

The purpose of our suggestion is:

- To improve the safety of state highway worker's during night time operations, by implementing the use of turbo flares (battery operated flares).
- To preserve and protect our states environment, by decreasing the amount of contamination produced by fusee's.
- To protect the health of state highway workers by decreasing the use of fusee's
- To improve efficiency of state highway workers by implementing the use of turbo flares and decreasing the use of 30 minute fusee's.

ISSUE: During night work and incidents, WSDOT personnel place a row of 30 minute fusee's in front of a minimum of 6 signs to draw attention to the signs. This is a safety factor for the crew working in the roadway. It helps a tired, impaired driver to see that something is happening ahead. These fusee's are also used in tapers, by WSDOT and WSP personnel. They are often used on the lane line alongside the closure area of the state highway. The use of these flares has a number of problems associated with them.

PROBLEM 1 – TIME ISSUES

- Set up time to lay a line of fusee's.
- The need to return and set more flares on incidents takes time
- Re-stocking flares after each use –Region purchasing ordering them, picking them up from region purchasing, and re-stocking our vehicles.

SOLUTIONS TO PROBLEM 1

- Use a turbo flare in place of a line of flares – cuts set up time by $\frac{3}{4}$. We did a timed comparison with 3 different people and averaged a time savings of 1 minute per set-up. With a minimum set-up of 6 signs per lane closure, time saved is 6 minutes per closure. Less time = Less exposure time to traffic.

- Use of turbo flare eliminates the need to return to the signs and set more flares.
- Use of a turbo flare decreases the need for re-stocking the 30 minute flares. A 30 minutes fusee lasts only 30 minutes or less, It takes 200, 30 minute flares to equal the battery life of one turbo flare

PROBLEM 2 – FIRE HAZARD ISSUES

- Fusee's have caused roadside fires
- Fusee's have burned the person during set-up and/or during extinguishing them.
- Can ignite loose flammable clothing
- Traffic extinguishes them – don't stay lit
- Rain extinguishes them – don't stay lit
- Collision scene have ignition sources, that could be hazardous
- A burning fusee releases nitrogen dioxide gas, polluting the atmosphere.
- Have caused vehicle fires in the vehicle hauling them (Police Vehicles, Highway Maintenance Vehicles)

SOLUTIONS TO PROBLEM 3

- The above listed fire hazards are not a factor when using the turbo flare.

PROBLEM 3 – ENVIRONMENTAL ISSUES

- A roadway fuse is a hazardous material – see MSDS
- A fusee burned 100% is a significant source of perchlorate contamination
- A single unburned fusee can contaminate up to 2.2 acre feet/300,000 gallons of drinking water by leaching into the soil and water supply. This affects groundwater, wells, and waterways.
- A burning flare contaminates the atmosphere with nitrogen gas.
- Due to condensation in storage areas of fusee's they rot, causing a hazard to the environment and a potential health issue to the state employee.

SOLUTIONS TO PROBLEM 3

- Turbo flare use can eliminate the environmental problems associated with traditional road flares. The "C" cell batteries used in the turbo flare are recyclable.

PROBLEM 4 – EFFICIENCY

- A fusee lasts 30 minutes or less. It takes 200 fusee's, to last the same amount of time as one turbo flare.
- Fusee's will crush and extinguish on impact
- Storage space needed to store a large number of fusee boxes at Region Purchasing as well as a re-stocking area for maintenance personnel at each facility.
- A vehicle is only allowed to carry 3 boxes of fusee's. More than that the vehicle needs to be placarded.
- Fusee's have to be kept away from ignition sources and kept in a ventilated area.

SOLUTION 5 TO PROBLEM 4

- A turbo flare has a battery life of 100 hours (using 4 "C" cell batteries), and a led light life of 100,000 hours.
- A turbo flare is impact resistant up to 10,000 lbs.
- Visibility of the turbo flare is up to 25 miles. They are visible in rain, fog and snow. They have been used to land Medivac helicopters at collision scenes.
- A turbo flare takes less space than a box of regular flares.
- A vehicle is allowed to carry as many turbo flares as needed.
- Turbo flares do not need to be kept in a ventilated area, away from ignition sources.

PROBLEM 5 – HEALTH HAZARDS

- 3 of the ingredients used in making a fusee is are an irritant to the eyes, skin and mucous membranes.
- Tube contents of a fusee are corrosive to the eyes, and irritating to the respiratory tract and skin. Inhalation of combustion products will irritate the eyes, lungs, and mucous membranes.

SOLUTION TO PROBLEM 5

- Turbo flares do not have any health hazards associated with them.

PROBLEM 6 – THEFT

- Both fusee's and turbo flares have been subject to theft when used to light up signs for lane closures and detour routing signs. Parts of the fuse is used to make Methamphetamine.
- Thieves could use them to start a fire.

SOLUTION TO PROBLEM 6

- Use a turbo flare that has been modified to prevent theft.
- Drill two 3/16" holes in the flanges of the turbo flare
- Cut 5/32 inch cable into 2' 8" sections. String the 5/32" cable through the holes in the flanges of the turbo flare, loop and clamp each end of the cable using 3/16" Ferrule and stop set. Due to cable end flaring, use electrical tape or duct tape to cover the ends of the cable that extend through the Ferrule stop set. Purchase 1 ½" aluminum pad locks, with ¼" thick loop to lock the turbo flare to a sign stand. This will deter or eliminate theft.

COST COMPARISON:

FUSEE – One 36 count case of 30 minute fusee's = \$34.60

- It takes 5 ½ cases of fusee's (\$190.60) to equal the burn time of one turbo flare on 4 "C" cell batteries (\$66.22) = \$124.38 cost savings
- 5 ½ cases of fusee's (\$190.60) is equal to one modified turbo flare @ (\$102.84). Cost savings of \$87.76. However the replacement of 4 recyclable "C" Cell batteries @ \$.63 each makes the turbo flare available for use again.
- WSDOT Spent \$21,000.00 on highway signal flares in 2010.

TURBO FLARE- One *modified* turbo flare = \$102.84 (just under the cost of 3 cases of 30 minute fusee's.)

- Turbo Flare – \$63.70
- Lock – \$36.31
- Cable - \$.52
- 4 "C" Batteries - \$.63
- 2 Cable Stops - \$1.68

SUPPORTING RESEARCH: See Attached -

- FUSEE MUTCD
- Battery Operated Flare Information
- Office of State Procurement, Steve Jenkins @ 360-902-7317 - Fusee Contract Pricing
- Olympic Region Purchasing, Char Santos @ 360-357-2689 – Turbo Flare and "C" Cell Battery Pricing
- Harbor Freight and Tool 5/32 Cable – 50' for \$9.99
- Home Depot – Ferrule Stop Set – \$1.68
- Olympic Region Facilities, Craig Danforth @ 360-357-2548 Lock Pricing

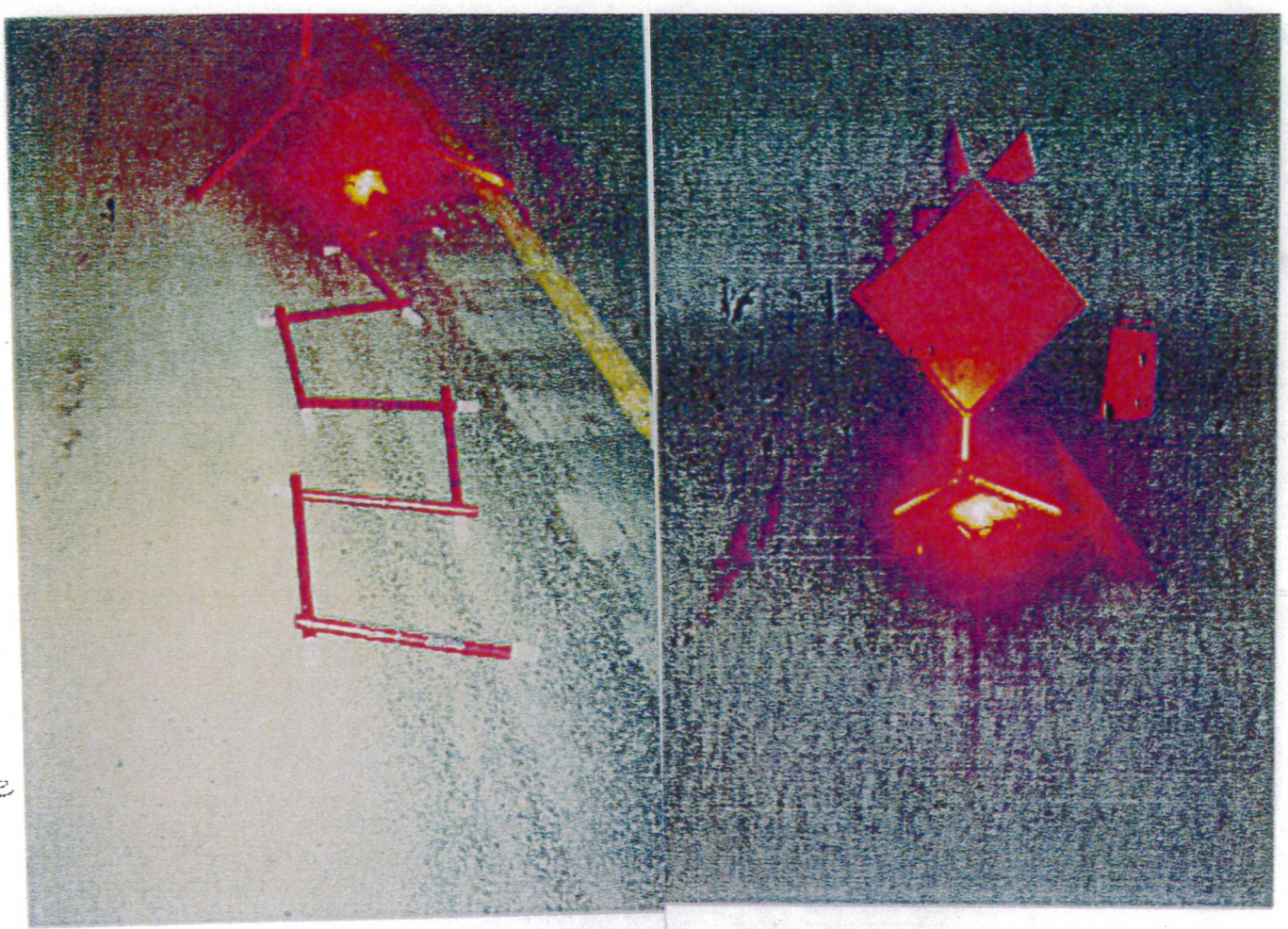
SUMMARY:

WSDOT spent \$21,000.00 in 2010 to purchase fusee's. Using the modified turbo flare, whenever possible, would significantly reduce the use of fusee's that:

- Have a negative impact on our state's environment.
- That pose a fire hazard.
- That pose a health hazard.
- That pose a safety hazard.
- That are less efficient.

WSDOT could reduce the costs to our state with the purchase, and use of, turbo flares and modified turbo flares. There is a monetary saving as well as an investment benefit for the welfare of the citizens of our state, as well as state employees, with the implementation of this process improvement. The use of the turbo flare would not eliminate the need for fusee's, but would reduce the need for them by 1/2, **resulting a savings of \$10,483.80 in fusee costs.** Each traffic control operation would need a minimum of 8 modified turbo flares (cost \$822.71) and a set of 8 standard turbo flares (cost \$529.76). Total cost per crew is \$1,352.48. This equals 39 cases of fusee's. The WSDOT alone spent \$21,000.00 for fusee's in 2010. This dollar amount is equivalent to 606 cases of fusee's.

Row of
uses vs.
turbo Flare



1 modified turbo Flare



Cable & lock system of Modified turbo flare to prevent theft.



1 turbo flare = 5 1/2 cases of fusee's
4" Cell Batteries vs 200 fusee's



Cable & lock to sign stand



Toll Free 1-877-278-8726



The Anatomy of a TurboFlare "SOS" Electronic Road Flare

Don't use incendiary flares, use safe, reusable, cost effective electronic flares!

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Journal of Emergency
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- Product Packages

Product Literature

General Information

- What is Turboflare™?
- Material Safety Warning
- FAQ's

Distributors

- USA
- International

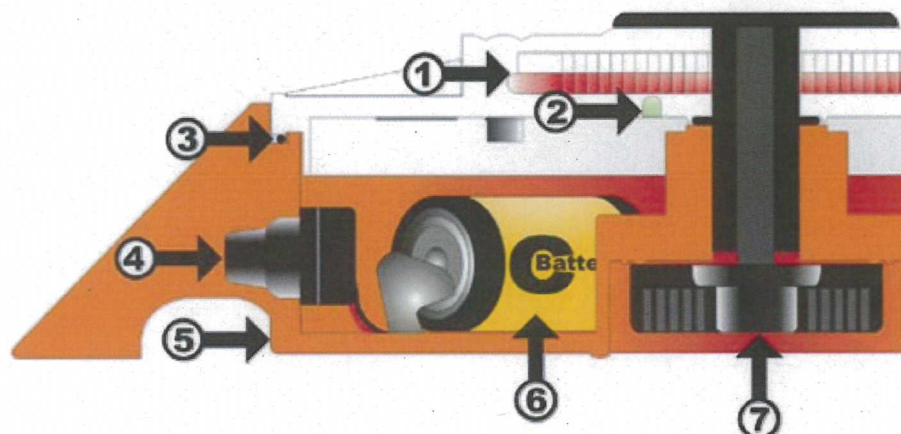
Testimonials

Links

Contact Us

Distributors Wanted

US - 877-278-8726
International 702-567-9464
sales@turboflareusa.com



1. Light Source: 20 high output LED's

2. Low Battery Indicator Light: Tells you when there is 20% battery life left

3. Weatherproof "O" Ring Seal

4. Spring-Loaded, moisture resistant ON/OFF switch

5. Made of Dupont Surlyn: Same material that golf balls are made with

6. Powered by 4 "C" cell batteries that yield hundreds of hours of continuous service (batteries not included)

7. Single Wing Nut Bolt to allows quick easy access to change batteries

SAVINGS

	1st 100 hrs	2nd 100 hrs	3rd 100 hrs	4th 100 hrs	5th 100 hrs	Totals
20 minute fuses(1.14 ea.)	\$2,736	\$2,736	\$2,736	\$2,736	\$2,736	\$13,680
TurboFlare " SOS"	\$535	\$32*	\$32*	\$32*	\$32*	\$633

Money saved by using TurboFlare "SOS"

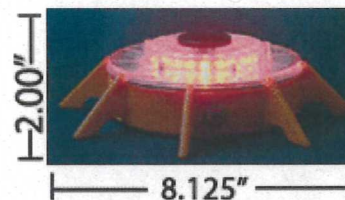
\$13,047

The average cost of four "C" cell batteries x 8 TurboFlare "SOS".

LED COLORS AVAILABLE

Amber 414 Candela

Orange	380 Candela
Red	360 Candela
Green	300 Candela
White	84 Candela
Blue	60 Candela



Rotations Per Minute - 160 nominal
Viewing Angle - 4° below horizontal to 14° above horizontal
Alkaline Battery (temp) Range- 160 above zero to - 40° below zero



LIFETIME GUARANTEE

Your complete satisfaction is important to us. We guarantee our product under normal use for as long as you own it, except batteries and damage caused by accident or commercial use. For product replacement or repair, please return product with all postage prepaid along with \$11.50 for handling.



WARRANTY

3-Year warranty on material and workmanship. 90 day warranty on Nickel-metal Hydride rechargeable batteries.

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