libel my ass.

They don't have shit. They're on a sinking ship doing Chinese fire drills.

Fuck 'em.

And Mr. Tuohy: good catch, and good work!
REPLY

2. **NDS**
SEPTEMBER 15, 2015 AT 08:02

Reloading mixed brass? Sure. Even though as you said the first two rounds LOOK like factory PPU. Nobody reloads with mixed primers. That doesn't even make sense.
REPLY

32. **CA**
SEPTEMBER 14, 2015 AT 17:25

Also, the PPU ammo will make the gun appear dirtier while the Cor-Bon will make it appear cleaner.
REPLY

33. **Dirk W**
SEPTEMBER 14, 2015 AT 18:24

I am glad you published this. I have spent way too much money on gun oil. I do not need the newest, greatest thing, but I do have some pricey historic firearms which I want to take proper care of. I tried one brand last year, only to discover that it turns to some kind of goo in freezing weather. I do not buy the smoke argument. I think the lube is burning off. That is not a big deal with a pistol, but could be a disaster with a class 3 firearm.
REPLY

34. **DarrenM**
SEPTEMBER 14, 2015 AT 19:24

Could you please test Brian Enos's slide glide next? I suspect it is actually Lucas Oil's Red-N-Tacky grease or Permatex's Engine Assembly lube just re-packaged.
REPLY

1. **DBCooper**
SEPTEMBER 15, 2015 AT 03:00

Brownells' MSDS for Slide Glide makes it pretty clear that it's repackaged A.T.B. Bicycle Chain Lube, which can be bought in bicycle shops for 2-3 bucks an oz. Enos apparently slaps a different label on it and hawks it for twice the price (and apparently has been doing so for a decade or more). At any rate, the components aren't anything special. Something something nothing new under the sun…

http://www.brownells.com/userdocs/MSDS/100-004-080_SLIDE%20GLIDE%20STANDARD%20LUBRICANT%20-%2003G_default.pdf
REPLY

1. **Andrew Tuohy**
SEPTEMBER 15, 2015 AT 22:23

Interesting. I've been using it for almost a decade and like it a lot. Twice the price isn't a huge markup though considering that there are more people looking for bicycle chain grease than specialty gun grease – and especially considering the 100x markup that appears to relate FireClean to vegetable oils used for cooking. I will look into it though.
REPLY

1. **DBCooper**
SEPTEMBER 16, 2015 AT 00:48

IIRC, you live in AZ — you could probably find some A.T.B. locally, as the company is based out of Mesa.

At least it has an anti-wear additive (zinc), but so do most lithium/calcium greases (not sure which to classify it as, considering it seems to contain both–under "thickener" it states lithium, however).

BTW, not sure of the extent of the results from the IR spectroscopy of FireClean, but presence of phosphorus or zinc means it has anti-wear additives, absence of them means it's (likely) just a mix of oils. I don't know what other additives they could have used that aren't toxic.

If that wasn't part of the spectroscopy (I'm not very familiar with them), you could ship some of it off to a place like Blackstone Labs and find out for 25 bucks. Probably not worth the money… I think I know the answer.

At any rate, keep up the good work!
REPLY

35. **Scuba_Steve**
SEPTEMBER 14, 2015 AT 19:25

Great stuff man. Seriously. And good for you for not backing down…and for calling BS where you see it.

Frankly, I just don't get anyone who buys something due to a celebrity endorsement. Folks, you do know these folks are almost always compensated in some way…right?
REPLY

1. **Dr. Wylie**
SEPTEMBER 14, 2015 AT 19:37

Compensated!!! Haha…they are bought and paid for. Do you know how many thousands, if not millions these fucktards have made off of honest working Joes like me and you??
REPLY

36. **MichaelBolton**
SEPTEMBER 14, 2015 AT 20:48

LOLZ . . . The house of cards continues to crumble.

Good to see shills get called out too.
REPLY

37. **Left Thumb**
SEPTEMBER 15, 2015 AT 04:55

A classic Vuurwapen blog test would be to take two idential AR's and lube one with Fire Clean and the other with Crisco. Perform a battery to tests with a control ammunition and see how each does. If there is any real difference, it should show. If they're identical, then if you ever run out of CLP you can run down to the chow hall and get yourself some at least emergency lube.
Granted I don't know how lard would do compared to Crisco.
REPLY

38. **Raymundo**
SEPTEMBER 15, 2015 AT 21:11

LAV is now claiming on his Facebook page (the post about the training certificate) that the ammo was Freedom Munitions reman. I've shot about 10,000 rounds of that stuff and I've never seen a nickel colored primer. LOL He keeps digging himself a bigger hole. Fireclean hasn't said anything. They've probably been advised by someone smart to keep quiet. LAV on the other hand… not so much.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 15, 2015 AT 22:17

I'm leaning towards him being an innocent victim. The Suggs would be obsequious around him and since they were apparently the ones cleaning the guns between shots (according to the LAV in the video), they were probably the ones loading his mags.
REPLY

1. **Raymundo**
SEPTEMBER 16, 2015 AT 08:33

If he is an innocent victim then why doesn't he just say that instead of creating a dubious cover story like we used Freedom Munitions reman? Someone could easily contact Freedom Munitions and ask them the odds of getting a nickel colored primer in their 9mm reman. I certainly haven't seen it before.
REPLY

1. **Andrew Tuohy**
SEPTEMBER 16, 2015 AT 09:08

Because then it would be clear that he was duped. He was used. That's not a position he wants to be in.
REPLY

2. **Frank M**
SEPTEMBER 16, 2015 AT 02:16

LAV also claimed in the same post that this whole thing was started by a competitor who is also a neo-nazi. WTF is that all about? (I mean, besides Vickers trying to avoid the real

issue..) Andrew, yer not a jackbooted romper-stomper on the weekends are ya?
REPLY

1. **Andrew Tuohy**
SEPTEMBER 16, 2015 AT 07:20

No, George fennell has SS lightning bolt tattoos on his right arm. That's why I called his product weaponSShield. Although I think now that they might be a reference to a biker bar in California that burned down in the 90s. I was watching the first season of x files the other day and saw a guy with an SS lighting bolt t shirt. I was like "what the hell" and Googled the name of the bar. The shirts are now sold as "zz biker bar shirts" for like 100 bucks since as I said the bar burned down about 20 years ago. The logo was supposedly because they were all about freedom of expression and sticking it to the man, man! Fennell looks like an old wannabe badass biker dude. That's the only alternative explanation I can come up with. It's either that or he is selling weaponSShield to fund the return of the fourth reich.
REPLY

1. **Dave**
SEPTEMBER 17, 2015 AT 12:14

A biker bar, eh?

A likely story, meesta Jones!
REPLY

2. **Dave**
SEPTEMBER 17, 2015 AT 12:13

Irrelevant: Ad HomiNazi
REPLY

39. **Gixp**
SEPTEMBER 16, 2015 AT 11:10

Andrew Tuohy It would be great to try to replicate the experiment
REPLY

40. **David**
SEPTEMBER 18, 2015 AT 14:05

Man, I would love to be able to reference your info in a video to shut up some of the people still supporting this product.
REPLY

1. 
Andrew Tuohy
SEPTEMBER 18, 2015 AT 23:57

Ian and Karl at Forgotten Weapons made a good one. I might make another yet.
REPLY

Yes, It's True: FireClean is Vegetable Oil

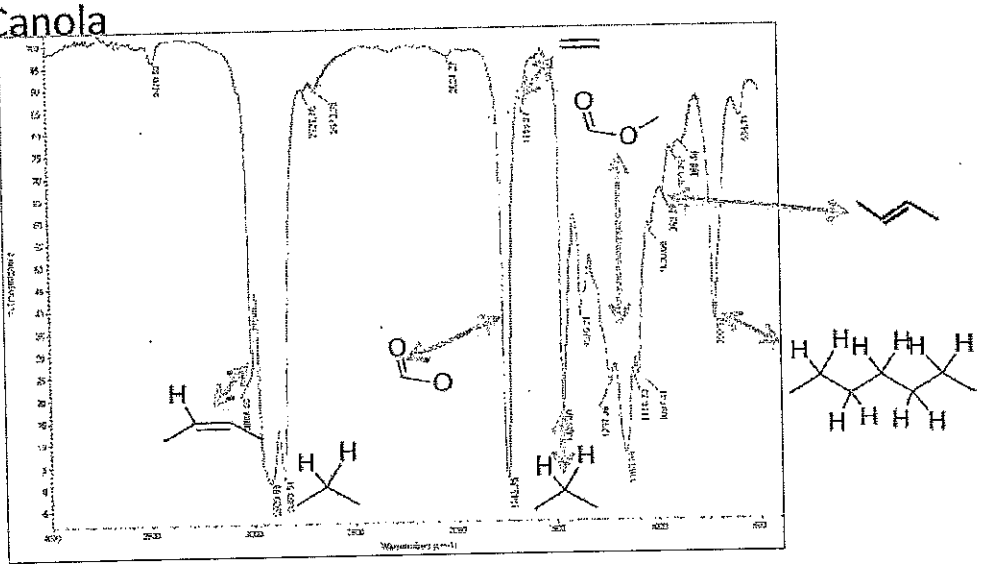
Posted September 13, 2015 in Other Gear & Gadgets by **Nathaniel F** with 526 Comments

Tags: lube, oil, **, FIREClean, fire clean, weapon lube, fireclean is crisco, vegetable oil

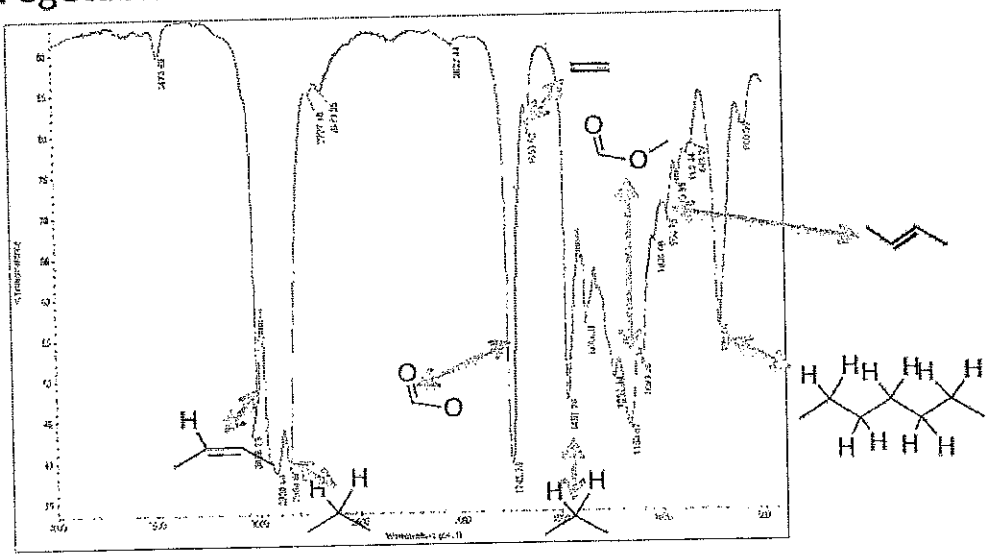
EXHIBIT H tabbies

Initially, the idea that FIREClean was basically just Crisco started with rumors of a spectral analysis, but took off after July of this year, when AR15.com member 12_gauge posted a video to YouTube of a burn-off test between FIREClean and canola oil. The results of this poor man's spectroscopy were that FireClean and the canola oil looked identical; not a conclusive result, but it began to raise suspicions. Further, FireClean founder Edward Sugg was listed on a patent available to the public listing alternative uses for vegetable oils, such as canola oil, including as firearms lubricants. It was with this that I was all but convinced: FIREClean was canola oil, commonly sold under the brand name "Crisco". Yesterday the inimitable Andrew Tuohy, a contributor to this blog, posted an article proving to me beyond any doubt that FIREClean is vegetable oil. The results of the infrared spectroscopy he conducted are reproduced below:

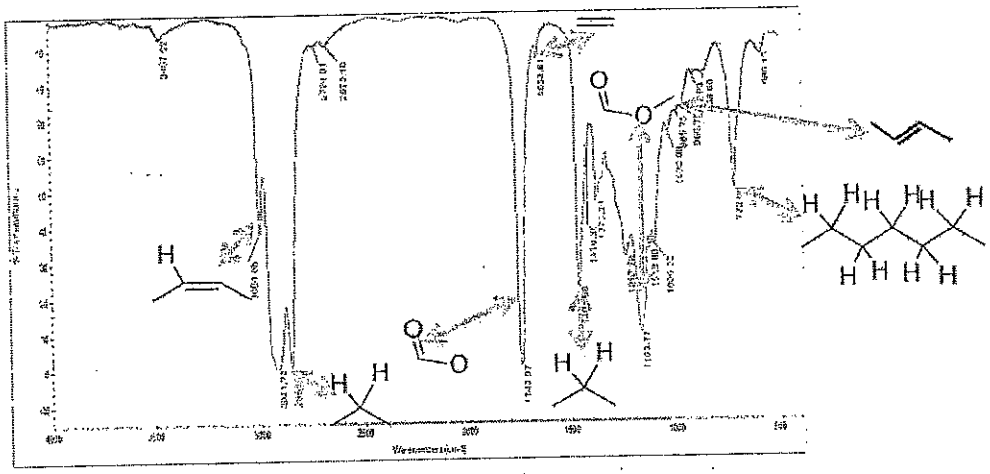
Crisco Pure Canola



Crisco Pure Vegetable oil



Fire Clean

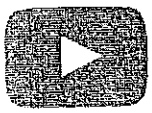


It is quite apparent that the results for FIREClean and Crisco are very similar. While I'd rather see a control, it is apparent to me that none of the three look more similar in this regard to other common

oils than they do to each other. So, in short, to the best of my knowledge, FireClean is canola oil.

From my perspective, FIREClean has been one of the most aggressively branded gun lubricants in recent years, promoted as a "revolutionary" lubricant that cleans and removes fouling unlike other offerings. [screenshot here] Gun expert Larry Vickers, who I have great respect for, recently released a spot promoting FIREClean as a superior lubricant, "proven" to carry away more fouling from a firearm due to the greater smoke it produced. Those of us with a modest basis in chemistry were immediately skeptical: The smoke produced by an oil under heat has at best only a tangential relationship to its ability to collect and trap debris.

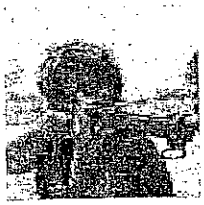
FIREClean Lube Test



It was with this video, on the backs of what felt like more than circumstantial evidence, that made many feel that "enough was enough". FIREClean may not have been a poor lubricant, at least for the range where it wasn't applied to firearms that were stored for a long time, but if it really was $15/oz canola oil as the patents and smoke tests suggested, then the company would have quite a lot to answer for.

With Andrew's spectroscopy, this has been realized. FIREClean, marketed as "the real deal", a revolutionary lubricant that would sweep aside all the snake oils that have plagued the gun market for years, has proved to be nothing more than canola oil at a 10,000% markup. Those who bought into it may feel cheated, as they undoubtedly were. Those who learned from previous snake oil gun lubes may feel smug, but they shouldn't. A slick marketing campaign and a reasonably effective (but horrendously overpriced) product was enough to get many people whose opinion I did and continue to respect. Better men than I, for a certainty, were taken in by this product, which has proven to be nothing more than vegetable oil. FIREClean's reputation should suffer; theirs should not.

UPDATE: FIREClean responds here.



Nathaniel F

Nathaniel is a history enthusiast and firearms hobbyist whose primary interest lies in military small arms technological developments beginning with the smokeless powder era. In addition to contributing to The Firearm Blog, he runs 196,800 Revolutions Per Minute, a blog devoted to modern small arms design and theory. He can be reached via email at nathaniel.f@staff.thefirearmblog.com.

Comments for this thread are now closed.

538 Comments The Firearm Blog Login

Recommend 13 Share Sort by Best

Devil_Doc • 3 months ago

Hey.. This is a glass half full situation if I've ever seen one. Didn't anyone else read this and think, "I can now use my wifes canola oil for gun lube"?

69 • Share ›

El Duderino ↛ Devil_Doc • 3 months ago

I use lard. Only downside is every time I shoot I really want to go get a bacon cheeseburger afterward.

20 • Share ›

Sergio Velazquez ↛ El Duderino • 3 months ago

hahahaahaha, thank you, now i am really hungry

• Share ›

dshield55 ↛ Devil_Doc • 3 months ago

That was the most exciting part! I had been contemplating buying FireClean for sometime, at Larry Vicker's suggestion, and I would have actually paid full price. Now I'm going to do it immediately, but use Walmart/Great Value brand spray on Canola oil anyway. I love how canola oil really really does prevent the eggs from sticking to the pan, and it just makes soooooooo much sense that if spam wont stick to canola oil coated pans that this will prevent carbon from sticking to my guns internals as well.

1 • Share ›

Dawna Lockhart ↛ dshield55 • 3 months ago

Do not use the sprays. The propellants leave residue. I like baking. I discovered there was a cooked on residue left on my pans that took forever to scrub off. Came to find out that it was due to the propellants in the sprays. My pans clean up much easier now that I put oil on a clean paper towel and wipe on my pans. Knowing this, I wouldn't trust the sprays on a gun where residue build up could cause a misfire.

3 • Share ›

dshield55 ↛ Dawna Lockhart • 3 months ago

Sweet. Thanks for that.

1 • Share ›

Danny Willard ↪ Dawna Lockhart • 3 months ago

The propellants are usually butane, propane, or freon (in one form or another). Freon may leave a miniscule residue, the butane and propane do not leave any residue. Just an FYI.

^ v • Share ›

Dawna Lockhart ↪ Danny Willard • 3 months ago

Well, then I don't know what the residue was. All I know is it had to be scraped off. Only happens with the sprays. Must be something else in there.

^ v • Share ›

Robert Saunders ↪ dshield54 • 3 months ago

You can buy a pump-style sprayer and use whatever oil you want in it...no propellant issues and it pays for itself if you use spray oil alot (about $9 dollars I think)

1 ^ v • Share ›

sckarekrow ↪ Devil_Doc • 3 months ago

i have been doing it for decades. Oil is oil. It isn't rocket fucking science.

15 ^ v • Share ›

cs ↪ sckarekrow • 3 months ago

Oils are not all made equal.

7 ^ v • Share ›

Chi Wai Shum ↪ cs • 3 months ago

This is exactly the problem with Fireclean: they try to tell you they have something better but really it is no better than these cooking oil.

3 ^ v • Share ›

Giolli Joker ↪ Chi Wai Shum • 3 months ago

Well, not all cooking oils are the same as well.

According to wikipedia, canola oil has good properties for some industrial uses (and for other, more personal, ones).

"The oil has many nonfood uses and, like soybean oil, is often used interchangeably with non-renewable petroleum-based oils in products, including industrial lubricants, biofuels, candles, lipsticks, and newspaper inks depending on the price on the spot market. Canola oil is also recommended by the American Society

market. Canola oil is also recommended by the American Society for Reproductive Medicine for use as a vaginal lubrication."

^ v • Share ›

mxprivateer ➪ Giolli Joker • 3 months ago

Reminds me of a joke...

Q: What do you do when your girlfriend starts smoking?

A: Slow down and use some lube.

3 ^ v • Share ›

Heartland Patriot ➪ Giolli Joker • 3 months ago

Yeah, that's why you shouldn't eat canola oil. It wasn't intended for human consumption, but as an industrial lubricant. They later deemed it safe to consume.

1 ^ v • Share ›

Thomas Stuart ➪ Giolli Joker • 3 months ago

This explains the old saw about treating your gun like your mistress.

^ v • Share ›

Ced Truz ➪ Giolli Joker • 3 months ago

So anyone try coconut oil with their gun? It works great as a "personal lubricant".

^ v • Share ›

TBW ➪ Ced Truz • 3 months ago

It makes my gun hard as a coconut shell!

^ v • Share ›

MarkVShaney ➪ Giolli Joker • 3 months ago

I think the people who pay $1000 a gallon for it need the lube a few inches south -------edited for language

^ v • Share ›

iksnilol ➪ sokarekrow • 3 months ago

But rockets use oil.

Ed1T: CHECKMATE, ATHEISTS/RELIGIONISTS!

10 ^ v • Share ›

fridaysmyday ➪ sokarekrow • 3 months ago

Is that so, "oil is oil"? Would you use canola in your new Mercedes Benz?

Matthew • 3 months ago

Yes I can use canola in my new mercedes turbo diesel engine as fuel, not as lubricating oil.

cs • 3 months ago

Mercedes advises against using bio fuels in their diesel engines. One of the reasons stated on their website (pdf) was that the bio fuels and vegie oils can produce soaps and unwanted residues during combustion.

http://www.mbusa.com/vcm/MB/Di...

(older version from my hard drive 2010, better i think)
http://www.filedropper.com/bio...

sckarekrow • 3 months ago

I don't have a mercedes. I prefer cars that run. Same reason I shoot Glock.

cs • 3 months ago

Mercedes diesels are known as the million mile cars. And its widely regarded that the 300d from the 1980s had one of the best diesel engines of all time.

Heartland Patriot • 3 months ago

Sorry to tell you, but Mercedes run great. In fact, very few makes/models of cars have serious problems anymore, thanks to new engineering and testing techniques. You are most likely to have accessories break down on you versus powertrain components...why do you think that companies are cool with those longer powertrain warranties? They don't give those out of the goodness of their hearts, they know you are unlikely to need it.

Eric Shearer • 3 months ago

I have an '83 mercedes diesel with over 300,000 miles that's

running still. I also have a glock 17, but rarely shoot it, don't like the feel of it

^ v • Share ›

Matt Bennett ➪ Eric Shearer • 3 months ago

Is how a gun feels more important than how it performs? Hey, it's your life not mine, but people's priorities confuse me sometimes.

^ v • Share ›

Eric Shearer ➪ Matt Bennett • 3 months ago

You are assuming I'm shooting something else that's not as reliable

as my Glock. That's not the case.

^ v • Share ›

n0truscotsman ➪ Devil_Doc • 3 months ago

I have used canola before. It was the only thing available at a gas station when i realized i left my lube at home just before heading to a range. Even used it on a suppressed SBR and thought, "oh neat. it works well actually".

I shouldve patented and sold bottles :)

6 ^ v • Share ›

Ripley ➪ n0truscotsman • 3 months ago

They didn't have engine oil?

^ v • Share ›

n0truscotsman ➪ Ripley • 3 months ago

They didnt! that was what I was actually gunning for when I went in there.

^ v • Share ›

Plumbiphiliious ➪ Devil_Doc • 3 months ago

I'll raise my hand in relative shame.

I'd really like it if other IR tests were done on other gun oils. PARTICULARLY MINE OF CHOICE IF YOU FEEL LIKE IT...Weaponshield.

There's a lot of marketing saying the stuff was uniquely designed by a trained tribologist, and I want to know if there's anything in there that's true (all I know is that it does pretty well at rust prevention).

5 ^ v • Share ›

Jeremy S. ➪ Plumbiphilious • 3 months ago

I'd like to see Frog Lube analyzed, as it has been rumored to be modified Crisco shortening since its release...

^ v • Share ›

prasko ➪ Plumbiphilious • 3 months ago

Weapon Shield was already done if you google around.

^ v • Share ›

R H ➪ Devil_Doc • 3 months ago

The true test isn't "How well will my wife's Crisco lube my gun", but "How good will this chicken taste if I fry it in some Fireclean!?!"

4 ^ v • Share ›

Ripley ➪ R H • 3 months ago

Don't use your wife's lube.

^ v • Share ›

Jeremy S. ➪ R H • 3 months ago

Wife's Crisco? Hmmm. The kitchen is no place for a woman.

;-)

^ v • Share ›

Savage Henry ➪ Jeremy S. • 3 months ago

^ v • Share ›

Mark Wadsworth ↩ Devil_Doc • 3 months ago

That is what I was thinking.

3 ^ v • Share ›

Charles ↩ Devil_Doc • 3 months ago

I had the same thought, I'm gonna buy a bunch of canola oil now :P

1 ^ v • Share ›

thedonn007 ↩ Devil_Doc • 3 months ago

I agree, I just need to find some fancy bottles to apply it with.

1 ^ v • Share ›

Phillysteak ↩ thedonn007 • 3 months ago

Applicator bottles are cheap:

http://www.amazon.com/Plastic-...

http://www.amazon.com/gp/produ...

So should we now wonder if Froglube is some strange emulsion of canola oil and wintergreen mouth wash?

5 ^ v • Share ›

Sledgecrowbar ↩ Phillysteak • 3 months ago

This. I've been wondering about Froglube since this all started. I bought two oils before getting smart; Kroil, which I do not regret as it's a good penetrating oil if you don't want the spray application of PB Blaster, Liquid Wrench, et. al., and I picked up Slip2000 EWL from reading both the Filthy 14 story and the good info from the arfcom posts (surprising) by the owner of Battlefield Las Vegas. Although, he found that Lucas gun oil was possibly better solely on the point of first-round spatter.

I still haven't opened the Slip2000, by the way. My current favorite is Ed's Red, and not just because you mix it at home from known ingredients. I knew ATF was highly detergent from a lifetime of automotive work but never thought to use it on my guns, but I'm glad Ed Harris thought of it. It has replaced Mobil 1 as my "known-good" lube.

4 ^ v • Share ›

Dan ↩ Sledgecrowbar • 3 months ago

I like Lucas oil products, so when I seen they made a gun lube I bought a bottle if for nothing more than brand loyalty fanboyish

reasons. It works well, i used slip before because of availability.

^ v • Share ›

Sheldon Robertson ↪ Dan • 3 months ago

Just use their upper cylinder lube. Its pretty similar in consistency to military CLP. I think it's closer than civvie CLP brand CLP. I use brake cleaner to clean metal parts. The only firearm specific cleaner I use is WW2 U.S. Army bore cleaner which is based on cresyllic acid. (I might have spelled that wrong) It smells like an arms room and shreds copper fouling. Its also cancer in a bottle.

1 ^ v • Share ›

Dan ↪ Sheldon Robertson • 3 months ago

Interesting i might try that. Ive used their synthetic oil stabilizer as a lube. Also I think now days at least in California everything is cancer in a bottle.

^ v • Share ›

Rick O'Shay ↪ Phillysteak • 3 months ago

I'm pretty certain froglube is just coconut oil with some kind of mint extract added for scent... they have similar melting points.

1 ^ v • Share ›

Greg ↪ Phillysteak • 3 months ago

Froglube is actually made out of plant esthers, that is where they get the smell from. That is also why it is bio-degradeable, and why it freezes in the cold.

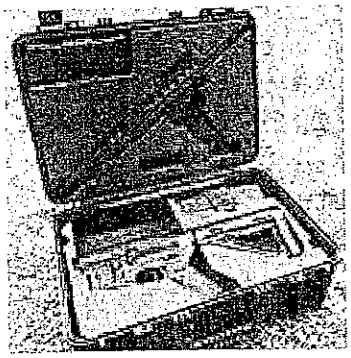
^ v • Share ›

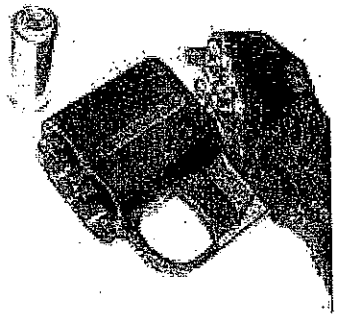
Patrick M. ↪ madcow907 • 3 months ago

I was thinking a cooking oil sprayer. Seems fitting.

2 ^ v • Share ›

TFB ON INSTAGRAM





Yes, It's True: FireClean is Crisco

Posted 3 hours ago in Other Gear & Gadgets by Nathaniel F with 227 Comments

17.4K 53 Tweet 57

1472

Initially, the idea that FIREClean was basically just Crisco started with rumors of a spectral analysis, but took off after July of this year, when AR15.com member 12_gauge posted a video to YouTube of a burn-off test

25 likes

EXHIBIT
I

LIES, ERRORS, AND OMISSIONS

A CLOSER LOOK AT FIRECLEAN AND CANOLA OIL

OCTOBER 23, 2015 55 COMMENTS

If you read the first article on this blog regarding whether or not FireClean is the same as Crisco, you are aware that people became really, really upset over the results.
Lines were drawn, accusations were made, the science was championed by some and attacked by others.

A second round of testing, conducted at the Worcester Polytechnic Institute in Massachusetts, sheds more light on the controversy. I submitted eighteen samples for various tests, including gun oils, gun pastes, cooking oils, and gear oils. If you would like to read about the methodology, you may do so here – straight from the horse's mouth. These tests included IR spectroscopy and nuclear magnetic resonance testing. Click that link to learn more about both. In addition, separate testing of FireClean and a different brand of canola oil was conducted by a different individual (who has a PhD in chemistry) at a different lab. This testing included HPLC (high performance liquid chromatography) and two variants of NMR (nuclear magnetic resonance). I did not supply the samples for this test, but the results were remarkably similar.

Some of the people involved wished to remain anonymous after they saw the vitriol directed at various parties after the first test, but others did not. Everett, who conducted the bulk of this testing, wanted me to thank the following people:

-Professor Drew Brodeur of Worcester Polytechnic institute for advising the project
-Daryl Johnson, Andy Butler, and Professor John MacDonald of WPI for help with the methods and testing
-Curtis of The VSO Gun Channel for help with the methods

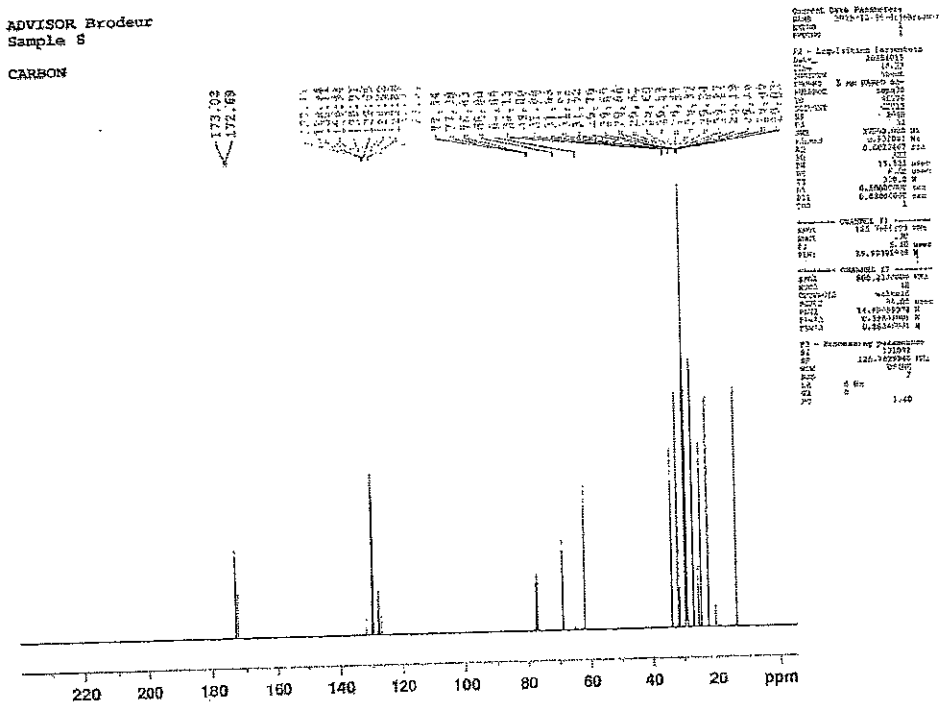
Several of these tests of the eighteen various lubricants will be of interest to those in the firearm sphere, but perhaps none will be as interesting as this one. Summarized in one sentence, here's why:

According to every PhD who looked at the NMR results, FireClean and Canola oil appear to be "effectively" or "nearly" identical.

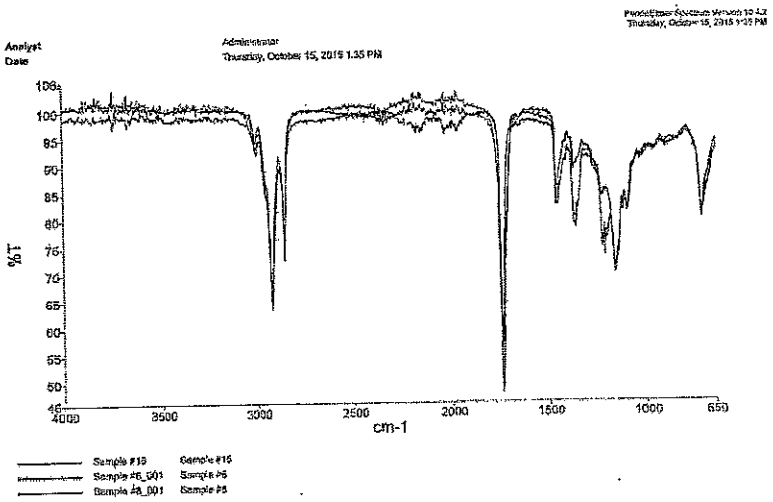
This was also the opinion of the chemistry student conducting the testing (Everett) and two other people with similar undergraduate degrees.

Here is the data:

NMR Sample #6 (2015 production Crisco brand canola oil)
NMR Sample #8 (2015 production FireClean)
Here is the NMR data superimposed upon one another:



Here is some additional IR data which also includes sample #16, generic corn oil:



Here is what people with chemistry experience and/or degrees had to say:

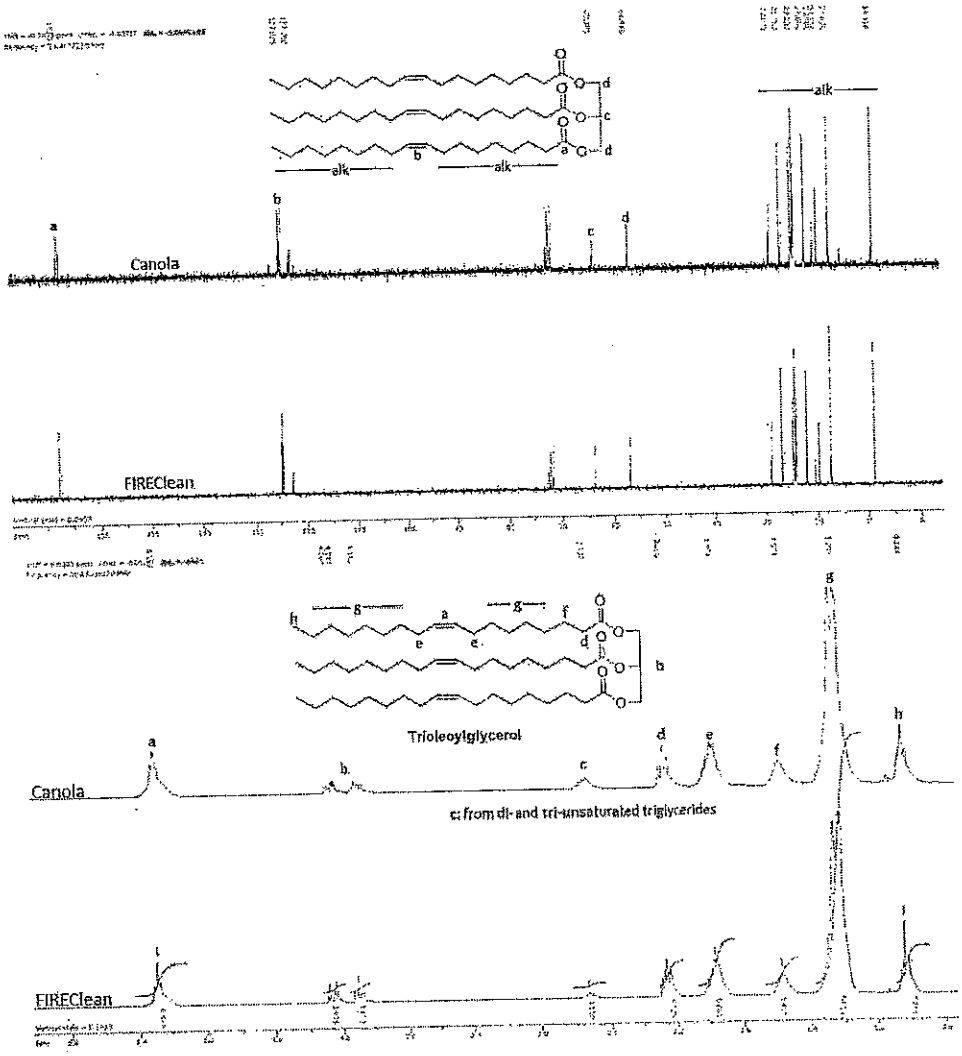
"For NMR, you have environment, shift, area and splitting. Presuming these samples were processed identically; I find the NMR spectra to be effectively identical. Each peak in a carbon NMR spectrum identifies a carbon atom at a distinct place along a molecule. Each place reflects its local environment. You can look up the peaks in the spectrum to referenced guides to then identify where along the spectrum the peaks correspond with molecular species in the molecule. For instance, is it next to another carbon atom, or an oxygen or hydrogen, etc... The important part is that the peaks overlap precisely. I made an image attached below that shows sample 8 superimposed in the green channel of sample 6 **(see above)**. *The height of the peaks is slightly different reflecting effectively nothing as it is the area under the peak that matters which here is negligible. Sample 6 and 8 are effectively identical." – PhD (Neurophysiology, BS Chemistry/Biology)*

—

"Height from one spectrum to another is irrelevant and can vary with a slight difference in amount of sample put in the NMR tube. As one of my professors put it "NMR is the gold standard for structural chemistry." Structural chemists that know the molecular formula of their compound can combine NMR with IR data to figure out what the structure of their molecule is. The chances of two different molecules having the same NMR spectra is almost zero." – Everett (conducted testing)

"In terms of your data, the two 13C NMR spectra look nearly identical and are expected for a vegetable oil blend. Some differences are apparent in the 'alkene' region (~129 ppm), and this is likely due to varying ratios of different unsaturated triglycerides being present in different products. Wikipedia has ratios of the various fatty acid compositions for different oils (here). The minor differences between oleic, linoleic, paltimic, stearic, etc acids will result in slightly different peak patterns in that region of the spectrum." – Anonymous, PhD (Chemistry)

Here is the second NMR test – two types of NMR, actually, proton (1H) and carbon (13C) done at a different lab, by a different individual, using different samples of FireClean and Costco brand Canola oil:



Here is what he had to say about the results:

"The structure I pasted over the spectrum is not the exact identity of the canola or fireclean, it's just a representative. These products contain a mix of various compounds, so the carbon chain length, number and placement of double bonds, etc will all vary between various chemical species and vegetable oil blends. The paper sums that up, for your more demanding readers. I haven't kept up with the press on fireclean all that much, but if they are claiming any addition of anticorrosives or stabilizers, they would likely show up in either the IR or NMR spectra unless in very small quantities. I would feel confident claiming that FIREclean is just a vegetable oil or vegetable oil blend of some sort.

Some differences in the NMR spectra are apparent, but they are relatively inconsequential and easily explained by the complexity of lipids derived from natural sources. In the 13C NMR, we see some variation in alkene peaks around 128 ppm (peak b) that are likely due to di- and tri-unsaturated fatty acids, and similarly in the 1H we see changes in the relative amounts of allyl protons due to additional unsaturation (2.7 ppm, peak c) between fireclean and Costco canola oil. There's still nothing about the NMR that would indicate that fireclean is anything but vegetable oil.

This means that some of their claims are true. Vegetable oil is certainly nontoxic/biodegradable, and somewhat odor free. However, it would be difficult to argue that vegetable oil possesses "extreme heat resistance" when it is known to degrade in the presence of heat and oxygen. As far as conditioning the metal substrate to resist further carbon buildup, a good comparison might be that of seasoning a cast iron skillet, where oil or fat is heated to the point of degradation, leaving behind a complex layer of polymerized triglycerides. If you are comfortable with this on your firearms' internal components, then this would be a good product to use, otherwise a more thermally stable product might be in order. The attached paper (Review of Food Lipids 2014) details the degradation of food lipids under conditions relevant to firearms use, so readers may make their own determination." – Anonymous, PhD (Chemistry)

—

As I have continued to state since forming an opinion on the product, **FireClean works very well as a lubricant for the AR-15.** I chose it for the LuckyGunner 40,000 round ammo test because I had used it with good results – I was provided with samples early in 2012 – and wanted to give a fledgling company a chance in a crowded field. I don't regret that decision – the lubricant worked well for the test. The FireClean folks must have felt the same way, because my work on that test is in almost every sales pitch they've made about their product.

That said, even the best lube can't make a bad rifle or a bad magazine or bad ammunition function 100%. All of those items working together – a good rifle built by Bushmaster, Magpul

PMags, Federal brass cased .223, and a good lubricant (FireClean) came together for 10,000 rounds with no malfunctions in that particular carbine. The steel cased carbines didn't perform at quite the same level, but still performed remarkably well, all things considered.

FireClean is, as stated previously on this blog, a common vegetable oil, with no evidence of additives for corrosion resistance or other features. The science is solid in this regard. Questions or concerns about the limited value of IR testing should be, I would think, put to rest with two discrete tests – tests regarded as "the gold standard in analytical chemistry" – and analysis by multiple sources.

Viewed in this light, FireClean's recent claims that using cooking oils such as canola oil on your firearm could lead to serious injury or death are simply laughable. They also claimed that it should not be used for cooking due to health concerns – but they also claim that it's non-toxic. Well, which is it?

I have absolutely no issue with the concept of making money (I applaud those who make money hand over fist), or taking a product from one sphere and introducing it to another. I think a certain amount of "finder's fee" is absolutely reasonable. If they discovered that the product would work as a gun oil, introduced it to the gun world, etc., then they did people a favor by telling them about something they never would have discovered on their own. There are also marketing costs, packaging, etc. We couldn't expect them to sell a 2oz bottle of Fireclean for the same per ounce price as a gallon of Walmart brand Canola oil.

That said, I don't think I could look someone in the eye and tell them that a bottle of vegetable oil was the most advanced gun lube on the planet, but those who can? Well, they're good salesmen, I guess.

What I do take issue with are attempts to mislead consumers and distort the facts. There is a line between being an aggressive and effective salesman and not being entirely truthful about your product, the way it works, or what it contains. It is my belief that FireClean crossed that line long ago – and that many of their recent statements are simply egregious.

Granite State Guns

How To Science

Posted by *granitestateguns* on *October 19, 2015*
Posted in: Testing and Reviews. Tagged: Fireclean, Science, Technology, Testing. 3 Comments
Is FIREClean really just Crisco? I headed to the lab to find out. The results will be out soon, but for now here's what I did in the lab and the background science behind the tests.

(https://granitestateguns.files.wordpress.com/2015/10/d38db861-a614-4d22-bea0-b87c87e6b642_zps5gdnvz84.jpg)

Rocking my ESS Crossbows and Noveske Rifleworks hat in the lab

Before I begin, I need to thank some people for making this project possible. First and foremost is my academic advisor at Worcester Polytechnic Institute, Professor Drew Brodeur. He not only got access to the labs, but gave me some extremely helpful advice on my methods for testing. If I didn't have him helping, this project would never have happened.

EXHIBIT K tabbies

Next is Professor John MacDonald of WPI, who was extremely helpful in reviewing my planned methods and giving suggestions. I had sent a short email explaining the project and expected something along the lines of "Sure, that would work fine." What I got was five paragraphs detailing what would work and what I should focus on, as well as other professors that could be helpful to talk with.

Some other key individuals are Andrew Butler and Daryl Johnson, also both of WPI, who allowed me to use the research NMR labs and helped me along the way. It's not every day you get access to $3 million worth of fancy equipment, and they were extremely kind for letting me run NMR samples, as well as helping get the data in a useable form.

Outside of my college, I also need to thank Curtis from the VSO Gun Channel. He is an experienced chemist and took a lot of time to discuss my methods, suggest other tests to do, and be another opinion in evaluating the data.

Finally, thank you to Andrew Tuohy for inspiring this project in the first place, getting me the samples, and doing most of the work outside of the lab. I'm assuming most of my readers came here from his blog, but if you haven't seen it go check out vuurwapenblog.com (http://www.vuurwapenblog.com)

Now, on to the reason you're here...

Background

Several weeks back Vuurwapen Blog posted about the Fireclean controversy. For those that missed it, several people claimed that the popular firearm lubricant and cleaner is actually just repackaged Crisco brand canola oil. Several Youtube videos show Fireclean and various oil samples placed on a stove smoking at the same point, leading many to cite these videos as "proof" that Fireclean is a common cooking oil.

The problem is, any decent scientist knows that smoke point of an organic compound is not nearly enough proof to claim that two samples are the same. So Andrew Tuohy of Vuurwapen Blog talked with an organic chemist at the University of Arizona to conduct Infrared Spectroscopy of Fireclean and two types of Crisco oil. As I am currently an undergraduate studying chemistry, this testing greatly interested me. His final conclusion was that Fireclean is "probably a modern unsaturated vegetable oil," but not Crisco. Without doing more testing, I couldn't say for sure. Along with several comments asking to test X brand of firearms lubricant next time, I got an idea.

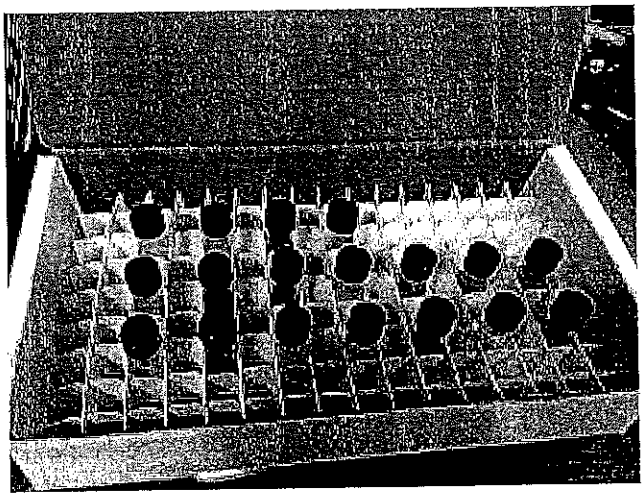
As far as I know Mr. Tuohy is not a chemist (if he is, I need to figure out how to use my degree to make it so I can shoot guns all day), so I assume that he doesn't have access to the equipment or skills to do this testing every day. But I'm a chemistry student. I pay absurd amounts of money in tuition to a small technical school, so I can easily get full access to some of the most complicated and stupidly expensive chemistry equipment you can imagine.

And I did…

The Project

After I read the original post of the IR spectra, I sent an email to my academic advisor asking if I could get access to one of the instrument rooms in our labs for a personal project. Once I confirmed that I could do IR testing, I emailed Mr. Tuohy to see if he was interested in the project. A few weeks later, I got a box with 18 small vials, each labeled with only a number. During the weeks I was waiting for the samples I sent several other emails to professors and others seeking help with the project. I had asked if I could use the NMR lab that is used for teaching the experimental chemistry labs, but was told it was for class use only. Instead, I was informed I would have to use the much nicer NMR lab in our research facility… It's not often that you ask to use a $400,000 piece of equipment, only to get told you have to use the $3,000,000 thing that does the same task even better. Oh well, if I have to…

I should note that neither myself nor Mr. Tuohy knew what sample numbers are any given oil. I was told that the pair of #6 and #8 are the Fireclean/Criso samples, but as of writing this I don't know which one is which. I was also asked to compare a few other pairs or groups of samples. From what I understand, Andrew gave 18 labeled vials to a friend to randomly fill with 18 different oils. That friend then told him the pairs to be compared. This double blind methodology ensured that there was no bias by anyone involved in the testing.



(https://granitestateguns.files.wordpress.com/2015/10/e8e0413b-65ed-43d6-84f3-ac407b809e7d_zpsl1ksq9qi.jpg)

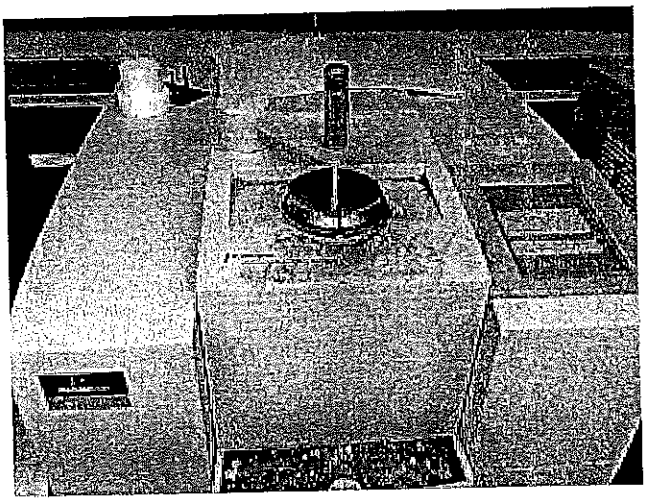
The samples as I got them from Andrew Tuohy

When the samples arrived the only change I made before the trip to the lab was to add labels to the caps in addition to the labels Andrew put on the side of the vials. This made it easier to see the sample numbers while they were in the carton that Mr. Tuohy shipped them to me in. Then I ɑbbed my safety glasses and it was off to the lab.

You know you're a chemistry nerd when the highlight of your fall term of junior year is spending about five hours in the chemistry labs during finals week...

The first thing I did was start running IR spectroscopy on the samples. Unfortunately the first day worth of testing (samples 1-9 of the 18 total) didn't save, so I had to redo them the next day. That's why the data Mr. Tuohy will post (or maybe already has) shows the sample names 1 through 9 as Sample#X_001 instead of Sample#X like the following ones do. I don't want anyone claiming I faked the data, so I'm just putting that out there now. All of the spectra sent to Mr. Tuohy were taken on the same day in the lab.

Infrared Spectroscopy

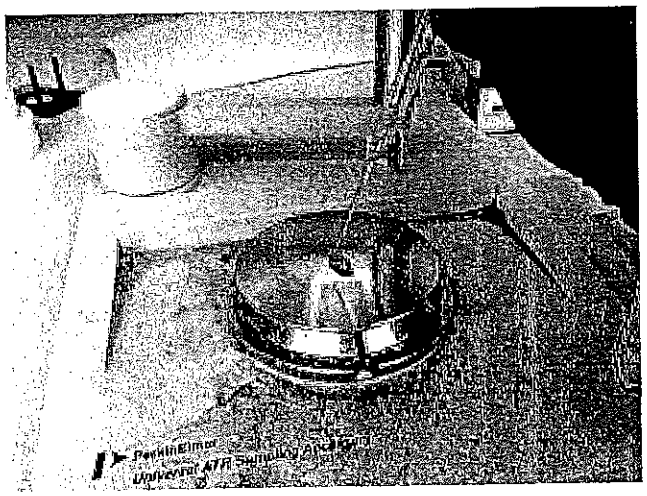


(https://granitestateguns.files.wordpress.com/2015/10/d7af050d-0f83-4159-b904-dc50b049568b_zpsnoepkq67.jpg)

The Perkin Elmer IR Spectrometer. The underclassmen never clean up after themselves...

The IR spectra were taken on a Perkin Elmer Infrared Spectrometer with an Attenuated Total Reflectance attachment. The ATR attachment means that instead of spreading the sample between ɔair of sodium chloride plates and securing it in a holding device (a time consuming process for a lot of samples) I could simply deposit a drop or two of the oil (or spread a small blob for the grease samples) on a small metal plate with a lens in the middle, swing a small probe attachment

over it, and screw the probe down to secure it. Using the ATR I was able to run a sample in about two minutes, as opposed to 10-15 minutes for the NaCl plate method we used in my general chemistry classes.



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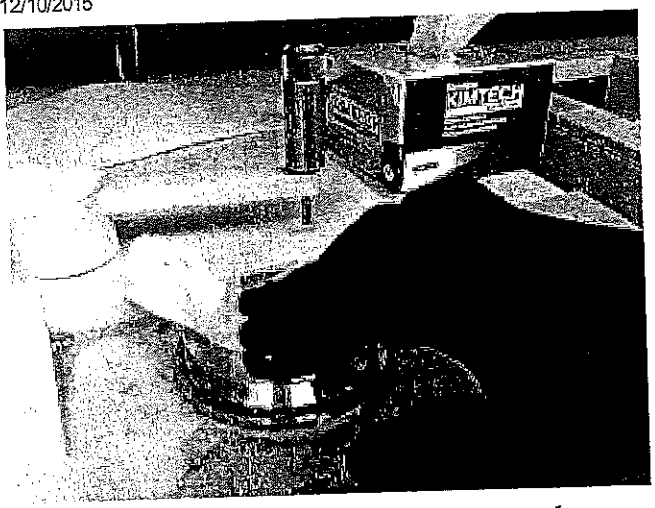
As you can see, it doesn't take much for an IR scan with the ATR. The amount used here is several times the amount needed for a proper scan.

One thing Curtis from the VSO Gun Channel was sure to remind me of was the possibility of cross contamination between each sample. For this reason I used acetone and kimwipes (fancy science tissues that don't leave any residue. We use them in lab a lot for cleaning sensitive equipment like lenses) to triple clean both the plate and probe before each sample was run. I also changed out the nitrile gloves I was wearing frequently when I got any oil on them, ensuring that the spectra seen are only of that sample.



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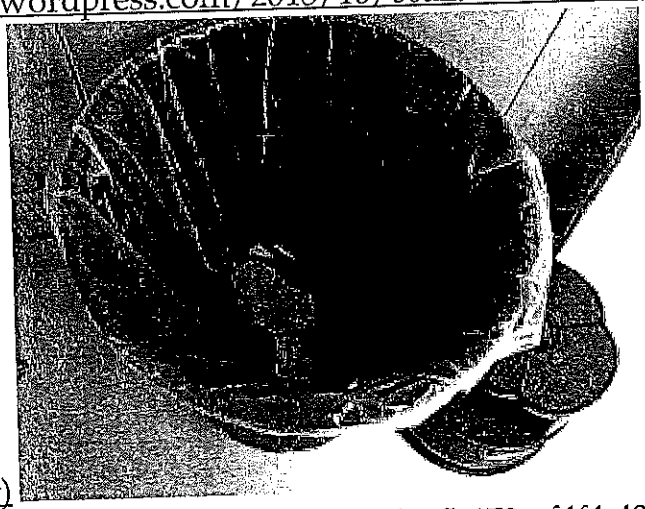


...9f53eb8527_zpsyzlnmibj.jpg)
(https://granitestateguns.files.wordpress.com/2015/10/17fb473a-f4f4-43fa-889e-c0bec120a226_zpsf8ucdg7e.jpg)

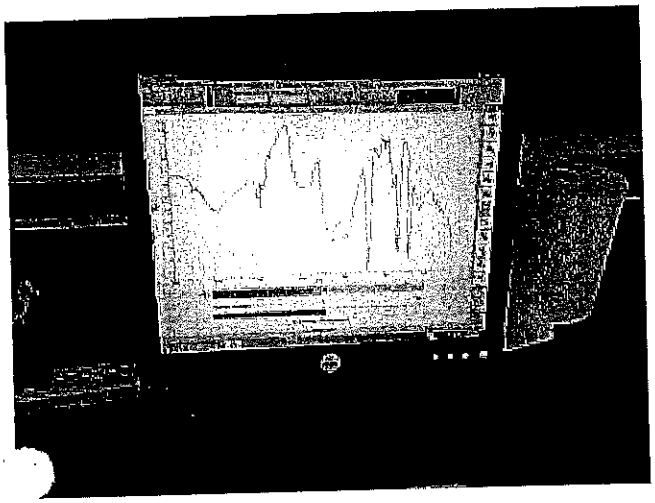
Cleaning the IR Spec. I went through lots of Kimwipes and gloves...

How it works:

IR spec. uses infrared light to bend and stretch the bonds in organic molecules. Different bonds have different strengths, so it will take different amounts of energy to cause a change. Infrared light is in the proper energy range that it adds the right amount of energy without breaking the bonds. Depending on the two atoms bonded, a given wavelength of IR light will cause bonds to stretch, bend, rock, or twist. By looking at the wavelength of light that the sample absorbs, we can know the energy level that is going into changing the bonds. This is measured as the percentage light transmitted through the sample versus the wavenumber (1/cm, which can be used to calculate the wavelength and frequency of the light). A "peak," or low spike in the IR spectrum

indicates that the sample absorbs at that wavelength, and therefore a bond is doing something with that energy. The peaks of common bonds are well studied, so by looking at the wavenumber of the peak we can accurately predict what bonds are in the sample being studied.

..ote that all of the spectra have a lighter line and a darker line. The lighter one is the original spectrum of that sample and the darker one is after adjusting to the baseline. Before any testing was done I did a "background scan," essentially scanning without a sample in place so that I could "blank out" any peaks caused by outside sources. The important things to compare are the darker lines, as they have been corrected by the computer program for the background and other possible errors.



(https://granitestateguns.files.wordpress.com/2015/10/acff67ef-912b-489a-b94f-6717c3ac412b_zpsgwmfkjgu.jpg)

Scan in progress. From here the spectrum was adjusted to a baseline and saved. Some spectra were then overlaid to compare sets of lubricants.

What this means for us:

By looking at the peaks in different spectra, we can see what bonds the samples have in common. I'll be doing a more in depth post after my results are posted on Vuurwapen Blog, so for now I'll ep it general. I don't want to ruin the surprise before Andrew can post the results. We already know all of the samples are hydrocarbons, so we can easily expect a major peak around the 3000-

2900 cm-1 range from the C-H bond stretch. If we see another peak in the spectrum of a sample, we can check the literature values for that wavenumber and determine what chemical bonds are there.

Nuclear Magnetic Resonance Spectroscopy:

NMR is a complicated but extremely useful method of analysis. Several of my professors have described it as "the gold standard in analytical chemistry," and for good reason. When combined with other methods of analysis it allows a chemist to determine the molecular structure of organic molecules.

How it works: Nuclear Magnetic Resonance is one of the more complex methods to explain. I spent most of a general chemistry class learning how it worked and how to evaluate the results. I'll do my best to explain it here without making it too complicated. NMR was actually the basis from which we get MRI imaging. Magnetic Resonance Imaging in hospitals uses the basis of NMR scanning to build a computer image of certain parts of the human body. So the next time you see a movie or TV show in a hospital where something metal goes flying across the room and sticks to the MRI machine, you can sort of understand how that machine functions. Yes, the magnets are that strong, but the nicer equipment usually has shielding to prevent flying metal parts like you e in the movies.

Nuclear Magnetic Resonance, like the name suggests, uses magnets to look at the nucleus, or core, of an atom. Certain isotopes (forms of the same element that have different masses) of varying elements can be used for NMR because they have an odd number of protons and neutrons. Neutrons and protons have "spin" values of plus or minus ½, and will pair up when possible, a +½ "up spin" pairing with a -½ "down spin" and resulting in no net spin. The reason that NMR requires an odd number of protons and neutrons is that the imaging requires a net spin that isn't zero to properly image the sample.

The NMR is essentially a giant electromagnet. It uses liquid helium to cool large coils of wire down to the point that they become superconductors. Liquid nitrogen is then used to help insulate this setup, because liquid helium is extremely expensive compared to liquid nitrogen. Depending on the exact setup the nitrogen levels must be topped off every week or so, with the liquid helium levels being maintained every few years. This giant magnet is powerful enough to align the spin of the nucleus in the sample to be either spin up or spin down relative to the magnetic field.

The down spin state is slightly lower energy, and therefore more stable. But there's not much difference in energy level, so even the relatively low power of radio waves can cause the nucleus to flip from spin down to spin up. Much like a ball balanced at the top of a hill, the up spin state is unstable and would easily "roll down the hill" to the down spin state. Much like IR

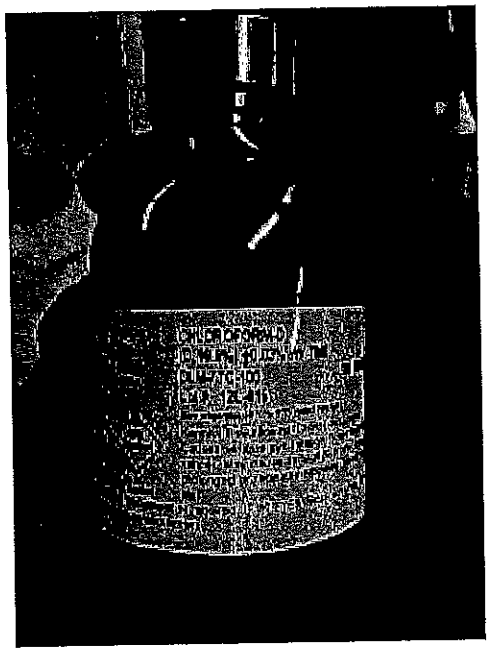
spectroscopy used IR waves and looked at what wavelengths of light were absorbed, NMR transmits a range of wavelengths of radio waves through the sample and looks at what wavelengths are absorbed and used to flip the spin states.

The NMR spectrum that results is shown as a series of peaks. The X axis (horizontal axis for those of you that don't remember high school math classes) is in units of parts per million, or ppm, and calculated based on the strength of the particular NMR used. So the raw data from a 300 MHz NMR is going to look different than the raw data from a 700 MHz NMR.

The Y axis (vertical axis) of an NMR spectrum is not measured in any standard measurement, instead it is relative to the specific spectrum. Each peak on the graph is shifted to the left based on the atoms it's bonded to, and the "shift" as measured in ppm will be consistent across all NMR spectra for that sample, but the height of the peaks will vary from NMR to NMR. The relative peak height will be consistent though. Given a single NMR spectrum with one peak being twice the height of another peak, the taller peak indicates that "type" of atom occurs twice as often in the molecule analized. When looking at the NMR spectra Andrew Tuohy posts please keep in mind that you need to compare the relative peak height between the two spectra, instead of directly comparing the peak height between any two peaks across the different spectra.

A note on NMR solvents:

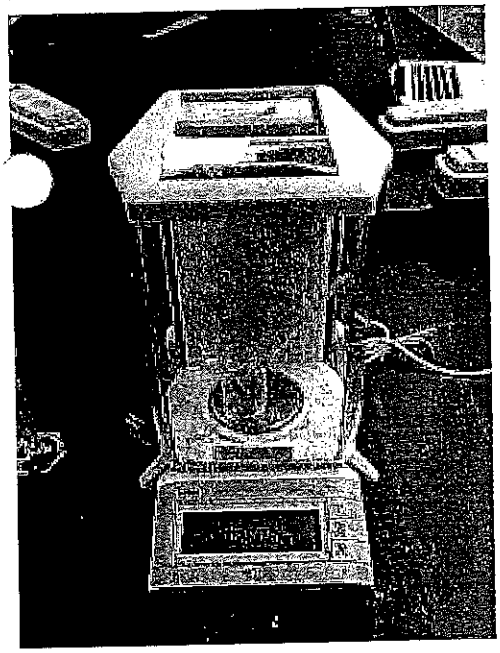
As stated, NMR detects atoms with odd numbers of protons and neutrons. Hydrogen-1 (known as proton NMR) and carbon-13 (or C13 NMR) are the most common, but other possibilities include nitrogen-17, oxygen-19, and many others. Unfortunately, hydrogen-1, also known as protium, composes approximately 99.9885% of all naturally occurring hydrogen. This means that using standard solvents will mask any chemical shifts from the actual sample. Therefore we must use special solvents that don't contain protium. To get around this, scientists have made solvents using hydrogen-2, known as deuterium (represented by a D). Many common lab solvents have been made using deuterium instead of protium. Water for NMR analysis is D2O or "heavy water." Other options for solvent include deuterated acetone, deuterated THF, and the solvent I used for this analysis, deuterated chloroform or CDCl3. No, chloroform is nothing like in the movies. You won't suddenly pass out from a tiny bit of it, although it doesn't exactly smell good...



(https://granitestateguns.files.wordpress.com/2015/10/e5374a8a-f0d9-4c76-8906-c24722b11f33_zpskskxmoqm.jpg)

I love the smell of Chloroform in the morning... Note that deuterated solvents are absurdly expensive. This bottle was 100mL and cost my school $60. Good thing I had free use of the labs

To prepare the samples I zeroed out a small beaker and a new NMR tube on an analytical balance. I then added as close as I could get to 0.25 g of sample #6 to the NMR tube. Approximately 0.6 mL of deuterated chloroform was measured out in a 5 mL graduated cylinder and added to the NMR tube via a pasteur pipet. The tube was then capped, labeled, and inverted several times to ensure the oil sample was fully in solution. This process was then repeated with sample #8 using new pipets. In order to get a "look" at the carbon structure of the oil samples, I decided to use C13 NMR. This type of NMR uses naturally occurring carbon-13 as the detected atom in the structure. For this analysis I used the 500 MHz NMR that my school has in their research labs, and the computer program converted the units to ppm. The images I sent to Andrew Tuohy of the data were the exact PDFs I was sent by Daryl Johnson, one of the people in charge of the NMR lab at my school.



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(https://granitestateguns.files.wordpress.com/2015/10/1fdaa186-05c8-4c8e-a40e-501bb919be8d_zpscd6cvpsl.jpg)

I don't want to beat Andrew to the punch, so I'm going to wait for my analysis of the data until he has posted the results. I sent him the IR spectra, several IR overlays to compared sets of lubricants that he had requested I look at, and the two NMR spectra. Keep an eye on his blog for the full data set. Shortly after he publishes the results I'll post my analysis as a chemist. Please note that I have no opinion on this issue. I have used FIREClean in my rifles in the past, and really don't care if it is or isn't canola oil. What matters to me are facts, which is why I used science. Regardless of the outcome, some people will disagree and get pissed off. To those people, I suggest you start studying for your PhD, then go buy your own NMR and run your own tests. The collective group of experts consulted for this projects totals over a hundred years of experience in chemistry, so I have full confidence in my results. Until someone shows otherwise with hard scientific facts, I will take my results as fact.

3 comments on "How To Science"

Pingback: Results Round 2 | Granite State Guns

Carl Opitz on October 23, 2015 at 3:26 pm said:
IR Spectrometer is good, NMR is better. But if you really what to know what something is, RGE is the best. 20 plus years semiconductor IND. CVD, PICVD. Diffusion process., Thin films. For what was ask of you. Your equipment was most adequate for the task. Good job.

Reply

granitestateguns on October 27, 2015 at 11:10 pm said:
Thanks for the input. I'm not familiar with RGE. I would have liked to do GC-MS as well, but the column was contaminated (or something like that, my advisor wasn't clear). Hopefully I'll get to that in a few months.

Reply

Granite State Guns

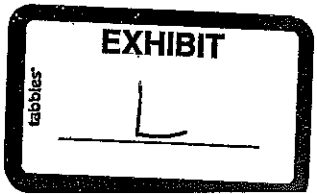
FIREClean vs. Canola Oil

Posted by *granitestateguns* on *October 29, 2015*
Posted in: Testing and Reviews. Tagged: Fireclean, Lies, Science, Technology, Testing. Leave a comment
NOTE: A few minutes after this was posted I received a message from FIREClean to my personal Facebook page. They sent a well worded and reasonable response stating that they will "wait and see what will be published or shared" regarding their products. I still have some research to do regarding the Iodine Value testing (I love that ASTM makes you pay to read what their standards are) so this post may be edited later, or followed up. We will see how this goes.

So I'm a bit late to the party, but Andrew Tuohy posted the results of the FIREClean/Crisco testing (http://www.vuurwapenblog.com/general-opinion/lies-errors-and-omissions/a-closer-look-at-fireclean-and-canola-oil/). I'm sorry I didn't post this earlier, but I was traveling and starting an internship. Maybe it's a good thing that I didn't get to writing about this right away, all things considered…

Before I discuss the results, I want to make it clear that I put a lot of thought into it before I even volunteered to test these samples for Andrew. I am a firm believer in free market economics, and I love to see small businesses get going and do well. If my testing showed FIREClean to be standard canola oil, I was concerned that I would play a part in the downfall of a business. Regardless of your feelings towards any company, I don't like to see companies fail. On the other hand, if my testing showed that FIREClean was different than canola oil, I would likely be accused of faking my data (more on that one later) or being paid off by FIREClean. In the end, I decided that no matter the outcome, I would do a fair and honest test in the name of scientific fact. That being said, on to the results.

You've probably already read the conclusion, so I won't hold you in suspense any longer. According to multiple tests and after analysis by several different chemists, FIREClean is pure and unmodified canola oil. I sent the spectra to my academic advisor at WPI and this was how he responded:



Well, those look fairly identical to me, who is not exactly an NMR expert. Your chemical shifts are all the same, except the peaks around 130 are more intense in one sample so the integration "found" more of them. But, the visual inspection of both spectra side by side shows that they are actually present, just not above the software's threshold for peak ID.

That's pretty good evidence for the two samples being identical, but of course it isn't 100% conclusive. You do have other tests to provide additional evidence, though!

The "other tests" he is referring to are the IR spectra of the samples. As many have claimed (and I agree), IR is not definitive proof of anything. What it is is simply another tool for an analytical or structural chemist to use in testing of samples. Combined with the NMR data, I feel confident when I say that the FIREClean I tested is canola oil without the addition of any corrosion inhibitors, stabilizers, or other enhancement materials. In addition, my advisor (a professor of chemistry at a technical school) and other chemists have agreed.

But FIREClean still refuses to accept facts. Shortly after Vuurwapen Blog posted the results of the testing they responded by claiming that their competitors were spreading lies and that "independent testing" showed that the Iodine Value of FIREClean is different than that of canola oil. I'd never heard of this method in analytical chemistry before, so I started doing some research. To summarize the process, a known mass of the sample being tested (usually 100g) is reacted with a known amount of excess iodine. The iodine breaks open the double and triple bonds in the oils and attaches to the carbon atoms on either side of where the bond was. Then the excess iodine is reacted with something to make it turn a dark color (the exact reactant varies based on the procedure, but some examples include starch or potassium iodide), and the solution is titrated to determine the amount of excess iodine that was in solution. This value is used to determine how much iodine was used in the reaction with the oil, giving an idea of how unsaturated the oil is (how many double and/or triple bonds the material has).

Unfortunately, this testing isn't as exact as FIREClean would claim. Various published papers I found showed that values for the same oil can vary dramatically. The procedure, exact reactants and solvents used, and a variety of other factors change the calculated iodine value. So when FIREClean claimed that they "proved" their product isn't canola oil, but then refused to post the labs that did their testing, it didn't help their cause.

Shortly after the iodine value post, FIREClean posted their own NMR data… sort of. They posted a clip of their own NMR spectra of canola oil and Fireclean, only showing the shift range from 2.5 to 4.7. I commented encouraging the use of scientific facts and asking what lab provided the "independently collected" data. They responded that they did "lots of testing" at lots of labs," but didn't say what labs or provide any other tests. I asked for a look at the full proton NMR spectrum, but they claimed that they are "a small private company" with "large well funded competitors," so they don't post much of their testing. I see this as an attempt to hide something. If the testing has been done (and it had to be done for them to post a piece of the spectrum at all), I don't see why they refuse to post the full dataset. I openly stated that I am the person who did the testing for Vuurwapen Blog, and that I want to give them a fair chance (and I do), so we will see what they do here.

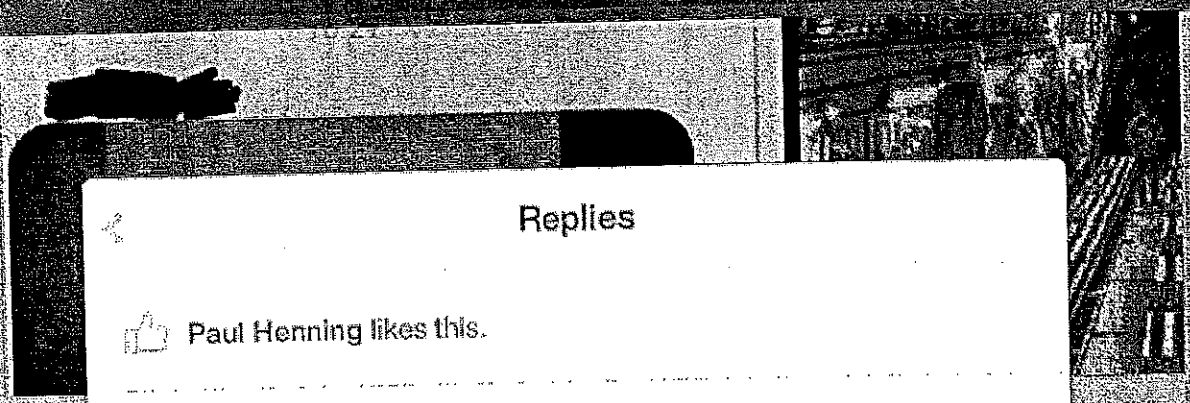
Why is the full dataset a big deal? For some tests it isn't. But this is NMR analysis. Remember how I said that peak size is relative in NMR spectra? Well you don't have something to compare the peaks with if you don't have the full spectrum. NMR peaks are compared via the integral value (the total area under each peak). FIREClean highlighted a difference of less than 1.1 between FIREClean and canola oil, claiming it "proved" their product is different than canola oil. If these were the only peaks then this could be a big difference, but these peaks represent only a small percentage of the total number of hydrogen atoms in the molecule. The majority of the hydrogen atoms in the samples are bonded to SP3 carbons (fancy science talk for the carbon having no double bonds) consisting of -CH3 or -CH2- bonds, and will result in a large peak with a shift in the 0.7 to 1.5 ppm range. With a peak this large (the spectrum posted on Vuurwapen Blog had an integral value of over 51) a difference of 1.1 between two smaller peaks is negligible. But what do I know. It's not like I took an entire college class to understand NMR. FIREClean is probably right, and clearly doesn't have a hidden agenda here.

What does all this mean? Take it as you wish, but I see it as FIREClean trying to save themselves. They are relying on a diehard group of customers that don't care about the absurd price and overwhelming scientific facts. FIREClean is trying to pretend they know chemistry and have "proof" that their product has some magical additives to make it worth $15 a bottle. In their defense, they likely do know chemistry decently well. Someone without chemistry knowledge wouldn't do as well at hiding behind their lies this long. ~~FIREClean started out just ignoring science, but now they have gone to blatant misrepresentation of scientific facts, something that really pisses me off. I took part in this testing to bring facts into the discussion, but FIREClean is heading toward the point of complete lies. Let's see how well that goes for them.~~ EDIT: FIREClean has messaged me stating that they will "wait to see what exactly is published or shared" regarding their products. See the note up top.

One comment that FIREClean has continued to use to attack those calling them out is the "Go see how canola oil works on your rifle" line. Unfortunately, our nation's capital isn't too friendly to firearms, so that testing will have to wait until my current internship is finished. But when I'm home in December I fully plan to make use of the gallon of canola oil I have. And what better way to test it than a New England winter and a few hundred rounds of cheap steel cased ammo. Soon enough...

Vuurwapen Blog

Ed



Replies

Paul Henning likes this.

Vuurwapen Blog
Well, I don't think it's crisco. But I do think the formulation is a lot less whiz-bang than it's been made out to be. More power to them for having been able to sell something at a 100x markup for three years, but they had to know the gravy train would come off the rails at some point. I admire their gusto for having done it and part of me wonders if I could look people in the eye and tell them they needed to spend $7.50 an ounce on some sort of cooking oil for their gun. I don't think I could.

Jeff Rogers
You'd be doing it through a monocle, because rich people use such things

Henry J Fontanills
I agree. Why not just own up to it though? PR would dictate just going with a "yes the chemical properties closely mirror cooking oil but our whiz bang scientists added a special sauce."

Visitor

I was reading through some old issues of Flying magazine from the 50s through the 70s (they're all available on Google Books) and came across a review of the Maule M4. In the review, the author/pilot says that it had some merits, but that it didn't live up to the claims of the manufacturer, and

EXHIBIT
tabbies

★ **Andrew Tuohy**

OCTOBER 29, 2015 AT 19:59

The very first video on this subject, the one that started all the controversy, showed that the smoke point was the exact same for the two oils. This was repeated elsewhere with the same results.

Iodine, as I understand it, is a range. It's not like body temperature, where if you're not really close to 98.6 you're in trouble. Canola oil can be anywhere in a range, and that range is very close to FireClean's self reported value. But knowing that FireClean has been willing to manipulate testing to make themselves look good, why would you trust anything they say?

I'm already testing the functional side.

As for why these tests? I went to recognized experts in chemistry and asked them how to answer the question originally posed on this blog. They went with IR and NMR. When conducting their own testing to determine the same things, they used the same tests.

You seem to have a real problem with twisting what I say and/or putting words in my mouth and I'm getting pretty tired of it. Quote me directly or don't bother.

↩ REPLY

Jon Gifford

OCTOBER 30, 2015 AT 07:49

That was MY video, and it was done on a kitchen stove. I believe I prefaced it as "the best tool I had available for the job, at the time". Also, considering that FC may indeed contain Canola oil, in an unknown percentage, the results of it may be rather explainable/accurate. Regardless, why not have a professionally done flash-test? That would be much less error-prone. Here is another

EXHIBIT
N
tabbies

55 THOUGHTS ON "A CLOSER LOOK AT FIRECLEAN AND CANOLA OIL"

1. **Pat**
OCTOBER 23, 2015 AT 09:14

Excellent article. Thank you (and those involved) for taking the time to conduct these tests and for sharing the results with us in an informative manner.

I have yet to use FireClean, and based on how they've handled things since this whole thing started, I probably never will. I'm sure your data won't change the minds of their most hardcore supporters, but hopefully it'll start a dialog and some people might start thinking critically for a change.

I started using CLP back when I was in the Canadian Army, since that's what I was taught to use, and I still use it occasionally. Nowadays I tend to use Slip 2000 EWL and I've had good results with it. I am curious to see if it's one of the lubricants that you have tested, since it seems to have similar application instructions, and makes similar claims of metal conditioning. Their website even mentions seasoning a frying pan: https://www.slip2000.com/slip2000_gunlube.php
REPLY

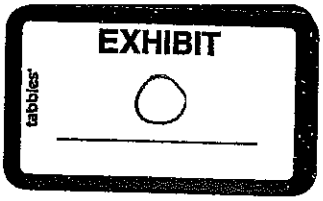
1. **Everett**
OCTOBER 23, 2015 AT 10:52

Since the samples yet to be discussed were "solid" grease type samples I don't think that slip 2000 was included. But I'll make sure to keep it in mind if I do a future round of testing.
REPLY

2. **Dane**
OCTOBER 23, 2015 AT 10:17

I have been using gunzilla for a couple years now and love the stuff. It is marketed in much the same way as Fireclean, what with the non toxic, biodegradable and so on. I would imagine it is likely similar, if not the same, as vegetable oil as well. Thanks for putting in the work on this Andrew, it's been interesting reading about the process.
REPLY

3. **Bill**
OCTOBER 23, 2015 AT 10:45



Vegetable oils and animal oils/grease are nothing new in the firearms world. The only thing fireclean did was use fancy marketing and questionable claims to market an already established product.
REPLY

4.  **Sian**
OCTOBER 23, 2015 AT 10:51

So I think the definitive test would be if someone whipped up a batch of fries cooked in FireClean and did a taste test.
REPLY

1.  **Brian**
OCTOBER 23, 2015 AT 12:12

There is a video of 2 guys frying eggs with Fireclean. The amount of Fireclean needed to deep fry french fries can probably only be afforded by LAV with his employee discount.
REPLY

2.  **Dink**
OCTOBER 23, 2015 AT 12:33

Who has $400 to spend on fireclean for frying? Would have to be a very small batch of fries.
REPLY

5.  **RyanDaNurd**
OCTOBER 23, 2015 AT 17:50

Yaaay Bruker NMR!

But seriously I'm happy to see actual NMR data to back up the IR work previously done. It's much better than IR for comparing things such as this. (IR does a good job but if you really want to be sure, you go to the NMR dungeon and stuff your sample in the magnet)
REPLY

6.  **Steve Sanders**
OCTOBER 23. 2015 AT 23:09

This article says 18 different oils were tested, to include Fireclean and Canola Oil. Where are the results for the other 16? I would be interested to see where they compare with the Canola Oil.
REPLY

1. **Andrew Tuohy**
OCTOBER 24, 2015 AT 17:26

Check the previous two articles on this blog and check back for future articles.
REPLY

1. **ZANG**
OCTOBER 28, 2015 AT 20:20

This certainly is a slam dunk on the whole issue. So much science. And then more science, twice with Doctors. The world needs more of this.

I thank you!

Senior Zang .
REPLY

7. **Greg**
OCTOBER 24, 2015 AT 07:51

canola oil will oxides and gum. Far as I know,no complaints from the gun community. It might be canola but they might found away from keeping It from oxidizing.
REPLY

1. **Everett**
OCTOBER 26, 2015 AT 17:34

I'll hang on to the samples and check back in a few years, but it doesn't look like it. the C13 NMR shows relatively equal peaks in the areas indicating C=C double bonds. A lot of the chemistry relating to oxidation and gumming up (which could also be from polymerization) would likely come from either those double bonds or the ester bonds in the triglycerides.
REPLY

8. **Andrew R**
OCTOBER 24, 2015 AT 08:35

Andrew,
This is exactly the sort of thing I've come to expect from your blog and one of the reasons I've continued to read. Thanks for being a beacon of truth and accuracy.
REPLY

1. **Everett**
OCTOBER 26, 2015 AT 17:34

Science: It's like magic without the lies
REPLY

9. **Chuck**
OCTOBER 24, 2015 AT 09:34

Here's my take fwiw. I guess I got taken. I've used fireclean and it worked, but now with all this evidence and especially the video with LV, I no longer have any faith in this company or LV. I actually threw out all my fireclean and unsubscribed to LV. Let's see if they are at next years shot show. This will also hurt other manufactures because it will cause serious doubt on any claims that are made. I also threw out my Rand CLP, Gunzilla, and Frog lube. I went back and read Grant Cunninham's lube 101 article, and promptly bought the lubriplate kit. At least it's honest and does what a lube should do without all the bullshit claims.
REPLY

1. **Everett**
OCTOBER 26, 2015 AT 17:37

I'd love to see this make people question things. I hope I don't make you distrust lubricant companies, but question claims before you blindly believe things. I spent way too much on Fireclean at one time too. Don't be mad about it, it still works as a lubricant, so use it for that. And when you go to buy more just know you can get it for less in the cooking section.
REPLY

10. **ShawnB**
OCTOBER 25, 2015 AT 05:28

I've been using single stroke motor oil on my guns for years, really cheap generic hardware store brand, the kind intended for a lawnmower that sells for $2 per jug. It works really well too. Generic white lithium grease also does a good job. People have always called me crazy, the same people who were paying $10 for a tiny bottle of Militec-1, or whatever trendy high tech space lube had just been invented.
I can't say I'm really surprised that a company came along and started repackaging cooking oil to sell to the gun community. Ours is an industry that is filled with disposable income, and at times shockingly little common sense. Ripe for the picking by a company with good marketing and endorsements by figure heads with questionable scruples.

Everyone should take this article to heart and remember it well when your local gun shop starts stocking a new wonder lube. They may not all be snake oil, but 99% of the time it hissed and had fangs before they bottled it.
REPLY

11.  **2hotel9**
OCTOBER 26, 2015 AT 04:27

Well, good. I'll just keep using remoil in the spray can and 3n1 oil in the squeeze bottle, and wd40&elbow grease for cleaning.(remember, kids, wd is a water dispersion/cleaning product, not a lubricant!) I know you been taking a lot of grief over this, AT, and I say f*ck'em. I was skeptical of FC when I smelled it and it made me think of some concoction a chick would rub on her snootch before a date. 'nough said.
REPLY

1. **Andrew Tuohy**
OCTOBER 26, 2015 AT 17:29

I laughed heartily at this.
REPLY

1.  **2hotel9**
OCTOBER 27, 2015 AT 03:48

Glad I could lighten your day!
REPLY

12.  **2hotel9**
OCTOBER 26, 2015 AT 04:39

Oh, and AT? Now that you have put this one in its grave how about some write ups on AKs. I know, I know, AR plat is your wheelhouse, still, applying your lazer-like focus to any subject will surely improve it! Look what you did for the fast food industry.(sorry, you left that chain lying there and I had to give it a yank, since you never got around to reviewing the Primanti Bros Samich)
REPLY

13. **Jon Gifford**
OCTOBER 26, 2015 AT 10:24

Mr. Touhey, I have noted that you used to sing the praises of Fireclean, and now you do not. Even going back on your sentiments so much as to call the firearms which you used in your 40,000 round ammo test as a "a good rifle built by Bushmaster". Well, originally half of them had barrel nuts hand-tight, as I remember that article. Regardless, you have shown that the weapons functioned very well in dust, rain, mud, etc. for thousands upon thousands of rounds, with little lube involved, and you praised the product heavily at the time. So, I would ask…why are you now attacking it? You have yet to produce a single failure of it to deliver on its advertised performance. You have managed to find / create NMR test data which shows FIREClean has similar signature as Canola oil. However, similar is not identical, and it may well contain Canola oil. The patent has made it quite clear that the product is a blend of various oils, yet you have set out on a path to stat that it is one specific oil, and you are pushing Canola (Rapeseed) oil, as that oil.

Further, I would direct you to numerous research articles which expound on the film strength, heat management/endurance, and other attributes of vegetable oils, in general. Vegetable oils are indeed VERY resilient when dealing with heat, and have boundary film strengths far in excess of petroleum based products. I have found nothing wrong with Fireclean's claims, here. A quick Google will show this to be born out on many pieces of very expensive equipment in the food and other industries where petroleum is a no-go, or where the specific attributes of a vegetable oil are better suited.

I would then address your regression back to the realm of fact…calling Fireclean a vegetable oil. Okay…but we already knew this.

Then you attack the product again, saying that a vegetable oil / blend does not warrant the cost, nor the title of "most advanced", etc.

The rub here, is you still don't know what the product is, how it is created/mixed/synthesized, etc.

Goose and Taaka are very similar, chemically speaking.

So I would ask…why are you attacking a product you once championed, and using half-truths and changing your story to do so? Has Fireclean caused an issue in function? Did one of the guys who owns the company kick your dog, metaphorically? I am curious, why the about-face?
REPLY

1. **Jon Gifford**
OCTOBER 26, 2015 AT 10:25

I'm sorry for the butterfingered typing, Mr Tuohy. It's been a long shift, and I did not mean to butcher your name. Apologies.
REPLY

1. **Andrew Tuohy**
OCTOBER 26, 2015 AT 17:19

No offense taken. If I had a dollar for every time someone has misspelled my name, I could buy a months' supply of FireClean.
REPLY

2. **Andrew Tuohy**
OCTOBER 26, 2015 AT 17:18

An obvious question, I guess, but one not based on facts. My only agenda here has been to conduct research and report on it truthfully.

You say that I used to sing the praises of FireClean and have now changed my story. Well, let's look at my actual statements, not your recollections.

I have been very consistent in saying that FireClean works very well as a lubricant for the AR-15 platform. I even say that in this article to which you responded (perhaps you missed that).

However, unlike others in the industry, I haven't quite championed it. In the LuckyGunner test article, where you claim I "praised the product heavily," FireClean is mentioned in wholly objective terms as the lubricant used and I neither champion it nor denigrate it. I also reviewed the blog's Facebook page from that timeframe and did not see any outstanding praise of FireClean. If you look at this article written in 2013, I say that Fireclean works very well but that I would not buy it due to cost. If you don't believe me, check internet archives – that article hasn't changed since publication, to the best of my recollection.
If you can find any quote from me in which I champion FireClean above all other oils or say that it is the best oil ever or say that I'll never use another oil or say that it made my rifles run better than anything else or say that it made all the difference in the 40,000 round test and without it the rifles wouldn't have worked as well – the likes of which we've heard from

others in the industry and ones which I would certainly consider championing – by all means, bring it to my attention.

More recently, I set out to address two rumors that were going around regarding FireClean – that it was Crisco, and that it would gum up over time. In this post, you can see that I intended to address both. On the first one, gumming up an action after prolonged storage – draw your own conclusions from the video – but it was hardly an attack on FireClean. Naturally, the FireClean people loved that video.
On the second point – the Crisco rumor – I conducted research and reported on it. I attempted to include feeback from the company, but they were more interested in misdirection.

I then saw the obvious manipulation of the "Fireclean Lube Test" video – ridiculousness of the claims notwithstanding – and reported on that as well.

Finally, you have this post which addresses concerns from those who say IR spectrography is not conclusive enough.

I hope that this helps you understand that at no point have I used half truths or changed my story. I feel that I have been exceptionally consistent, considering recent revelations. I'll repeat what I said in 2013 – Fireclean works very well as a lubricant, but I wouldn't buy it because it's too expensive.
REPLY

1. **Jon Gifford**
OCTOBER 29, 2015 AT 00:47

I suppose my largest qualm with what I've read on your blog is that FIREClean claims to be a blend of multiple oils. I myself have tried physically mixing it with vegetable oil, as well as canola (rapeseed) oil, and it does not readily mix. For all I know, it contains rapeseed oil as a component, I won't argue for/against that. However, even to the casual observer, it is clearly not the same. All of the lab data you have produced/had produced also indicates that it varies significantly from pure rapeseed oil. For example, please see this: http://www.process-instruments-inc.com/images/PI_Raman_Cooking_Oils.jpg I am sorry that the image is so bloody small, but the point is made. There are AT LEAST as much variances on the spectrum analsysis you have shown of Fireclean, and yet you say that it is "functionally the same", or at least that's the gist, as Canola/Rapeseed oil. Well, there is Raman spectra of multiple oils with VERY different properties, and they look just

as similar as your Fireclean vs. Canola graphs, yet we clearly know that Canola oil and Vegetable oil (soybean) have very different properties. So I guess what I'm asking is…why have you chosen spectrum analysis as your method to prove that Fireclean = Canola oil? I think that if you want to prove that Canola = Fireclean, you need to subject them to PERFORMANCE tests, such as falex weld point, smoke point, iodine uptake (already done by fireclean), and other things like that, because as we can see, most vegetable oils look darn similar on spectrum analysis, and I feel that using that tool is very misleading to the public at large. It would be like me trying to sell you TAAKA instead of Grey Goose and using "alcohol content" as the thrust of my sales pitch. So I would ask…why have you chosen the most ambiguous method? Why choose the only method that seems to support your views, which is also scientifically valid, instead of some of the other tests which are more in line with its intended use? A firearm cannot read a spectrum analysis any better than most of your audience, but it CAN see smoke-point, coefficient of friction, falex weld point, etc…I would like to see how FIREClean and Rapeseed oil differ on THOSE points…now if they don't…THEN you have a case. Otherwise, you're just selling me TAAKA instead of Goose and brandishing alcohol % by volume as the reason I should buy, IMO

REPLY

1.  **2hotel9**
   OCTOBER 29, 2015 AT 05:26

   "why have you chosen the most ambiguous method?" Really? Repeated testing by multiple sources is "ambiguous"? Glad I was done with my coffee when I read that one.

   REPLY

   1.  **Jon Gifford**
      OCTOBER 30, 2015 AT 07:43

      Here is NMR data for 20 distinct marine, plant, and animal oils. Would you say that they look "almost identical"? I think you'll find NMR is rather ambiguous for some applications…

      [img]http://www.process-nmr.com/images/productspage/edible10.gif[/img]
      http://www.process-nmr.com/edible_oils_nmr_spectra_at_60.htm
      Have some more coffee. It probably doesn't matter which brand you drink, either, as they are all "almost identical" ;)

2. **Andrew Tuohy**
OCTOBER 30, 2015 AT 07:57

I have no clue, that's why I relied on the opinion of people with PhDs in related fields who are paid a lot of money to analyze this stuff.

3. **2hotel9**
OCTOBER 31, 2015 AT 06:48

So, you are one of those people who always asks the deal to hit you when you have 19. Glad we sorted that out.

4. **Andrew Tuohy**
NOVEMBER 2, 2015 AT 10:26

I think the fact that FC chose to conduct their own NMR testing speaks volumes about its importance. They probably planned to release their tests as triumphant evidence of how their product was different, not knowing I and others were pursuing NMR as well.

5. **2hotel9**
NOVEMBER 3, 2015 AT 07:14

They have fallen victim to "overzealous advertising executives", people who watched Mad Men too much. They are not the first and will certainly not be the last. Bad thing is they had a product that appears to work as well as others in the market, could have turned it into a multi-product brand. Instead people are laughing at them.

2. **David**
OCTOBER 29, 2015 AT 07:02

Well, AT has this to say about "tests carbines can see":

"I'm also happy to report that my ARs lubricated with canola oil almost two months ago are still chugging along with no malfunctions."

So, I bet the FC guys never did spectrum analysis or anything – probably just bought different brands of oil and tested them in their suppressed SBR. After they found one they like then talked to a lawyer for their patent who said "whoa – you can patent a repackaged product – you need to make some changes" – so the FC guys added a little something or other to their oil.

So Andrew, running Canola oil, is doing the exact same testing if my hypothesis is correct.
REPLY

3. **Andrew Tuohy**
OCTOBER 29, 2015 AT 12:55

The very first video on this subject, the one that started all the controversy, showed that the smoke point was the exact same for the two oils. This was repeated elsewhere with the same results.

Iodine, as I understand it, is a range. It's not like body temperature, where if you're not really close to 98.6 you're in trouble. Canola oil can be anywhere in a range, and that range is very close to FireClean's self reported value. But knowing that FireClean has been willing to manipulate testing to make themselves look good, why would you trust anything they say?

I'm already testing the functional side.

As for why these tests? I went to recognized experts in chemistry and asked them how to answer the question originally posed on this blog. They went with IR and NMR. When conducting their own testing to determine the same things, they used the same tests.

You seem to have a real problem with twisting what I say and/or putting words in my mouth and I'm getting pretty tired of it. Quote me directly or don't bother.
REPLY

1. **Jon Gifford**
OCTOBER 30, 2015 AT 07:49

That was MY video, and it was done on a kitchen stove. I believe I prefaced it as "the best tool I had available for the job, at the time". Also, considering that FC may indeed contain Canola oil, in an unknown percentage, the results of it may be rather explainable/accurate. Regardless, why not have a professionally done flash-test? That would be much less error-prone. Here is another video I did with Rand and Froglube. Can you conclude that they are identical because they burst into flames simultaneously?https://www.youtube.com/watch?v=P_GMBvypr7M

2. **Andrew Tuohy**
OCTOBER 30, 2015 AT 07:56

Oh. Now I understand the pedantic behavior.

4. **Everett**
OCTOBER 29, 2015 AT 16:51

This issue first came up due to the smoke point testing. Back then the argument was "smoke point doesn't show anything, do real chemistry before you make claims."

So I did, and Andrew did, and other chemists did. Now I have FireClean Facebook messaging me trying to get me to believe that their reaction based chemistry "data" somehow proves the exact opposite of what data is saying, and they want to go back to performance testing. All the while they refuse to post the entire data set from any test and claim they have their testing done by "the most respected lab in the industry" but refuse to provide the name of the lab.

As soon as I get back to the lab I'll be doing as much more testing as I can. I guess this is what Andrew warned me about when he said the results would piss people off either way…
REPLY

1. **Andrew Tuohy**
OCTOBER 29, 2015 AT 16:54

I do find it funny that they're now referring to me as simply a "blogger" when before this, they were offering to pay me money to make videos for them and pushing my work far and wide as proof that their product works. Well, they're still doing the latter, they just don't want people to know I'm behind both the 40k test and this one.

2.  **2hotel9**
OCTOBER 30, 2015 AT 04:57

Marginalizing and silencing "bloggers" is the next big thing. Just look at the wailing&gnashing of teeth from "professional journalists" over bloggers banging their a$$es. Shutting up the rabble is going to fail, cause the harder they try the louder the "rabble" gets.

3. **David**
OCTOBER 29, 2015 AT 18:59

"Pay no attention to the man behind the 40k test… he's a blogger, he's a nobody!"

sigh

4. 
2hotel9
OCTOBER 30, 2015 AT 04:49

Just be glad they can't Galileo you!

5. **Jon Gifford**
OCTOBER 30, 2015 AT 07:51

Let's get some physical property data. NMR is useless as I have pointed out and demonstrated previously here. Lets see specific gravity, flash-point, pour point, coefficient of friction modification, etc.

6. **Andrew Tuohy**
OCTOBER 30, 2015 AT 08:00

You haven't demonstrated anything, you've just thrown a bunch of crap at the wall in attempt to see what sticks.

14. **David**
OCTOBER 27, 2015 AT 12:41

Andrew,
If FireClean is too expensive (and, like you, I'm not a big fan of their handling of this whole thing…) what lube would you recommend?
David
REPLY

1. **Andrew Tuohy**
OCTOBER 27, 2015 AT 18:52

If you want to buy a gun oil, I have used FP-10 with excellent results over the years. I'm also happy to report that my ARs lubricated with canola oil almost two months ago are still chugging along with no malfunctions.
REPLY

1. **David**
OCTOBER 27, 2015 AT 20:24

Hehe. And how does performance/cleanability compare to FireClean?

My hunch is that, since there are various versions of Canola Oil (derivitives of Rape Seed Oil, with less of certain acids), that the FireClean guys found the version that worked the best. So there was, as they say in the Vickers Video, some trial and error.
So, what kind of oil (brand/name) are you using, and how is it faring? Can you perceive ANY difference compared to FireClean?
My other hunch (and this is based on me never having used FC) is that part of what makes FC work is their specific application instructions (i.e. strip off the old oil, etc). Thoughts?
REPLY

2.  **2hotel9**
OCTOBER 29, 2015 AT 05:20

Plus that delicious chickenwings and french fries aroma after 100 rds!

Seriously, though, there are so many effective and relatively inexpensive weapon lube options that it comes down to personal preference in the end. FC made its biggest mistake in letting a REMF advertising hack go way overboard in their initial roll out, then doubling down on stupid when people called them on it. Not uncommon in the business world, it just did not fly with the firearms using crowd and they got smacked for it.

David? AT is right on FP-10. I am a fan of remoil spray and 3n1. Its kinda like beer, got to find one you like and run with it.
REPLY

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15. Pingback: FIREClean vs. Canola Oil | Granite State Guns
16. Pingback: Weekend Knowledge Dump- October 30, 2015 | Active Response Training

17. **Adam**
OCTOBER 30, 2015 AT 13:16

So if the vegetable oil works so well then why pay any manufacturers to buy their expensive gun oils?

AT, how many rounds have you shot in your weapons lubricated with canola oil? It sounds like

with an election year coming that vegetable oil should be hard to find.
Can you do a performance write up on your results? Keep us updated!

Everyone knows LAV is a paid and sponsored advertiser. Daniel Defense, Glock, Fireclean, Wilson combat, the list goes on.
I found FireClean through his website and I have used one bottle for over a year and a half. It works like you said. If Crisco works exactly the same I'm eager to know before I need to purchase another bottle of lubricant. Who wouldn't want to save money and run something cheap and so plentiful that you can find it everywhere easily.
REPLY

18. **Jon Gifford**
NOVEMBER 4, 2015 AT 03:22

I have not "thrown a bunch of crap at the wall to see what sticks", Mr. Tuohy. Respectfully, you have posted numerous graphs that students and professors have taken the time to create for you, based on data gleaned from FTIR and NMR tests. Every graph shows a slight difference in the signature of FC and every other oil you have used. I then posted a graph of 20 distinctly different oils, as tested via NMR, and they all look just as similar as your FC vs. Canola oil NMR test. I understand the FTIR and NMR are the only tests you have posted comparing Fireclean to other products? Am I mistaken?

You are using tests which will not show much variance at all, as demonstrated here:
http://www.process-nmr.com/edible_oils_nmr_spectra_at_60.htm
Then you are basically saying "Science!" and concluding the issue, as best I can tell. Well, the issue is not concluded, as you can see, as I have data which when subjected to the same sensitivity that you are requiring, shows 20 distinct oils as being "functionally the same". Yet we know this is, of course, not an accurate interpretation of the data.

I see then that you've insulted me by saying I'm "being pedantic", and "throwing a bunch of crap at the wall". I think this is a perfect example of projecting, Mr. Tuohy, as I have simply countered your assertion that the NMR data and FTIR data is meaningful within context. I countered it with lab data which I sourced, and have linked you to, from a vetted and established

institute, which you can readily see. For my trouble, I was told "you're throwing a bunch of crap at the wall to see what sticks". My interpretation of all of this? You're slinging crap at Fireclean to see what sticks, and it's starting to slide off, because you did not do your homework, used tests whose sensitivity you did not understand with regards to the task at hand, presented them as conclusive, and are now seeing that they support the evidence of the opposition when compared with more tests of their ilk, in context. The next insult I will dignify by addressing, is your calling me "pedantic". What does pedantic mean? Mr Tuohy, the definition of "pedantic", as I am sure you are aware, is to be overly concerned with details…Mr. Tuohy…this entire topic is about DETAILS…this is chemistry, science, and it might turn into law. All of which hinge upon being a little bit pedantic, although I prefer the term "diligent".

So, again, I would ask…why did you choose these methods to compare the substances? Why are you insisting that FIREClean is 1 substance, and not the multiple substances that it claims it is a mixture of in the patent? Why have you resorted to insulting me and my methods when you don't even claim to understand the methods you are presenting, and are now distancing yourself by saying "I have no clue, that's why I relied on the opinion of people with PhDs in related fields who are paid a lot of money to analyze this stuff." That sounds very much like "I was just following orders". It's not a good defense, legally, personally, or even socially.

I suppose I would close my argument in saying that I hope you can product data which shows a functional difference in FIREClean with more sensitivity than the NMR/FTIR data shows. If indeed it truly is Canola/Rapeseed oil, which I doubt, I'd be the first to cry foul, but everything your FTIR/NMR data shows indicates that it differs meaningfully, when the tests are viewed in relation to the sensitivity that is expected between two samples of organic oils (see my composite of 20 different).

Your own data is supporting FIREClean's assertions. I say "your", yes, I acknowledge that this data is sourced.

At any rate, Mr. Tuohy, I cannot say that your material is conclusive either way, when viewed objectively, except to say that Fireclean is indeed organic oil(s). I believe that an honest review of what you've posted, as well as comparisons from 3rd party companies to your data, regarding other organic oils and their NMR/FTIR signature similarities will lead the reader to similar conclusions. I wish you well in your en devours, and hope that the students/professors supplying data for you will be able to create a conclusive comparison that is transparent and definitive, one way or another.

REPLY

1. **Andrew Tuohy**
NOVEMBER 4, 2015 AT 15:21

Several months ago, FireClean wanted to sue you. When we were still on speaking terms, I urged them not to. Maybe they still threatened to do so, and that's why you've made such an abrupt about face? They certainly alluded to suing me before I ever published any of this.

It's funny that you were so ready to call FireClean and Crisco identical based on burning some nickels on your stove, and now you're saying that these methods and conclusions are flawed. You must have earned the world's fastest chemistry degree in the last two months. I quoted the PhDs because they are more qualified to look at and analyze these results. That's a pretty simple fact.

As to the rest of your wall of text, I do not care what you think of the data. Your past history of erratic behavior and obsession with various firearm lubricants calls into question any authority you may have on the subject. I am, however, not FireClean, and so I will not censor your responses here. Feel free to continue tilting at windmills.
REPLY

1. **Jon Gifford**
NOVEMBER 5, 2015 AT 00:18

I call things like I see them. Mr. Tuohy. That means that my viewpoints and my opinions are subject to change as I have new data available to me. You like FP-10…you had to use something before that, right? Then you learned of it, tried it, liked it, and new data available to you created a change in habit, yes? Well, there ya go!

As to the rest of your post, I sent you a PM because it is more appropriate as a personal conversation.
REPLY

19. **Jim R**
NOVEMBER 5, 2015 AT 19:49

Once again, thank you. I don't have a dog in this fight; I am a casual shooter and the CLP I learned to use in the Army is good enough for me.

What is impressive to me is the rigour with which you've followed this up. In this day when people argue "science" based on what they think they remember reading on a web page or heard on TV, it's refreshing to see the tools of actual science – STARTING WITH A SKEPTICAL MIND – brought to bear on a question.
REPLY

being a beacon of truth and accuracy.

REPLY

Everett

OCTOBER 25, 2015 AT 17:34

Science: It's like magic without the lies

REPLY

Chuck

OCTOBER 24, 2015 AT 09:34

Here's my take fwiw. I guess I got taken. I've used fireclean and it worked, but now with all this evidence and especially the video with LV, I no longer have any faith in this company or LV. I actually threw out all my fireclean and unsubscribed to LV. Let's see if they are at next years shot show. This will also hurt other manufactures because it will cause serious doubt on any claims that are made. I also threw out my Rand CLP, Gunzilla, and Frog lube. I went back and read Grant Cunninham's lube 101 article, and promptly bought the lubriplate kit. At least it's honest and does what a lube should do without all the bullshit claims.

REPLY

Everett

OCTOBER 25, 2015 AT 17:37

I'd love to see this make people question things. I hope I don't make you distrust lubricant companies, but question claims before you blindly believe things. I spent way too much on Fireclean at one time too. Don't be mad about it, it still works as a lubricant, so use it for that. And when you go to buy more just know you can get it for less in the cooking section.

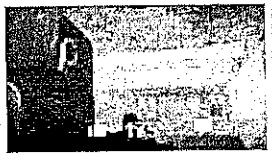
REPLY

EXHIBIT

tabbies

P

ShawnB



VISITOR POSTS

HaldiThavis Collins
January 28 at 8:54pm

Just wanted to say thank you for the podcasts! They are an unexpected gem.

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Johan Geldenhuys
January 28 at 4:43pm

More morewest lemand dalk van n nommer of lemand hoer op IN die CFR... See More

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Alex Hill
January 28 at 5:19pm

Grey Ghost Precision rep says their .308 Specter Heavy "saw combat i... See More

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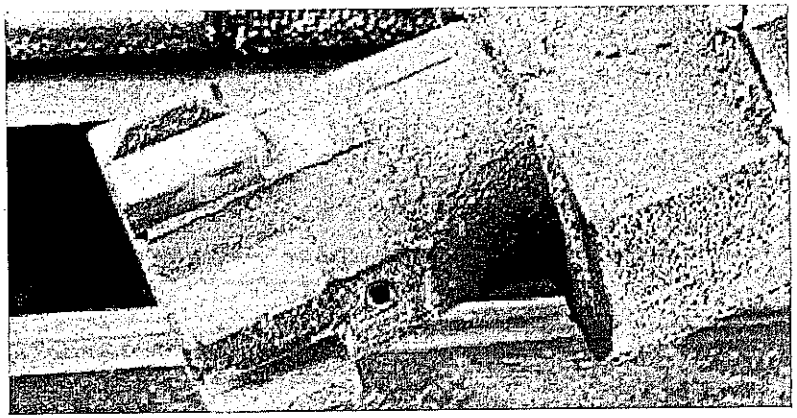
Vuurwapen Blog
January 13 at 9:39pm

It has been just over three years since the LG brass/steel 40,000 round test was published. If you have not looked at it in a while, I would encourage you to do so again. There are lessons in there for everyone (including me).

If we look at this photo from the article which I have selected, you can see one of the bolt carrier groups at the halfway point. This would be five thousand rounds with a brief scrub at 2500 rounds. It is filthy and has lots of carbon caked on. The contact points on the bolt are scraped clean by force of mechanical action. The oil used was Fireclean.

Keep this photo in mind the next time you see an image of a dirty AR BCG with "10,000 rounds and no cleaning" that looks much wetter and cleaner than this one.

People lie for the strangest reasons but one of the more common reasons is to separate you from your money. Question people when they make statements you find hard to believe. Don't be a fool. Be an educated consumer.



Brass vs. Steel Cased Ammo - An Epic Torture Test

This comprehensive 40,000 round brass vs. steel torture test examines at key indicators of ammo performance and cost in AR-15 rifles.

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Heidi/Travis Collins

Just wanted to say thank you for the podcasts! They are an unexpected gem.

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Johan Geldenhuys

More more.weet iemand dalk van n nommer of iemand hoer op IK die CFR... See More

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Alex Hill

Grey Ghost Precision rep says their .308 Specter Heavy "saw combat l... See More

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Simon Ni Didn't some of the locking lugs in that test shear off or something?

Like · Reply

Vuurwapen Blog Nope

Like · Reply

Simon Ni Vuurwapen Blog I'm probably getting confused with the Filthy 14 test

Like · Reply

Henry J Fontanille Filthy 14 did.

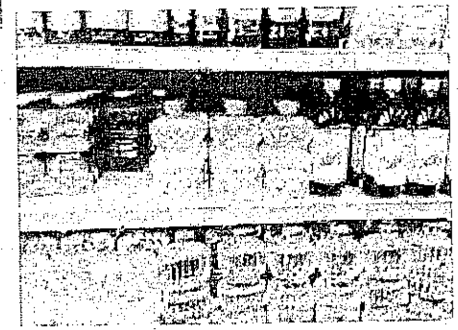
Like · Reply

Joshua Berry Filthy 14 didn't break a lug till it hit just north of 16,000 rounds.

Like · Reply

Write a reply...

Siwei Wong Speaking of FireClean, is this a good deal?



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Vuurwapen Blog Canola oil. Go for the green cap.

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EXHIBIT R

PETRO-LUBRICANT TESTING LABORATORIES, INC.

Member A.S.T.M.

116 Sunset Inn Road
PO Box 300 Lafayette, N.J. 07848
fax 973-579-9447
phone 973-579-3448

September 28, 2015

Test Report 15091801

Fireclean LLC
P.O. Box 192
Ashburn, VA 20146

RE: Your samples of September 18, 2015

Final Report

Dear Sir,

Analysis of your samples has been completed. The results are as follows:

	Test Methods							
	ASTM D5554 Iodine Value	ASTM D445 Kv @ 40°C	ASTM D445 Kv @ 100°C	ASTM D97 Pour Point	ASTM D92 Flash point	ASTM D92 Fire Point	ASTM D1298 Specific Gravity @ 15.6°C/15.6°C	ASTM E1252 FTIR Spectrograph
Crisco Pure Canola Oil Lab# 15091801	113 cg/g	36.07 cSt	8.069 cSt	-21°C	324°C (615°F)	356°C (673°F)	0.9200	Graph attached
Crisco Pure Vegetable Oil Lab# 15091802	132 cg/g	30.92 cSt	7.521 cSt	-6°C	324°C (615°F)	356°C (673°F)	0.9230	Graph attached
Fireclean Lab# 15091803	93.8 cg/g	31.75 cSt	8.364 cSt	-15°C	325°C (617°F)	357°C (675°F)	0.9163	Graph attached

Please call if you have any questions regarding this report.

Respectfully submitted,

Josiah Wintermute
Chief Chemist
JW:sh
Attachment (1 ASTM E1252 FTIR Graph)

Petro-Lubricant Test Labs

Crisco pure Canola Oil (Lab# 15091801) neat
Crisco Pure Vegetable Oil (lab# 15091802) neat
Fireclean (Lab# 15091803) neat

Client: Fireclean, LLC **Sample ID:**

ASTM E1252 FTIR Spectrograph Date: 9/25/2015