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ACQUISITION
TECHNOLOGY
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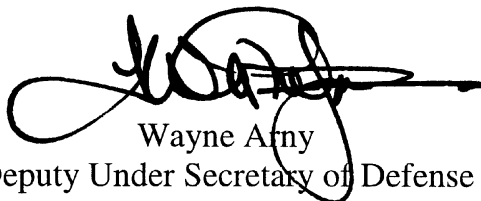
MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY
(INSTALLATIONS & ENVIRONMENT)
ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS & ENVIRONMENT)
ASSISTANT SECRETARY OF THE AIR FORCE
(INSTALLATIONS, LOGISTICS & ENVIRONMENT)

SUBJECT: Best Management Practices (BMPs) for Fireworks to Minimize Perchlorate Releases

The Chemical & Material Risk Management Division in my office developed a series of risk management options (RMOs) for perchlorate. The options were approved for implementation by the Emerging Contaminants Governance Council. One of the RMOs recommended the distribution of BMPs for minimizing the release of perchlorate on DoD-owned properties as a result of fireworks displays.

The attached BMPs are provided for use as appropriate by your installations. Wide distribution is recommended.

My point of contact for any questions regarding the BMPs is Mr. Paul Yaroschak at (703) 604-0641, Paul.Yaroschak@osd.mil.



Wayne Army
Deputy Under Secretary of Defense
(Installations and Environment)

Attachment:
As stated



Best Management Practices (BMPs) for the Use of Recreational Fireworks on DoD Property May 2009

Scope

This document is designed to provide DoD personnel, special events organizers, and facilities contracting personnel with suggested Best Management Practices (BMPs) for the use of recreational fireworks on DoD property. The BMPs are designed to reduce the potential for releases of perchlorate to the environment. The BMPs contained in this document pertain to recreational fireworks used on DoD property.

Perchlorate and Fireworks

The vast majority of aerial display fireworks are manufactured in Asia (primarily China) and use perchlorate as an oxidizer in formulations and in the flash powder. Over the years, perchlorate use and content in fireworks has increased, primarily (in the form of potassium perchlorate or sodium perchlorate) to produce more vivid color effects. Perchlorate content in fireworks imported from foreign countries can vary and it is difficult to verify the composition. Fireworks color effects are most typically produced by the launching of aerial display shells that contain numerous “stars” or small pellets containing a fuel/metal/oxidizer mixture. Aerial shells containing flash powder are used in “aerial salutes” and produce a loud bang/flash. When an aerial shell bursts, stars that fail to burn are often called “blind stars”.

Potential Environmental & Health Impacts from Fireworks

The use of perchlorate-containing fireworks can result in environmental contamination via atmospheric fallout after a fireworks event, and/or from “duds” or “misfires.” Duds are aerial shells that are launched from a mortar, fail to ignite in the atmosphere, and fall back to earth. Misfires are aerial shells that do not launch from the mortar. Statistics on fireworks that are launched but not burned are not available. While most of the perchlorate present in the exploding firework is expended, it appears that the deposition of blind stars, un-ignited display shells, and residues from the fireworks or lift charges, and other pyrotechnic debris may be the primary mechanism of potential sources of perchlorate release to the environment. The potential environmental impact is dependent on the size of the display, the perchlorate content of the fireworks, the extent of incomplete combustion, improper disposal of duds and misfires, excessive debris fallout, and lack of post-display housekeeping and cleanup. Fireworks displays, if near drinking water sources, groundwater recharge areas, or other sensitive habitats, have the potential for significant environmental impact due to the solubility of perchlorate in water. There are documented links between fireworks displays and surface water perchlorate contamination. At relatively low levels, perchlorate can affect thyroid function in susceptible populations. The Agency for Toxic Substances and Disease Registry has health risk information available at the following web site:
<http://www.atsdr.cdc.gov/tfacts162.html>

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Fireworks on DoD Property

DoD typically conducts fireworks exhibitions on DoD property, where permitted, as part of Fourth of July fireworks displays, air shows, or other open base events. Due to the hazard associated with commercial fireworks, the activity is usually contracted out to a properly licensed and insured commercial vendor, to provide all the necessary transportation, storage, security, setup, and functioning of aerial fireworks for a safe on base display. Contracting for commercial fireworks services is usually done as a Non-Appropriated Fund (NAF) procurement through a NAF contracting office or as a pass-through by a special events coordinator. Coordination is required with on base authorities, including Morale Welfare and Recreation (MWR), the Fire & Emergency Services Branch, Safety Departments, DoD police, and Public Affairs. Effective implementation of BMPs requires teamwork across the organization and incorporating the BMPs into future contract specifications for fireworks shows on DoD property.

Best Management Practices for Recreational Fireworks Use on DoD Property

The implementation of BMPs can minimize the potential impacts of perchlorate from fireworks. The following BMPs represent a collection of recommended approaches.

- **BMP 1 – Low or No-Perchlorate Containing Fireworks:** Where not cost prohibitive, DoD installations should use “eco-friendly” perchlorate-free or low perchlorate fireworks of documented quality. Installation personnel may want to collect bids for fireworks shows with both perchlorate-free or low perchlorate fireworks, and regular fireworks to make an informed decision.
- **BMP 2 – Post Event Cleanup¹:** The fireworks show contractor should institute rigorous post-event cleanup (i.e., "housekeeping") practices. Fireworks companies or display sponsors should remove all visible shell debris encountered at the site during the search conducted immediately after the fireworks show. Consider using station forces to augment the fireworks contractor personnel for wider coverage of the show area the next morning. Meteorological conditions at the launch site and charge altitude dynamics should be monitored so that blind stars and duds can be searched for in their most probable location
- **BMP 3 – Managing Duds and Misfires:** All "duds" or "misfires" must be removed from the site and disposed of in accordance with applicable local, state and federal regulations and manufacturers' instructions. Under no circumstances are duds or misfires to be buried. Duds and misfires can be doused in water for safety. Contain and/or promptly address runoff in cases where water is used to douse duds or misfires.
- **BMP 4 – Managing Un-Ignited Pyrotechnics:** Within 24 hours of a fireworks show, the pyrotechnics operators should, to the extent practical, collect any blind

¹ In California, the State Fire Marshal oversees the licensing of pyrotechnic operators. They require the pyrotechnic operator to fill out a post-display form listing information concerning duds, etc. The web site with further information is at http://www.osfm.fire.ca.gov/strucfireengineer/strucfireengineer_fireworks.php

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stars and un-ignited pyrotechnic material found during the inspection of the entire firing range. Blind stars are often released at high altitudes and can therefore travel great distances from the launch site. They can also be released as a result of the breakage of dud shells. The stars can be the size of a dime and can evade detection during the post-show walkover at night. Station forces should be used to augment the fireworks contractor personnel for maximum and wider coverage of the show area in daylight. The collected material must be managed as appropriate according to local, state, and federal regulations and not buried on site.

- **BMP 5 – Citing Events:** The location of fireworks must be made to minimize risk to drinking water sources. DoD personnel and the contractor should be aware of the existence of surrounding drinking water supplies and keep fireworks displays as far away from them as possible. Of particular concern are fireworks displays near surface waters used for drinking water supplies and within the recharge areas of public drinking water supply wells.

The table below provides other sources of information on perchlorate, fireworks and other BMPs.

General Information and Web Resources	
General DoD Perchlorate Information	Available at https://www.denix.osd.mil/portal/page/portal/denix/environment/MERIT/EC/ECAL/Perchlorate
General Information on Perchlorate with Brief Coverage of Fireworks	Perchlorate: Overview of Issues, Status, and Remedial Options (September 2005), Interstate Technology & Regulatory Council, Available at http://www.itrcweb.org/guidancedocument.asp?TID=32
The Chemistry of Fireworks	Website that covers science of fireworks Available at http://www.ch.ic.ac.uk/local/projects/gondhia/index.html
Fireworks: How They Work	“What’s That Stuff: Fireworks”, Chemical and Engineering News, Volume 79, Number 27, page 30, July 2, 2001 Available at http://pubs.acs.org/cen/whatstuff/stuff/7927sci3.html
Fireworks: Environmentally Friendly	“Pyrotechnics for the Planet”, Chemical and Engineering News, June 30, 2008, Volume 86, Number 26, pp. 14-18. Available at http://pubs.acs.org/cen/coverstory/86/8626cover.html

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<p>Best Management Practices: Massachusetts</p>	<p><i>“Fireworks Best Environmental Management Practices”</i>, Massachusetts Department of Environmental Protection (MassDEP), April 14, 2008. Available at http://www.mass.gov/dep/water/drinking/fworkbmp.htm</p>
<p>Best Management Practices: California</p>	<p><i>“DTSC’s Perchlorate Best Management Practices (BMPs)”</i>, California Department of Toxic Substances Control, Fact Sheet, July 2006. Available at http://www.dtsc.ca.gov/HazardousWaste/Perchlorate/upload/HWM_FS_Perchlorate_7-061.pdf</p> <p>State of California Regulations concerning Perchlorate BMPs effective July 1, 2006. Available at http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/Perchlorate_BMP_regs.cfm</p>
<p>For Additional Information</p>	<p>DoD Chemical and Material Risk Management Directorate POC: Mr. Paul Yaroschak E-Mail: paul.yaroschak@osd.mil</p>