



**Matthew Rodriguez**  
Secretary for  
Environmental Protection

## Department of Toxic Substances Control

Barbara A. Lee, Director  
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P.O. Box 806  
Sacramento, California 95812-0806



**Edmund G. Brown Jr.**  
Governor

V St Jean 4/13/14

### Community Protection and Hazardous Waste Reduction Initiative Pilot Project Proposal Form

#### Instructions

This form contains fillable fields. Mouseover each field for additional instructions. Not all fields need to be completed for submission, and general responses are acceptable if more specific responses have not been developed.

#### 1.0 Pilot Project Summary

Identify the primary components of this pilot project.

<b>Waste Stream:</b>	flares, pyrotechnics (devices and fireworks), unexploded ordnances, other explosives
<b>Industry:</b>	boaters, auto industry, coast guard/chp, Fire/police departments
<b>Geography:</b>	CA, US, internation
<b>Stakeholders:</b>	product mfrs and mfrs of mobile pyro destruction, thermo ox, incinerators devices
<b>Government:</b>	ALL- EPA, DTSC, Coast Guard, OES, DOT

#### 2.0 Pilot Project Details

Describe this pilot project and how it fits with the overall goals and objectives of the CPHWR Initiative. Characterize the waste(s) to be reduced and the implications.

It is irresponsible to ship our explosives wastes outside of CA. Only 3 sites in the US are properly permitted to accept such explosive wastes

The generation of such waste is exacerbated by consumer protection laws that require marine and road flares, air bags and seat belt tensioners. Not only do we pollute when these devices are used, we don't have an easy way of proper disposal

Historic ingredients make these waste streams more complicated. One example- old aerial flares contained strontium nitrate, potassium nitrate, or potassium perchlorate, all of which can be unstable and require tremendous overpacking to safely ship to permitted disposal site.

Unexploded and seized fireworks and ordnances typically are so unstable and dangerous to transport, they are blown up in place with vicinity evacuations, capturing NONE of the pollutants as they explode. This method is also unsafe for humans, animals and any other unknowing folks. What air pollution residuals are we leaving in neighborhoods as a result of these uncontained explosions.

CA needs a safe, permitted portable/transportable treatment unit to destabilize explosives that also contains ALL FUGITIVE EMISSIONS. These units should be transported to the sources as needed, destruct the waste on site, then properly manage any residuals.



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### 3.0 Pilot Project Characteristics

Identify any applicable characteristics of this pilot project.

☒ **Source reduction or elimination**  
☒ **Provides a permanent solution**

☒ **Minimizes or avoids disposal**  
☒ **Avoids media shifting**

☒ **Long term reductions**  
☒ **Replicable**

☐ **Short term reductions**  
☒ **Scalable**

☐ **Decreases high volume waste**  
☒ **Decreases toxicity of waste**

☐ **Decreases high toxicity waste**  
☐ **Reduces waste treatment impacts**

☐ **Economically beneficial**  
☐ **Stakeholders willing to participate**

☐ **Represents a viable alternative**  
☒ **Benefits EJ community**

☐ **Other:**

Describe how this pilot project addresses the characteristics identified above.

A portable incinerator will eliminate these waste streams from negatively impacting any one neighborhood.

To avoid these devices from going into trash and not being treated at all, maybe consider changing to UNIVERSAL Waste, force them to go to recyclers. This will be problematic as well, as we currently do not allow anyone in CA to collect these legally. Not to collect them is short sided and irresponsible.

Incentivise the research for proper management of incinerator waste, help the development of transportable units that allow no fugitive emissions.

The only neighborhoods currently affected are the 3 treatment sites nationally. It is unfair to those communities to bear the burden for the whole country.

Incentivise research for non-explosive substitutes. The auto industry and marine flare industry need to be at the table as well as the agencies that impose laws requiring use of these items (Coast Guard and Consumer Protection)



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### 4.0 **Pilot Project Considerations**

Identify resources, tools and/or experts which can be used to gather information in support of this pilot project.

Any and all existing portable/transportable incineration and/or high heat destruction technologies- the pros and cons, efficacy, costs  
Alternatives to explosives (lights, other switch triggers)

Identify other agencies that may have jurisdiction where this pilot project will be implemented.

Air, Fire depts, OES, CALEPA, local CUPAs. Coast Guard, Automotive consumer protections, pyrotechnic and fireworks show manufacturers

Identify areas of potential competing considerations and objectives (including technical, legal, environmental, social, and economic factors).

consumer/boater safety- coast guard requires unexpired marine flares on boats, no way to dispose of expired flares,  
Autos- need 3rd party to determine if explosives are only way to go for seatbelt restraints and airbags.

Discuss other possible benefits in addition to decreasing the volume and toxicity of hazardous waste.

Proper management of these waste streams in CA, safe treatment, encourage proper disposal to treatment sites

What are other key items to consider in completing this pilot project?

Identify the various approaches to implementing this pilot project.

Work with DTSC, previous TAG, to resurrect issues and get to a point with a good solution. Much info was culled, discussed from agency to agency, but project was halted due to DTSC lack of staff and interest.



## Boaters Beware: Expired Flares!!

**Safe Boating requires    How to dispose of Expired Marine Flares Safely**  
**Visual Distress Signals:**

You have to have visual distress signals on your boat, and so you have some flares. But flares don't last forever –they expire after 42 months. You can get fined for having expired flares, and stockpiling explosives on your boat, in your car, or in your home is never a good idea.

### **So what do you do with expired flares?**

Flares are considered hazardous waste, mostly because they are explosives. You should **NEVER throw them in the regular trash**. Some counties collect flares as part of their Household Hazardous Waste disposal days – but only residents of that county can utilize those services. If your county collects them, this is probably the best way to get rid of excess expired flares. You may also donate flares to the Coast Guard or your local fire department for training purposes. It's best to call and ask these agencies first though, rather than just showing up with them!



Some people have advocated soaking them in water to make them non -reactive, and then throwing them in the trash. However, perchlorate, the main ingredient in flares is a newly recognized pollutant of concern. If you soak the flare in water, you now have water contaminated with perchlorate that becomes a pollution issue.

### **What are we doing?**

Rutgers Cooperative Extension is researching options to this disposal problem, and held a pilot disposal event associated with the Marine Trades Boat Show in September 2010. Over 600 flares were collected from boaters from five New Jersey counties. As a follow up, we are working on ways to implement a permanent disposal solution. Until then, you can contact your County Household Hazardous Waste Program for disposal options, or hang onto your expired flares for a little while longer – just keep them safely stored.



*Coming Soon! Expired Flare Pilot Final Report!*

## Useful Links

- NEW!! Rutgers Cooperative Extension Expired Flare Fact Sheet!
- 2010 RCE Survey of County HHW Programs Accepting Flares
- Association of NJ Household Hazardous Waste Coordinators
- BoatUS Foundation Page on Recycling Boating Items
- Flare collection Event Press release

This work was supported in part by a grant from the New Jersey Department of Transportation IBOATNJ program.



# Proper Disposal of Marine Expired Flares in California

March, 2011

## Boaters Fact Sheet on Marine Flare Requirements

The purpose of this factsheet is to provide boaters with information about how to properly dispose of marine flares and answer some frequently asked questions about these kinds of flares in California.

### Why Use Visual Distress Signals, i.e. Marine Flares?

Boaters must carry a minimum of three visual distress signals approved for daytime and nighttime use in order to meet the visual distress signal requirements. These flares must be in serviceable condition, stowed where readily accessible and not outdated. According to US Coast Guard regulations, the shelf life for marine flare devices is three (3) years from manufacture. Failure to have flares or having expired flares could result in a \$1,100 fine. The US Coast Guard inspects boaters on a random basis.

### What Are Marine Flares?

A flare is a type of pyrotechnic that produces a brilliant light or intense heat without an explosion. The basic form of a flare is a tube packed with explosive chemicals that burns very brightly or gives off smoke, and is used to attract attention in an emergency. Handheld flares (which operate on the ground) and rocket flares (which are fired into the air) are the two most commonly used as visual distress signals because they can be used for daytime or nighttime.

The main ingredients in flares include strontium nitrate, potassium perchlorate or potassium nitrate, and magnesium or aluminum. Perchlorate is a known hazardous material and is recognized as a pollutant of concern.

### What Kinds Of Flares Meet The Definition Of Acceptable Marine Flares?

Approved pyrotechnic marine flares/ devices include:

- hand-held or aerial flares
- floating (or hand-held) orange smoke flares
- launchers for aerial red meteors
- parachute flares

Only three are required if they are approved for BOTH daytime and nighttime use. Otherwise, you need a combination of three flares for day use and three for night use. Check

<http://dbw.ca.gov/Pubs/Abc/renequip.pdf> (Page 43) to identify the required flares for day and/or night use.

The marine flares devices must be in serviceable condition, dates not expired and stowed accessibly.

### Who Regulates Flare Usage?

**Federal Requirements:** Title 33 Code of Federal Regulations Part 87 - Annex IV (33 CFR 87-Annex IV) Distress Signals

**State Requirements:** Harbors and Navigation Code 652 and Title 14 of the California Code of Regulations Section 6692 (HNC 652 and 14 CCR 6692).





## **What Type of Boaters Need to Comply With This Requirement?**

All boaters operating on coastal waters, the Great Lakes, territorial seas, and waters directly connected to them (up to the point where the body of water is less than two miles wide) Exceptions are:

- Recreational boats less than 16 feet in length,
- Open sailboats less than 26 feet in length and not equipped with propulsion machinery, and
- Manually propelled boats

These vessels are only required to carry nighttime signals when operating from sunset to sunrise. (Example: Lake Tahoe boaters are not required to use flares because even though the water body is greater than two miles, as it is not connected to international waters)

## **Why are Flares Considered to Be Hazardous?**

The Department of Transportation (DOT) classifies aerial and marine flares as explosives as follows:

Aerial Flares: Hazard Class 1.2 Explosives (with a projection hazard)

Marine flares: Hazard Class 1.4 Explosives (with no significant blast hazard).

Marine flares classified as 1.4 by DOT that will no longer be used for their intended purpose are considered by the Department of Toxic Substances Control (DTSC) to be hazardous wastes because of their high concentrations of toxic metals in addition to their explosive classification. They must be disposed of at a permitted hazardous waste facility. State laws and regulations prohibit the disposal of hazardous waste in the trash and in municipal landfills.

## **Where Can Marine Flares Be Properly Disposed?**

Some counties accept Marine Flares classified as 1.4 from the public as part of their Household Hazardous Waste (HHW) disposal events– but typically, only residents of that county can utilize those services. Refer to this link to find out if your county's HHW program will accept marine flares:

[http://www.coastal.ca.gov/ccbn/Ca\\_Flares.pdf](http://www.coastal.ca.gov/ccbn/Ca_Flares.pdf)

If your county does NOT accept marine flares, please contact the California Department of Toxic Substances Control at assistance 800-728-6942 (in state); 916-255-3617 (out of state) or your local Certified Unified program Agency (CUPA) <http://www.calcupa.net/services/directory/result.asp> for assistance.

**Can A Boater Transport the Flares Safely/Legally?** California regulations require the haulers that collect and transport/ store flares must be licensed for that purpose. Therefore, the companies collecting/hauling marine flares must use a hazardous waste hauler registered by DTSC to transport explosive waste to a permitted hazardous waste facility ([http://www.dtsc.ca.gov/HazardousWaste/upload/hwm\\_list\\_fireworks.pdf](http://www.dtsc.ca.gov/HazardousWaste/upload/hwm_list_fireworks.pdf) ). If any unlicensed person accepts flares for disposal they are breaking the law. However, any individual can hold, transport or store up to 50 pounds of his/her own flares (Health and Safety Code – Sub section b, Section 25218.5.1). This allows boaters the ability to transport flares from the point of purchase to their home, boat, and HHW facility for proper disposal.

For more information, please contact: California Department of Toxic Substances Control at assistance 800-728-6942 (in state); 916-255-3617 (out of state).



# Proper Disposal of Marine Expired Flares in California

March, 2011

## Problem Statement

Improper disposal and storage of marine expired flares poses a public safety hazard and potential harm to the environment. Currently, there are only three (3) Household Hazardous Waste Facilities in California that accept marine and aerial expired flares [http://www.coastal.ca.gov/ccbn/Ca\\_Flares.pdf](http://www.coastal.ca.gov/ccbn/Ca_Flares.pdf)

## Estimated Number of Expired Flares Produced in California

An estimated 174,000 flares are generated each year by recreational vessels in California. With this large amount of out-of date flares being generated annually in California, increased education and awareness of proper disposal options needs to be implemented as soon as possible.

## Documented Cases of Environmental Harm or Emergency Incidents Caused by Mismanagement of Marine Flares

- On July 4<sup>th</sup>, 1998, fireworks caused a boat fire in Port St. Lucie, Florida which in turn ignited several out dated flares kept on board.
- In 1999, in Palm Beach County, Florida, a small child found an old flare in the back seat of a car, set it off and injured all six people in the vehicle. (Note: Florida boaters alone generate over 400,000 expired flares annually, according to state officials.)
- In 2007, in Nova Scotia, Canada, an old flare caused a residential fire, resulting in over \$75,000 in estimated damage.
- In 2010, in New Zealand, a marine flare set off at midnight was being blamed for a blaze that destroyed a hillside of native bush in the community of Piha. <http://www.3news.co.nz/Marine-flare-blamed-for-Piha-blaze/tabid/423/articleID/135839/Default.aspx>

There are no documented cases of environmental harm or emergency incidents caused by mismanagement of marine flares in California. However, it is imperative to find proper and convenient solution to this issue before a major disaster involving human live or environmental impacts happen.

Some testimonies in California Include:

**Rick Saber** (US Coast Guard Auxiliary Flotilla 12, District 11NR)

"As a USCG - Auxiliary certified Vessel Safety Examiner, I have assessed 700 vessels. About 1 in 7 vessels has numerous expired flares needing disposal. With no official plan in place, this has always been a major problem with little solution."

**Doug Powell** (Sergeant Contra Costa County, Office of the Sheriff )

This has been a problem for years! I applaud your efforts to find a safe location to drop flares, as in Contra Costa County the Fire Department, U.S.C.G. do not take or have a SOP for flares. I have been contacted by boaters trying to do the right thing with little information to give them.

**James J. Fitzgerald** (University Of California, Davis, Office of Boating Safety Bodega Marine Laboratory - [jf Fitzgerald@ucdavis.edu](mailto:jf Fitzgerald@ucdavis.edu)) "I typically provide the list of approved CA marine flare collection sites issued through the Dockwalker program, and/or instruct them to check with their local fire department. Some fire departments will expend them during controlled burns or training. Locally here in Bodega Bay, I have a verbal agreement with the local USCG station to direct mariners to the Bodega Bay Fire Department;



they will take receipt of the expired flares and store them in a safe manner until I can stop in to retrieve them. I later employ the flares during formal pyrotechnic and visual distress signal training as part of the standardized Department of Interior, Motor Boat Operator Training Course curriculum. When teaching the above curriculum at various field sites through out CA, I'm often approached by local police officers and firemen, asking what they should do with expired marine flares that they have accepted from mariners. Many of these municipalities struggle with the same problem the mariners are faced with, "What do we do with expired marine flares?" Due to a lack of training with marine flares, many people have a fear of how to use them, and are unable to expend them legally for training or in a distress situation. Unfortunately there can be severe risks and liability associated with an accidental discharge, or perceived false distress signal when the training is not communicated properly to the authorities. Therefore it is difficult for mariners to receive any training in the proper safe use due to the obvious liabilities associated with live fire training exercises. Local authorities also discourage the practice of "Joe/Jane Boater" conducting their own random pyrotechnic training, due to the potential for fire hazard and a lack of control measures, further compounding the problem for safe use."

**Shelley Griffin** (Bay Club Marina, Dockmaster) "I never accepted any old flares from my tenants. I only got a constant flooding of inquiries on where they could dispose of them. Some of my tenants indicated to me that they quite literally had 20 to 30 expired flares on their boat because they had no where to dispose of them. This is when I decided to take action and find out what could be done because I was so concerned that it is not safe to "stockpile" old flares on your boat."

**Richard Engfer** (Boater San Jose) "In all my years of boating on San Francisco Bay, I have never known of where to properly discard outdated flares. I have quite a (metal) box of them aboard my boat. I would welcome a convenient location for disposal."

**Jim Haussenner** (CA Marine Affairs and Navigation Conference ) "While a problem, not sure how big. I personally keep the old flares on my boat."

**Susan West Village** (West Yacht Club Stockton) "I personally have expired flares on my vessel. I was told by the USCG Auxiliary when I had my annual vessel inspection this year that I do not have to replace expired flares. The date says they may not work, but there is no rule that says that I have to replace them with new one or current flares, just current Fire Extinguishers."

**Anthony Budlong** (Monterey, US Coast Guard Auxiliary) "I have been involved in sea and river kayaking for over 15 years, and every 42 months, my flares expire whether used or not. My first set of three got wet when I capsized in the surf returning to shore with no need to use or signaling and became mushy, so I spread out the material and let it dry in the sun over time. My second, third and fourth sets, still look good, but have expired and I keep them in my Gear Box along with my current set which are to expire in two years, also in my Gear box. I keep my gear box in our garage to keep dry and for ready use. So now I am getting an increased pyrotechnic load in my gear box/garage. We attempt to keep down gasoline, paint, paint thinners and oils to a minimum at our home and try to better meet Federal, State and County Laws and Ordinances using the County Hazardous Waste Facility in Marina, but they will not accept any highway or boat flares or other pyrotechnics."

**James Haas** (ADSO - MEP, Sector LA/LB - USCG Auxiliary ) "As we have discussed many times in the past, expired flares are a major problem among boaters. We find them when we do vessel safety checks. They often have several expired ones that they have no idea what to do with them. We, unfortunately, cannot offer them any solution to the problem. Several boaters have confessed to us that they simply throw them overboard or dump them in the dock side trash. Many have indicated a willingness to handle it properly if only there were a place to get rid of them. The danger in dumping them, as you



know, is that they could inadvertently be exploded in the process of the trucks picking them up. Additionally, the other obvious dangers are children or teens finding them and setting them off improperly. Also, if trash is dumped into an incinerating plant we have the potential for a major hazard. All in all, providing a proper place for disposal serves a community purpose."

**Norma E. Lococo** (USCG Auxiliary, Dana Point) "Although some locations accept hand held flares periodically (depending on who is working that day), none of the locations will accept any form of aerial flares or any flare that had the general appearance of ammunition. Additionally, it is unrealistic to develop a level of boater responsibility with this limitation and level of inconsistency particularly when the drive is generally 15-20 miles to these locations. We have advocated dedicating one day a year at each of the local mariners for proper flare disposal. The photos below represent the flares volunteered by boaters and collected in one season (January-August 2010) from boaters only in Dana Point Harbor, CA with many boaters electing to retain expired flares."

**Anonymous** A postcard signed anonymous stated that this person has been dumping their expired marine flares into San Francisco Bay off of Alcatraz Island for years.



One season collection in Dana Point, CA (Jan-Aug, 2010).  
The one flare with wood handle expired in 1959



## **Water Quality Concerns**

Potassium perchlorate - Barium nitrate

Polyvinyl chloride

Strontium nitrate

### **Expired Marine Flares Working Group:**

California Department of Boating and Waterways

California Coastal Commission

California Department of Toxic Substances Control

California Department of Resources Recovery and Recycling

San Francisco Department of Public Health

US Environmental Protection Agency

California Emergency Management Agency





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## Explosives Management

Clean Harbors Explosives Management Services provide risk-free management of explosive and reactive wastes at one of our EPA-approved thermal treatment facilities. Quality control is of utmost importance with Clean Harbors, exceeding government requirements and eliminating the risk of costly waste rejections while guaranteeing the timely processing of approvals, quotes, and schedules.

### Colfax, Louisiana Thermal Treatment Facility

Clean Harbors' Colfax, Louisiana, thermal treatment facility is the only commercial RCRA Part B, Subpart X, permitted explosive disposal facility in the U.S. It receives, stores, and treats over 300 energetic/reactive waste streams in solid, sludge, and liquid forms. Spanning more than 700 acres, the Colfax facility provides a proven resource for the safe and cost effective disposal of these highly regulated materials. [learn more »](#)

### Industries Served and Material Handled

#### Federal/State/Local Governments

- Confiscated articles including such as fireworks, ammunition and manufactured explosives
- Bulk propellants and rocket motors
- Riot control articles and flares

#### Manufacturing

- Airbag inflators
- Initiators
- Aircraft ejection systems
- Bulk explosives/propellants

#### Engineering & Consulting

- Bulk explosives/propellants from demilitarization operations
- Rocket motors and missile propellants
- Explosive contaminated debris
- Refinery / Petrochemical
- Items stemming from oil field services
- Shape charges, jet perforation guns, detonators, and cartridges

#### Chemical and Specialty Chemical

- Bulk explosives
- Explosive contaminated debris

- Detonation cord
- Propellants

### Pharmaceutical & Biotechnology

- Power device cartridges
- Bulk explosives
- Education
- Small arms ammunition and confiscated articles
- Improperly stored or expired lab chemicals



### Need more information about Waste Disposal Services?

- [Download a facility fact sheet](#) for any Clean Harbors facility
- Find a Clean Harbors [explosives management facility](#)
- Use our [Information Download](#) services to instantly obtain brochures, fact sheets and white papers, or if you prefer,
- Use our [Information Request form](#) and a sales representative will assist you.

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For 24-Hour Emergency Response, call 800.OIL.TANK (800.645.8265)  
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## Colfax, Louisiana Facility

### Fact Sheet

The Colfax facility is located in central Louisiana approximately 35 miles northwest of Alexandria. With a health and safety record that is unparalleled in the United States, this facility is uniquely permitted to treat over 300 kinds of explosives and reactive waste. Storage for explosives is provided in ten permitted ATF storage magazines.

The Colfax facility is capable of treating a wide range of materials from fireworks and contaminated debris to rocket motors. Thermal treatment in 20 permitted burn units treats the waste. Residue is collected from the treatment process and shipped off-site for disposal at an approved facility. Metal by-products are shipped off-site for recycling.

### Facility Description & General Information

Start-up Date: 1993

Facility Size: 700 acres

### Services Provided

- LTL Services
- Explosive Packing Service
- Demilitarization
- Storage prior to final Treatment and/or Disposal

### Typical Customers

Explosive manufacturers and end-users, government / military ordnance suppliers, automobile airbag manufacturers, DOD / DOE / Corps of Engineer projects, oilfield industry, colleges, universities, medical facilities, research centers, and private.

### Typical Waste Streams

Undeployed air bags, fireworks, rocket motors, munitions, propellants, high explosives, warheads, shaped charges, detonating cord, and nitro-related compounds.



### Clean Harbors Permitted Services

- US EPA ID No. LAD981055791
- Louisiana Department of Environment Quality Small Source Air Permit No. 1120-00010-00
- LPDES Stormwater General Discharge Permit No. LA0101931

### Treatment, Storage and Disposal Capabilities

- Treatment Throughput: 561,700 pounds Net Explosive Weight (NEW) annually.
- Storage Capacity: 50,000 pounds NEW in 10 storage units.
- Waste Codes Accepted: All waste must carry D003.
- Transportation Service is provided by approved Sub-Contract transport for transportation of hazardous waste and explosives.







Transportable Flashing  
Furnace (TFF)

Contaminated Waste  
Processor (CWP)

Contained Burn Open  
Burn/Open Detonation

El Dorado Engineering  
2964 West 4700 South  
Salt Lake City, UT 84129

801.966.8288

Email Us



### Transportable Flashing Furnace (TFF)



#### TFF On-site, Various Locations

Operations involving UXO clearance, remediation of explosive processing buildings, or handling military test range target debris, often produce metal parts with explosive contamination. This material, known as 3X, is closely controlled and cannot be released directly to the public. EDE's flashing furnace thermally decontaminates these materials to the 5X level so they can be sent to metal recyclers. Up to 10,000 pounds of contaminated metal can be flashed per hour. The furnace can be installed in a fixed location, or can be trailer mounted for field applications such as UXO operations or remedial actions. When flashing contaminated metals, furnace emissions—even without expensive pollution control devices—are typically below the *de minimis* levels established by most states, and operations require no permits.

Additional Information on Past Products:  
(links are located on websites not associated or endorsed by EDE)

[Kaho'alawe TFF Project](#)

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## Portable armored incinerator for dangerous substances

US 5727481 A

### ABSTRACT

A mobile incinerator suitable for burning explosive material, has armored walls capable of withstanding internal explosions, a primary combustion chamber within which initial burning of the material to be incinerated takes place, a secondary combustion chamber to burn exhaust from the primary combustion chamber a second time to reduce pollution and safety hazards, and a trailer for providing transportation. The armored walls may include steel plates reinforced by steel channel beams. The mobile incinerator includes: vents for allowing air and exhaust to pass into; between and out of the combustion chambers, assisted by a draft induction fan, with flammable fluid delivered to and ignited within the combustion chambers; pressure release hatches; a loading cart mounted on telescoping rails by which material to be incinerated can be inserted through an opening; refractory material lining the primary combustion chamber; an exterior shell of aluminum sheeting; and a control system powered by a generator. The trailer is preferably equipped with hydraulic brakes, a surge brake actuator, and a leveling device.

<b>Publication number</b>	US5727481 A
<b>Publication type</b>	Grant
<b>Application number</b>	US 08/504,780
<b>Publication date</b>	Mar 17, 1998
<b>Filing date</b>	Jul 20, 1995
<b>Priority date</b>	Jul 20, 1995
<b>Fee status</b>	Lapsed
<b>Also published as</b>	WO1999034146A1
<b>Inventors</b>	Randall Paul Voorhees, Joseph Ernest Voorhees
<b>Original Assignee</b>	Voorhees; Randall Paul, Voorhees; Joseph Ernest
<b>Export Citation</b>	BiBTeX, EndNote, RefMan
Patent Citations (10), Referenced by (32), Classifications (11), Legal Events (4)	
<b>External Links:</b>	USPTO, USPTO Assignment, Espacenet

### IMAGES (6)



### DESCRIPTION

#### BACKGROUND OF THE INVENTION

##### 1. FIELD OF THE INVENTION

The present invention relates to incinerators designed for the incineration of explosive articles, such as ammunition, fireworks, and other dangerous substances.

##### 2. DESCRIPTION OF THE PRIOR ART

There presently is a need, in particular for law enforcement agencies, for disposal of materials such as seized ammunition, fireworks, and illegal drugs, that is better than the current method of digging a pit, placing the contraband in the pit, pouring gasoline or other flammable liquid over it, and setting it afire, with the resultant pollution and hazards to bystanders, including noxious fumes, and personal injury and property damage from explosions and sudden flames. Though it is not believed that the present invention is suitable for high explosives, current bomb disposal devices do not provide an apparatus by which moderately explosive materials, such as small ammunition or pyrotechnics, can be completely incinerated. Mobile incinerators in the prior art are not armored to protect against explosions. When explosive material must be transported to a site where it can be safely disposed of, besides the hazards of

### CLAIMS (9)

We claim:

#### 1. A mobile incinerator for burning explosive materials comprising:

a primary combustion chamber having armored walls constructed of steel plates and steel channel beams attached to said steel plates, said primary combustion chamber being lined with a refractory material;

a secondary combustion chamber communicating with said primary combustion chamber;

a loading cart mounted onto telescoping rails and removably positioned within said primary combustion chamber to allow loading of material to be incinerated;

a hatch communicating with each said chamber for releasing pressure; and

means for transporting said mobile incinerator.

2. The mobile incinerator according to claim 1, further comprising an intake vent to allow ambient air to pass into said primary combustion chamber and said secondary combustion chamber, a transfer vent through which exhaust passes from said primary combustion chamber to said secondary combustion chamber, and an exhaust vent through which exhaust exits from said secondary combustion chamber.

transport, there are the costs and delays necessary to obtain government permits.

U.S. Pat. No. 2,985,120, issued on May 23, 1961, to John B. Brandt et al., discloses a mobile incinerator designed to burn garbage and refuse, which has primary and secondary combustion chambers. It is not armored, nor does it have explosion hatches, as the instant invention does in the preferred embodiment, to withstand shocks from explosions, and uses a conveyor belt to load material to be incinerated.

U.S. Pat. No. 3,882,800, issued on May 13, 1975, to Michel G. J. du Chambon, discloses an automotive unit for the collection and incineration of household or industrial refuse, with a rotary furnace. It is not armored and has no explosion hatches, and material to be burned is carried into the furnace by an endless screw.

U.S. Pat. No. 3,938,450, issued on Feb. 17, 1976, to John C. Jaronko and John T. Jaronko, discloses an apparatus for collecting and disposing of refuse, having a wheeled chassis carrying a hopper, shredder and fan for directing air and refuse to a cylindrical member where the refuse is burned.

U.S. Pat. No. 4,627,365, issued on Dec. 9, 1986, to Kuoy-uan Tseng, discloses a mobile garbage incinerator, with a hanging drum for lifting and dumping garbage into a collecting tank, from which the garbage is moved to a main incinerating room, and then to a secondary incinerating room.

U.S. Pat. No. 4,852,815, issued on Aug. 1, 1989, to Hugo V. Giannotti, discloses an in transit resource recovery system, including a motor vehicle on which are mounted means for bag-ripping, sorting, shredding, pre-heating and pre-volatilization, classifying, incineration, and gas clean-up, and containing bins for collecting recyclable items and ash.

U.S. Pat. No. 5,237,938, issued on Aug. 24, 1993, to Minoru Fujimori et al., discloses a mobile type medical refuse incinerating vehicle, having a main furnace and an after burning furnace, with means for injecting lime water into the main furnace.

None of the aforementioned prior inventions are armored, have explosion hatches, or a loading cart mounted on telescoping rails.

While there are mobile incinerators in the prior art, none are comparable to the instant invention in their ability to safely and completely incinerate explosive materials. The prior art does not teach the present combination, which includes armor to withstand explosions in the material being incinerated, primary and secondary combustion chambers to insure complete burning, and in the preferred embodiment, pressure release hatches and a loading cart on telescoping rails for inserting materials to be incinerated.

None of the above inventions and patents, taken either singly or in combination, is seen to describe the instant invention as claimed.

## SUMMARY OF THE INVENTION

The mobile incinerator of the instant invention is suitable for burning explosive material, having armored walls capable of withstanding internal explosions, a primary combustion chamber within which initial burning of the material to be incinerated takes place, a secondary combustion chamber to burn exhaust from the primary combustion chamber a second time to reduce pollution and safety hazards, and a trailer or other means for providing transportation. The armored walls may include steel plates reinforced by steel channel beams. The armor plating protects against damage both to persons and property, and to the mobile incinerator itself.

In the preferred embodiment, there are: vents for allowing air and exhaust to pass into, between and out of the combustion chambers, assisted by a draft induction fan, with flammable fluid delivered to and ignited within the combustion chambers; pressure release hatches; a loading cart mounted on telescoping rails by which material to be incinerated can be inserted through an opening; refractory material lining the primary combustion chamber; an exterior shell of aluminum sheeting; and a control system powered by a generator. The trailer is preferably equipped with hydraulic brakes, a surge brake actuator, and a leveling device.

This invention eliminates the need for hazardous transportation of explosive substances that are to be destroyed, as the invention can easily be brought to the site where they are located. The present invention will also eliminate the need for costly permits required for the moving of such material, or make it safer and easier to transport explosive substances for

3. The mobile incinerator according to claim 2, further comprising a draft induction fan to assist movement of ambient air and exhaust through said intake vent, said transfer vent, and said exhaust vent.

4. The mobile incinerator according to claim 2, further comprising a means for delivering flammable fluid to said primary combustion chamber and said secondary combustion chamber, and means for igniting said flammable fluid in said primary combustion chamber and said secondary combustion chamber.

5. The mobile incinerator according to claim 1, wherein said mobile incinerator includes an exterior shell of aluminum sheeting.

6. The mobile incinerator according to claim 1, further including a control system to control combustion within each said chamber and a generator to supply power to said control system.

7. The mobile incinerator according to claim 1, wherein said means for moving said mobile incinerator is a trailer, said mobile incinerator being mounted onto said trailer.

8. The mobile incinerator according to claim 7, wherein said trailer includes wheels equipped with hydraulic brakes and a surge brake actuator.

9. The mobile incinerator according to claim 7, wherein said trailer includes a leveling device for raising and lowering an end of said trailer.

incineration in a different location. With easy set-up and uncomplicated operation, the invention will reduce labor and other disposal costs, and minimize disposal time. It will eliminate exposure to open flames, possible injury through explosion, and reduce exposure to toxic fumes. The primary and secondary combustion chambers minimize pollution from the incineration by ensuring that there are no unburned combustible airborne particles or vapors emitted. The loading cart on telescoping rails allows for easy loading and removal of waste with its telescoping design, and allows for the safe disposal of ash and debris after incineration.

Accordingly, it is a principal object of the invention to provide a safe and effective means for law enforcement officials or other persons to dispose of explosive materials including ammunition and fireworks, or other contraband including illegal drugs.

It is another object of the invention to provide an incinerator that can withstand the internal shocks resulting from burning explosive articles and substances.

It is a further object of the invention to provide a means for insuring that substances that would be harmful to inhale in an unburned state are completely combusted.

Still another object of the invention is to provide a safe and effective means for disposing of explosives or other hazardous materials that can easily be brought to the site where it is needed.

It is an object of the invention to provide improved elements and arrangements thereof in an apparatus for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear perspective view of the invention, with one of the two pressure release hatches omitted to show other features more clearly.

FIG. 2 is a rear perspective view of the invention, showing the loading cart in an extended position.

FIG. 3 is a left side, elevational view of the invention, with a portion of an aluminum cover cut away to reveal the secondary combustion chamber and further showing an interior side wall of the primary combustion chamber, exposed to reveal interior steel reinforcing beams.

FIG. 4 is a right side elevational view of the invention, similar to FIG. 3, but with a portion of the secondary combustion chamber aluminum cover cut away to reveal the generator.

FIG. 5 is a front, elevational view of the invention, showing interior detail.

FIG. 6 is a rear elevational view of the invention.

Similar reference characters denote corresponding features consistently throughout the attached drawings.

Broken lines show parts of the invention hidden from view.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the present invention is an armored mobile incinerator 10, including, in a preferred embodiment: a primary combustion chamber 12; a secondary combustion chamber 14; armor plating 16 reinforced by beams 18 (see FIGS. 3 and 4); pressure release hatches 20; a loading cart 22 mounted on telescoping rails 24 and 26 (see FIG. 2); a trailer 28; doors 30; gas trains 32; a control panel 34 and a generator 36 (see FIGS. 4 and 5); and an outer aluminum shell 38.

While the incinerator is mounted on a trailer 28 in the preferred embodiment, mobility could be otherwise provided such as making the incinerator an integral part of a motor vehicle, or attaching it to a sled or boat. The frame of the trailer 28 is constructed using channel beams and cross members, reinforced by triangular gussets (not shown). In the preferred embodiment, the channel beams are constructed of steel and are eight inches by eight inches in cross section, and weigh 13.75 pounds per foot. The cross members are preferably steel channel beams four inches by four inches in cross section. The frame is coped to fit the parts of the mobile incinerator 10 resting upon it, and solidly welded to ensure strength for both highway and off-road travel. Referring to FIGS. 5 and 6, the trailer has dual axles 40, each being rated for carrying a load of at least 4,000 pounds, preferably. Hydraulic brakes (not shown) are provided for each of the four wheels 42, and protective fender skirts 44 are provided as well.

Referring to FIGS. 3 and 4, the trailer 28 includes a front end 46, by which it is attached to the towing vehicle, and a rear end 48. It is equipped with a surge brake actuator on the front end, preferably able to exert a pressure of 20,000 pounds, for smoother and more responsive braking with heavy loads. The surge brake actuator includes a cylindrical piston 50 attached to the vehicle pulling the trailer, which, when the trailer moves closer to the vehicle, as when the vehicle is

slowing down or moving down an incline, is pushed inward, thereby increasing hydraulic pressure on the brakes. When the trailer moves away from the pulling vehicle, as when the vehicle is accelerating or moving up an incline, the cylindrical piston is pulled outward, thereby decreasing hydraulic pressure and releasing the brakes. There is also a leveler 52, by which the end of the trailer near the vehicle may be raised or lowered by manually turning a crank 54. The trailer lighting and signalling devices 56, 58 (see FIG. 1) and 60 are wired for twelve volts, powered by the battery or generator of the vehicle pulling the trailer, and meet the requirements of U.S. Department of Transportation regulations.

Referring to FIGS. 3 and 4, the primary combustion chamber is fabricated from armor plate 16, surrounded with beams 18 for added support and to eliminate warpage. In a preferred embodiment, the armor plate is fabricated of steel and is at least three-eighths of an inch thick. The beams are preferably steel channel beams, three inches by three inches in cross section, weighing 4.1 pounds per foot, and parallel with their centers spaced 16 inches apart. The primary combustion chamber is preferably eight feet six inches long, five feet four inches wide, and six feet high. Preferably, all weld joints in the primary combustion chamber are bevelled at 45 degrees, and use full penetration welds. Full penetration means that when two pieces of metal are welded together, one piece passes through a fitted hole in the other piece, which creates a much stronger bond. Inside the primary combustion center, on all 90 degree corners, steel gussets (not shown) are installed at 45 degree angles, using continuous welding. This reduces pressure on the corners, adding strength and eliminating warpage from heat.

Referring to FIG. 1, the primary burners 66 are gas units which run on a supply of liquid propane, supplied through gas trains 32. In the preferred embodiment there are eight primary burners, and electrically operated regulators (not shown) which coordinate and control burn cycles, times and temperature. There are also intake vents 70 to allow ambient air to pass into the primary combustion chamber.

The primary combustion chamber is preferably lined on the inside with boiler refractory (not shown), to absorb heat, and avoid overheating the metal, which would cause metal fatigue. In a preferred embodiment, the refractory is a mixture of quartz-cristobalite, fused silica, amorphous silica, zirconium silicate, and graphite.

Referring to FIG. 1, the secondary combustion chamber 14 in a preferred embodiment is fabricated from 11 gauge steel plate. The secondary burner 72 also preferably uses liquid propane, and it is designed to burn all exhaust from the primary combustion chamber a second time, thereby ensuring that all combustible particles and gasses in the exhaust have been burned, which reduces pollution to safe levels. In the preferred embodiment, there is an intake valve 74 to allow ambient air to pass into the secondary combustion chamber.

Ordinary spark plugs (not shown) can be used to ignite each primary burner and the secondary burner. The heat in each chamber can be adjusted to a temperature suitable for the material being incinerated. Normally, the temperature in the secondary combustion chamber should be higher than the in the primary combustion chamber, to insure complete burning of any combustible airborne particles or vapors that are not completely burned in the primary combustion chamber. There are transfer vents 76 to allow exhaust to pass from the primary combustion chamber to the secondary combustion chamber. There is a draft induction fan 78 to assist movement of ambient air and exhaust through the intake vents 70 and 74 and exhaust through the transfer vents 76 and the exhaust vent 80.

Referring to FIGS. 4 and 5, the generator 36 is gasoline powered, preferably provides 120 or 240 volts, and it powers all electrical components and functions, including controls, burners 66 and 72, the control panel 34 (see FIG. 1), and lighting, except for the previously mentioned trailer lighting and signalling devices 56 and 58 (see FIGS. 1, 3 and 4) powered by the vehicle when the trailer is being towed. The lighting includes safety lighting and marker lights as required by U.S. Department of Transportation regulations.

Covering the primary and secondary combustion chambers, gas trains, and generator, in the preferred embodiment, is a 14 gauge aluminum shell 38. This shell composes the outer skin of the unit and allows the outside to remain at safe temperature levels and cool to the touch during operation.

The two pressure release hatches 20 (see FIGS. 2, 3 and 4) are located on top of the unit. The hatches are needed in case of a pressure build-up during the combustion process, when they will open, relieve the pressure, and automatically reset. In the preferred embodiment, the hatches may be made of eight inch diameter, schedule 40 black steel pipe. The top 84 of each hatch is preferably constructed from steel plate, one quarter inch thick, and is hinged for quick opening. There are stops 86 that limit the movement of the tops.

Referring to FIGS. 1 and 2, the loading cart 22 is mounted on telescoping rails 24 and 26 and pulls outward from the back of the unit. When the telescoping rails are in an extended position (as in FIG. 2), the smaller inside portion of each rail 24 extends beyond the larger outside portion 26. In a preferred embodiment, it may extend eight feet out from the unit's doors. This allows for easy loading of items to be incinerated, and for easy removal of ashes and debris after incineration. The cart itself is preferably constructed of square tubing, 1.5 inches by 1.5 inches in cross section with a wall thickness of 0.25 inches, welded solid for strength. The cart is removable, and rolls on guide rails with raised sides, preferably three inches wide, with trolley wheels 88. The cart can be loaded manually or with a lift truck.

Referring to FIG. 6, the doors 30 are on the rear of the mobile incinerator, and open outward on hinges 90 having vertical axes. The frames of the doors are preferably fabricated from square tubing, and covered with inside and outside skins made of steel plate. All door joints are continuously welded. There are three hinges on each of the two doors, with latches 92 on the exterior. In a preferred embodiment, the doors are each 26 inches wide, 60.5 inches high, and 2.75 inches thick, their inside skin is 3/8 inches thick, their outside skin is 1/4 inches thick, and the square tubing has a cross section of two inches by two inches with a thickness of one quarter inch.

It is to be understood that the present invention is not limited to the sole embodiment described above, but encompasses any and all embodiments within the scope of the following claims.

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US2985120 *	Feb 3, 1958	May 23, 1961	Mobile Incinerators Inc	Mobile incinerators
US3307507 *	Jun 1, 1965	Mar 7, 1967	Boyd John A	Method and apparatus for incinerating refuse material
US3785303 *	Aug 30, 1972	Jan 15, 1974	Hopkins H	Portable debris incinerator
US3882800 *	Feb 13, 1974	May 13, 1975	Locaner	Automotive unit for the collection and incineration of household or industrial refuse
US3938450 *	Aug 27, 1974	Feb 17, 1976	Nutmeg Sanitation Inc.	Mobile furnace vehicle
US4627365 *	Sep 23, 1985	Dec 9, 1986	Tseng Kuo Yuan	Mobile garbage incinerator
US4688494 *	Jul 17, 1986	Aug 25, 1987	Irving Domnitch	Incinerator towable by a vehicle for burning refuse
US4852815 *	Feb 29, 1988	Aug 1, 1989	Giannotti Hugo V	Transit refuse resource recovery and incineration system
US5237938 *	Dec 23, 1991	Aug 24, 1993	Rokuro Ito	Mobile type medical refuse incinerating vehicle
US5495812 *	May 5, 1992	Mar 5, 1996	Bowas-Induplan Chemie Ges.M.B.H.	Plant for incinerating explosive substances

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US6457424 *	Oct 31, 1997	Oct 1, 2002	Messer Griesheim Gmbh	Cremation system
US6729247 *	Dec 4, 2001	May 4, 2004	Andrew Brown	Mobile crematorium
US6758151	Sep 13, 2002	Jul 6, 2004	Her Majesty The Queen In Right Of Canada, As Represented By The Royal Canadian Mounted Police	Remotely activated armored incinerator with gas emission control
US6766750	Sep 25, 2002	Jul 27, 2004	Air Burners Llc	Trailer-mounted trench burner
US6834597	Sep 10, 2001	Dec 28, 2004	Terry Northcutt	Small caliber munitions detonation furnace and process of using it
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US7503268	Dec 22, 2005	Mar 17, 2009	Air Burners Llc	Transportable incineration apparatus and method
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Citing Patent	Filing date	Publication date	Applicant	Title
				materials, e.g., unexploded chemical warfare ordinance
US8474161	Apr 7, 2010	Jul 2, 2013	John Cunningham	Multitask vehicles for military use, rescue, transport, and explosive detection and removal
US9061626	Jan 29, 2014	Jun 23, 2015	John Cunningham	Lifting system for lifting a person into a vehicle
US9163832 *	Jul 13, 2011	Oct 20, 2015	Stefan Johansson	Waste combustion chamber
US20040055516 *	Sep 25, 2002	Mar 25, 2004	O'connor Brian M.	Trailer-mounted trench burner
US20050192472 *	Apr 7, 2004	Sep 1, 2005	Ch2M Hill, Inc.	System and method for treatment of hazardous materials, e.g., unexploded chemical warfare ordinance
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US20050230163 *	Mar 14, 2005	Oct 20, 2005	Cunningham John P	Motorized vehicle
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WO2003069262A3 *	Dec 30, 2002	Nov 13, 2003	Ch2M Hill Constructors Inc	of an explosion containment chamber Method and apparatus for shielding the interior walls of an explosion containment chamber
WO2005024336A3 *	May 5, 2004	Sep 21, 2006	Ch2M Hill Inc	System and method for treatment of hazardous materials, e.g., unexploded chemical warfare ordinance

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#### CLASSIFICATIONS

U.S. Classification	110/237, 110/212, 110/193, 110/241
International Classification	F23G7/00, F23G5/40
Cooperative Classification	F23G7/003, F23G2209/16, F23G5/40
European Classification	F23G7/00G, F23G5/40

#### LEGAL EVENTS

Date	Code	Event	Description
Aug 21, 2001	FPAY	Fee payment	Year of fee payment: 4
Oct 5, 2005	REMI	Maintenance fee reminder mailed	
Mar 17, 2006	LAPS	Lapse for failure to pay maintenance fees	
May 16, 2006	FP	Expired due to failure to pay maintenance fee	Effective date: 20060317

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