All-Purpose Heat Source for Field Rations
White Paper

1.0 BACKGROUND

THE NEED FOR A SAFE AND EFFECTIVE HEAT SOURCE IN THE FIELD.

In 1991 the United States Armed Services discontinued the trioxane fuel bar ("heat tabs") for heating field rations because of its inherent toxicity. Since then there has been no good alternative that allows forces in the field to effectively heat rations, boil water, and start fires for heat, hygiene and survival purposes.

The heat source in common use today, pre-packaged with military meals ready-to-eat (MRE)[1], is the flameless ration heater (FRH)[2]. This system is difficult to use, inefficient in bringing the MRE entree to full heat, and limited in its potential use.

What's more, because many soldiers become frustrated with its limitations, the FRH is often tossed aside (as often as 60% of the time). These discarded FRHs must be disposed of as hazmat waste, effectively doubling their cost to the military. Worse, because the FRH gives off hydrogen gas when activated, it is used by insurgents in combat zones for improvised explosive devices.

A Better Way To Cook

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[1] There are three US firms which produce MRE: SoPakCo; AmeriQual; Wornick

[2] The manufacturer of FRH for US MRE is InnoTech.

2.0 REQUIREMENT

A BETTER, SAFER HEAT SOURCE

The modern warfighter requires a heat source that can quickly and efficiently deliver a hot entree and beverage in the field without providing the enemy with a weapon.

With all that the modern soldier has to carry, their ration heater would be more valuable if it did more than just heat a single MRE entree to lukewarm. It should be able to easily start a fire for warmth, or to dry a pair of wet socks, and; to burn smokeless and clear, leaving no charring and no trace that soldiers have been there.

That system is now available. The *Utility Flame™* system (formerly known under the "*PyroPac™*" and "*MilPack™*" brand names) fulfills all the heat source needs of the modern warfighter. It is a perfect fuel for cooking and as a fire starter. It is approved by the US Defense Logistics Agency[1], as well as by the armed forces of Canada and Norway.

It is so safe that it is approved for transport on commercial airlines by the United States Transportation Security Agency. (Not even the US Air Force will fly with the FRH unless it is double sealed). *Utility Flame™* is odorless, smokeless, economical, non-toxic and friendly to the environment. With an unlimited shelf life, it is the perfect fuel for troops who need 'fire in the field.'

No Transport Restrictions

[1]Defense Logistics Agency, Andrew T. McNamara Building, 8725 John J. Kingman Road, Fort Belvoir, VA 22060-6221 USA. Attention: Distribution Chief of Staff. Tel: + 1 717 770 7325. References: National Stock Number: 9110-01-518-9201; Federal Supply Class: 9110; National Item Identification Number: 015189201; Description: Fuel,Gel,Diethylene Glycol

3.0 RANGE OF USE

MORE USES IN THE FIELD MEANS MORE VALUE TO THE SOLDIER

Utility Flame™ is a heat source system developed by military experts with the needs of soldiers in mind. The system is based on a proprietary gel that burns hot and clean, with no smoke or fumes. *Utility Flame™* will not freeze or melt, and it burns well at high altitude. *Utility Flame™* is non-toxic and safe for the environment. Its only by-products are carbon dioxide, water and sand.

The *Utility Flame™* kit comes with an ultra light metal stove that, when easily unfolded, creates a convection flow that funnels the heat where it's needed, while shielding the faint blue flame from enemy eyes.

When set up, the stove is the perfect size to fit a standard issue canteen cup. Alternately, a pot and its contents weighing up to 1.3kg. can be set on top.

Unlike the FRH, *Utility Flame™* can be used to boil water, dry wet clothing, or start an open fire. And because the gel is smokeless and burns so clean, the flame is almost impossible to see — a clear advantage on the battlefield.

Foldable, Reusable Stove

3.1 HOW IT WORKS

SAFE, EASY, AND FAST

In the field, the soldier unfolds and forms the stove, keeping the small cutout as a surface for the flame gel. He opens the gel pack and empties its contents on the metal cutout. He places the cutout on level ground, lights the gel with a lighter or matches, and then sets the stove above the flame with its opening downwind.

The soldier then fills his canteen cup with water and places one or two MRE entrees inside. The water comes to a boil in 7-8 minutes. The entree is removed, piping hot, and the water is used to make a hot beverage. One single 1.25 ounce (35g) pack of gel will burn hot for 15-20 minutes.

Once the gel has burned, all that is left at the site is fine silica that easily brushes away. There are virtually no signs that a fire has been made. The stove folds back up to its original size for reuse. Because *Utility Flame™* gel is not a hazardous material, it requires no special clean up or handling.

Utility Flame™ also ships in a re-sealable 6 ounce (170g) pouch that burns hot for over one hour. And while the stove was specifically designed with the U.S. Military Canteen Cup in mind, the gel is perfect for all other gel and solid fuel cookers, such as the *Crusader Cooker™* and the *Esbit™* stove. Of course, the gel can be set directly on the ground or any other surface as well.

Burns at 737° C. on any surface

3.2 PACKAGING OPTIONS

BUILT TO YOUR SPECIFICATIONS

Utility Flame™ can be custom packaged to meet your specifications and needs. In addition to our standard 1.25 ounce (35g) and 6.0 ounce (170g) packets, it can be packaged in bulk for central dispensing, or per your usage requirements.

1.25 oz. (35g)

6.0 oz (170g) Resealable

We can also custom design the package graphics to incorporate your information in your language.

Instructions for Use	Instructions for Use
이용 안내	Instrukcja użytkowania
تعليمات الاستخدام	მითითებები გამოყენება
Gebrauchsanweisung	Инструкция по применению
استعمال کے لئے ہدایات	Bruksanvisning
Kullanma talimatları	使用説明書
İstifadəçi üçün təlimat	Istruzioni per l'uso
Mode d'emploi	Használati utasítás
Οδηγίες Χρήσης	Návod k použití
คำแนะนำสำหรับการใช้งาน	Brugsanvisning
Instrucciones para el uso	Upute za uporabu
Instrucțiuni pentru utilizare	Käyttöohjeet
Udhëzime për përdorim	Инструкции за ползване
Instruções para uso	Maelekezo kwa ajili ya Matumizi
Ցուցումներ է օգտագործման համար	Kasutusjuhised

3.3 USES & SPECIFICATIONS

PORTABLE FIRE FOR MILITARY AND SURVIVAL APPLICATION

Utility Flame™ is light, inexpensive, safe to transport and use, and extremely versatile. It is an excellent addition to the soldiers' kit, and makes a valuable gift to allies in the field.

USES

Heats MRE entrees	Provides hot water for hygiene
Cooks indigenous foods	Purifies water
Boils water for coffee and hot beverages	Gives off high temperature flame for emergency sterilization

SPECIFICATIONS
[See Attached Technical Data Sheets]

Does not evaporate	Burns hot with high BTU output (737° C)
Does not freeze	Burns at 5000+m elevation
Does not melt	Burns at -30°C
Smokeless	Not explosive (high ignition — flash point 151°C)
Odorless	Zero vapor pressure
Non-toxic	Unlimited shelf life
Water soluble — washes off with water	Gel assumes any form
No transport restrictions	Easy to contain and/or package in any kind of container
Not a hazmat — no EPA restrictions	NSN number and available in COTS.
"Green" product	Byproducts are carbon dioxide, water, silica sand

Hot Water For Field Hygiene

3.4 COLD WEATHER APPLICATIONS

WHEN A RELIABLE HEAT SOURCE REALLY COUNTS

If the outside temperature is below freezing, a soldier may do without warm food or a hot drink if using a FRH. The average altitude of Afghanistan, for example, is 1500m and it is often below freezing in the mountains.

However, *Utility Flame™* does not freeze. A single *Utility Flame™* packet has proved its usefulness in cold conditions by heating two cups of snow to boiling water, and then fully heating the MRE entree. In comparison, the FRH takes 10 to 15 minutes to raise the temperature of an entree 37°C above ambient temperature. (The test was conducted at the U.S. Army Mountain Warfare School in Jericho, VT).

The Meal Cold Weather and Food Packet Long Range Patrol (MCW/LRP) are designed to meet the Joint Service requirements of the United States Marine Corps (USMC) and the Army Special Operations Forces (SOF). These rations are designed for extreme cold environments. They require boiling water to reconstitute the meal and beverage but have no FRH heaters.

A single *Utility Flame™* packet provides sufficient heat to boil the water requirement for the LRP, while the MCW requires multiple small packets (or a single large packet) for its full use.

Works at -30°C and 5000+m

4.0 TESTING & TRIALS

PROVEN IN THE LAB, PREFERRED IN THE FIELD

Utility Flame™ has been tested and approved by the U.S. Army Research, Development and Engineering Command [RDECOM]. They granted *Utility Flame™* National Stock Numbers (NSN) for supplying the Armed Forces.[1] Says their report:

> *"*[Utility Flame™] *is the only fuel which meets the following user requirements: it is tactical in that it burns with a steady blue flame which does not disclose the warfighters' position; has negligible vapor pressure that allows it to be declared a non-flammable substance and therefore not subject to Department of Transportation hazardous material regulation, which allows ease of transport to overseas destinations; and has completed safety and health data sheet, required for immediate material fielding. Additionally, the heat to mass ratio allows the warfighter to carry lesser amounts of fuel than other to complete their mission."*[2]

In a field test, *Utility Flame™* was clearly favored over the standard FRH by 95% of the soldiers. Soldiers were randomly selected from the Combat Medics Course during field training at Camp Bullis, Texas in March 2010. They were divided into two groups: one was given the FRH system to heat their MRE entree, the other used *Utility Flame™*. Then each group got the opportunity to use the other heat system.

The results were clear. Both groups — the soldiers who used the FRH first and the soldiers who used *Utility Flame™* first — preferred *Utility Flame™* by a wide margin. And the soldiers who used *Utility Flame™* first preferred it by a significantly wider margin over the FRH (8.3 to 4.9 respectively, on a scale of 1 to 9).

Utility Flame™ has been used in the field by the 10th Mountain Division and 101st Airborne Division to great success. Special attention was provided to one unit, Co "B", 1st BN, 506th PIR, 101st Division at Fort Campbell, KY just prior to deployment.

Every man received three units with a stove, and additional cases were provided to the S-4. Not one negative evaluation was received throughout an extensive deployment during which they ate MREs extensively. Writes Brigadier General Benjamin Freakly:

> *"101st Airborne Division (Air Assault) has an urgent operational need for* [Utility Flame™] *gel to enable our soldiers to heat items (consumables) in a safe and environmentally sound manner. This ability would greatly enhance the morale of our soldiers in support of contingency operations."* [3]

Once they use it, soldiers request more *Utility Flame™*. Most suggest that it should be put in the MRE. During one period, some 20,000 samples were provided to deploying units.

Evaluations submitted to U.S. Army Training and Doctrine Command (TRADOC) System Manager at Fort Benning, GA indicated that 99% say the US Army should adapt it for the beverage heater in the MRE.

[1] NSN 9110-01-518-9201 for the 1.25 oz packets; NSN 9110-01-518-9219 for the multiuse 6 oz pouch.

[2] FBO Daily Issue of April 02, 2003 FBO #0488 special notice from U.S. Army Robert Morris Acquisition Center, ATTN: ASSB-CAN-S, Natick Contracting Division (R&D and Base OPS) Building 1, Kansas Street, Natick, MA 01760-5011

[3] Memorandum thru Commander, XVIII Airborne Corps. (ATTN: Chief of Staff), FT Bragg, NC 28310-5000; Commander, United States Army Forces Command (ATTN: Chief of Staff), FT McPherson, GA 30220, 4 March 2003

The product has also been marketed to non-governmental organizations (NGOs), relief agencies, and civilian outdoors enthusiasts.

Utility Flame™ has been evaluated for safety and has on file a full Material Safety Data Sheet [MSDS] as required by the U.S. Occupational Safety and Health Administration. Highlights of the report include:

> *"If this material becomes a waste, it would not be a hazardous waste by RCRA* [Resource Conservation and Recovery Act] *criteria (40CFR 261)."*
>
> *"This material is not subject to DOT* [Department of Transportation] *regulations under 49CFR parts 171–180."*

5.0 PRODUCT COMPARISON

NOTHING WORKS LIKE *UTILITY FLAME™*

The Flameless Ration Heater (FRH) is presently included in all US military issue MREs that have a heat source. It is a pouch containing an iron oxide/manganese dioxide mixture, which when united with water produces heat (60°C) and hydrogen gas (6-8 liters), leaving a wet residue in the package.

Its shortcomings include low temperature (it does not heat water sufficiently for coffee), and is a hazmat product. When deployed in a confined area, the FRH can be explosive, and unused FRH units are used by insurgents for improvised explosive devices. (RDECOM estimates more than 60% of FRH units are discarded by our troops unused).

The FRH cost includes extra packaging for safe transport, and disposal of both used and unused items. It cannot be transported by air outside of the MRE packaging due to its explosive nature. Common complaints among soldiers are:

- *"The FRH seldom works properly."*
- *"Smells awful."*
- *"Heats rations unevenly."*
- *Doesn't heat the coffee."*
- *"Does not work in cold weather conditions."*

***Utility Flame™* vs. FRH**

	Utility Flame™		**FRH**
Entree temperature	98°C		60°C
Time to reach hottest entree temperature	8 min.		15 min.
Weight	35g		92g
Shelf life	Unlimited		Limited
Can transport on commercial airline	✓		
Boils water	✓		
Thoroughly heats MRE	✓		
Has multiple uses	✓		
Can use frozen water	✓		
Soldier preferred	✓		
Can heat entree AND make hot drink	✓		
Hazmat			✓
Can be used as explosive			✓

The European forces generally use *Esbit™* blocks, a form of hexamine that comes in a stove housing the cubes. This system has been tested by US forces and found to be unacceptable in toxicity and cost. Other fuel gel products are on the market, but they contain petroleum products. They do not burn smokeless and odorless, and are restricted items for travel and safe disposal.

6.0 CUSTOMER SERVICE & SUPPORT

AMERICAN MADE, AMERICAN OWNED

Utility Flame™ is manufactured by Milpack Ventures of Clearwater, FL and distributed internationally by the SIL Group of Tampa, FL. Both are USA owned and operated business enterprises.

Safety and quality control of the product are primary concerns of the manufacturer, and are examined in quarterly reports derived from user input, field reviews, and independent testing as necessary. We encourage you to visit our product website (http://portablefiregel.com/) to learn more.

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National Defense Industrial Association

UtilityFlame™

All-Purpose Heat Source for Field Rations