PRISM SOLUTIONS

RESEARCH BRIEF

Research Request:

Use of Vaping Devices Onboard Aircraft (February 2017)

Research Response:

DOT Bans Use of E-Cigarettes on Commercial Flights, Including Charters

March 9, 2016

The U.S. DOT recently issued a final rule that bans the use of electronic cigarettes on commercial aircraft. The ban affects scheduled airlines and charter flights in which a flight attendant is a required crewmember (aircraft with 19 or more passenger seats).

The DOT said it created this regulation to improve air quality, reduce health risks and enhance safety. The final rule prohibits smoking on all commercial non-scheduled flights, except for single-entity charters and on-demand air taxi flights where a flight attendant is not a required crewmember.

This announcement follows a 2011 notice of proposed rulemaking in which the DOT proposed to amend its existing smoking rule to explicitly ban the use of e-cigarettes on all flights covered by current smoking bans. The proposal also asked specifically about including a ban of e-cigarettes on charter flights since the current regulations prohibiting smoking on charter flights were adopted in a 2012 final rule.

The DOT said it expects the effect on operators to be minimal. During the proposed rule's comment period, DOT reviewed carrier websites and advertisements, which indicate many carriers already prohibit use of e-cigarettes on aircraft.

FAA Safety Alert for Operators (SAFO) - SAFO 15003

Fire Risk of Electronic Cigarettes (e-cigarettes) in Checked Baggage

Purpose: This SAFO alerts operators to recent incidents involving e-cigarettes in checked baggage and recommends carriage of such devices in the passenger cabin only.

Background: On August 9, 2014, at Boston's Logan Airport, an e-cigarette contained in a passenger's checked bag in the cargo hold of a passenger aircraft caused a fire that forced an evacuation of the aircraft. On January 4, 2015, at Los Angeles International Airport, a checked bag that had missed its flight was found to be on fire in a baggage area. Emergency responders attributed the fire to an overheated e-cigarette inside the bag. These incidents and several others occurring outside of air transportation have shown that e-cigarettes can overheat and cause fires when the heating element is accidentally activated or left on. This danger may be exacerbated by the growing trend of users modifying and rebuilding their reusable e-cigarette devices (personal vaporizers) and interchanging original and aftermarket batteries, heating elements, and vaporizing components.

On December 10, 2014, the International Civil Aviation Organization (ICAO) issued an Electronic Bulletin (EB) titled, DANGEROUS GOODS CARRIED BY PASSENGER AND CREW — INCIDENTS RELATED TO ELECTRONIC CIGARETTES (EB 2014/074). The ICAO bulletin recommends that a passenger's e-cigarettes be carried in the cabin of the aircraft and not in checked baggage.

Discussion: These incidents highlight an emerging safety risk relating to the carriage of e-cigarettes on aircraft in checked baggage. Although ICAO standards and applicable U.S. Department of Transportation (DOT) regulations do not explicitly prohibit e-cigarettes in checked and carry-on baggage, the transportation of battery-powered devices that are likely to create sparks or generate a dangerous evolution of heat is prohibited unless they are packaged in such a manner to preclude such an occurrence (see 49 CFR 173.21(c)). Carriage of e-cigarettes in the passenger cabin addresses this safety risk by ensuring that if an incident does occur, it can be immediately identified and mitigated. Operators can also refer to SAFO 09013 Fighting Fires Caused by Lithium Type Batteries in Portable Electronic Devices.

Recommended Action: It is recommended that Operators require their passengers to carry e-cigarettes and related devices exclusively in the cabin of the aircraft. Operators are encouraged to communicate their e-cigarette policy to passengers as widely as possible to include their website, press releases, ticket purchase, the check-in process (on-line, kiosks, check-in agents, etc.), and through any other means already established to inform passengers of hazardous materials regulations and related company policies.

ICAO Bulletin—EB 2014/074

DANGEROUS GOODS CARRIED BY PASSENGER AND CREW—INCIDENTS RELATED TO ELECTRONIC CIGARETTES

1. Electronic cigarettes are being carried by passengers in increasing numbers. Several incidents have been reported involving electronic cigarettes overheating through the accidental activation of their heating elements resulting in fires in checked baggage. The Dangerous Goods Panel (DGP) will be addressing this safety risk at its next panel meeting which will likely result in an amendment to the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284). Until such time, States are encouraged to inform operators of this safety risk and to recommend that they require passengers to carry such devices in the cabin, where an incident can be immediately mitigated, and not in checked baggage.

2. Electronic cigarettes, also called personal vaporizers or electronic nicotine delivery systems, are battery-powered devices that simulate tobacco smoking by producing a heated vapour which resembles smoke. The devices have a heating element to vaporize a liquid solution. Passengers are normally permitted to carry these devices under the provisions for dangerous goods carried by passengers and crew contained in Part 8 of Doc 9284.

3. Background information on this subject can be found in the report of the DGP Meeting that was held from 20 to 24 October 2014 in Rio de Janeiro, Brazil (DGP-WG/14). The report is available on the DGP website at http://www.icao.int/safety/DangerousGoods/Pages/DGP.aspx

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FEMA—U.S. Fire Adminstration

Electronic Cigarette Fires and Explosions

Key Points

- More than 2.5 million Americans are using electronic cigarettes (e-cigs or e-cigarettes), and this number is growing rapidly.
- Fires or explosions caused by e-cigarettes are rare.
- Twenty-five separate incidents of explosion and fire involving an e-cigarette were reported in the United States media between 2009 and August 2014.
- Nine injuries and no deaths were associated with these 25 incidents. Two of the injuries were serious burns.
- Most of the incidents occurred while the battery was charging.
- The shape and construction of e-cigarettes can make them more likely than other products with lithium-ion batteries to behave like “flaming rockets” when a battery fails.
- Lithium-ion batteries must be charged in accordance with the manufacturer’s instructions.
- Using power sources not approved by the manufacturer to recharge a lithium-ion battery can result in an explosion and fire.

American Lung Association

E-cigarettes and Lung Health

On May 5, 2016, the Food and Drug Administration (FDA) announced it was extending its authority to include e-cigarettes and other tobacco products. Starting in August 2016, FDA began to apply and enforce key provisions of the Family Smoking Prevention and Tobacco Control Act as it relates to the sales, marketing and manufacturing of e-cigarettes.

The American Lung Association had long called for FDA to bring e-cigarettes and other unregulated tobacco products under its authority. This action was especially important given the rapid rise in youth use of e-cigarettes in the U.S., including a 900 percent increase among high school students from 2011 to 2015.

How Will FDA Oversee E-cigarettes?

A 2010 ruling from a federal court in a case filed by an e-cigarette manufacturer against the FDA determined that e-cigarettes which do not make therapeutic claims will be regulated as tobacco products.

If a manufacturer does make a therapeutic claim (such as that an e-cigarette can help you quit smoking), then the manufacturer must first prove through a series of clinical trials that their product is safe and effective.

What Are in E-cigarettes?

The main component of e-cigarettes is the e-liquid contained in cartridges. To create an e-liquid, nicotine is extracted from tobacco and mixed with a base (usually propylene glycol), and may also include flavorings, colorings and other chemicals.

Following the 2016 announcement allowing FDA oversight of tobacco products, e-cigarette manufacturers must register with FDA by August 8, 2016, and then will have two additional years to submit an application to remain in the marketplace. Until that time, the nearly 500 brands and 7,700 flavors of e-cigarettes will remain on the market – before FDA is able to fully evaluate them. Until FDA's evaluation is done, there are very few ways for anyone other than the manufacturers to know what chemicals are contained in e-liquids, or how e-cigarette use might affect health, whether in the short term or in the long run.

The U.S. Surgeon General has concluded that e-cigarettes can expose users to several potentially harmful chemicals, including nicotine, carbonyl compounds and volatile organic compounds.

Nicotine

Nicotine is an addictive substance, and almost all e-cigarettes contain nicotine. Even some products that claim not to have any nicotine in them may still contain it. For in-

stance, initial FDA lab tests conducted in 2009 found that cartridges labeled as nicotine -free had traceable levels of nicotine. A 2014 study found little consistency in the amount of nicotine delivered by e-cigarettes of the same brand and strength.2 Similarly, another 2014 study found that the amount of nicotine in e-liquid refills is often substantially different from the amount listed on the package.3 Experienced users learn how to use e-cigarettes in a way that increases their exposure to nicotine. Newer e-cigarette devices, especially "tank" styles, with higher voltage also deliver a greater concentration of nicotine. This matters because the more nicotine used, the greater the potential for addiction.

Nicotine is not safe. The U.S. Surgeon General has found exposure to nicotine during pregnancy harms the developing fetus, and causes lasting consequences for the developing brain and lung function in newborns. Nicotine exposure also affects maternal and fetal health during pregnancy, and can result in low birth weights, preterm delivery and stillbirth. It can also cause sudden infant death syndrome.

Nicotine also has a negative impact on adolescent brain development. Human brain development continues far longer than was previously realized, and nicotine use during adolescence and young adulthood has been associated with lasting cognitive and behavioral impairments, including effects on working memory and attention.

Other chemicals

We don't presently know what is in e-cigarettes. However, in initial lab tests conducted in 2009 the FDA found detectable levels of toxic cancer-causing chemicals, including an ingredient used in anti-freeze, in two leading brands of e-cigarettes and 18 various cartridges. A review of studies found that levels of toxins in e-cigarette aerosol varied considerably within and between brands. A 2014 study found that aerosol from e-cigarettes with a higher voltage level contains more formaldehyde, another carcinogen with the potential to cause cancer. The findings are alarming, and underscores why the American Lung Association called so urgently for FDA oversight of these products.

Flavors in e-cigarettes are also a cause for concern. Not only are flavors used to target kids, but they may be harmful on their own. E-cigarette and flavor manufacturers and marketers may suggest that the flavor ingredients used in e-cigarettes are safe because they have FEMA GRASTM status for use in food, but such statements are false and misleading. The reality is that FEMA GRASTM status only applies to food, meaning it's safe to eat, and does not apply to inhaling through e-cigarettes.

The U.S. Surgeon General has concluded that flavoring/taste is one of the main reasons youth and young adults use e-cigarettes and according to data from the 2013-2014 wave of FDA's PATH study, among youth who have ever tried an e-cigarette, 81 percent used a flavored product the first time they tried one.

Diacetyl, a buttery flavored chemical often added to food products such as popcorn,

caramel, and dairy products, has also been found in some e-cigarettes with flavors. Diacetyl can cause a serious and irreversible lung disease commonly known as "popcorn lung."

Poisoning concern

Aside from concerns about e-cigarette use and emissions alone, data released by the Centers for Disease Control and Prevention (CDC) shows that calls to the nation's poison centers for e-cigarette exposure poisonings are rapidly increasing. One study found that while most calls involving e-cigarette liquid poisoning came from accidental ingestion of the e-cigarette or its liquid, about one-sixth of the calls related to someone inhaling these items. Exposure through the eye and the skin were also reported.

Large doses of nicotine have a potential for poisoning, with symptoms beginning with nausea and vomiting in cases of acute toxicity and progressing to seizures and respiratory depression in cases of severe nicotine poisoning. The U.S. Surgeon General has concluded that ingestion of e-cigarette liquids containing nicotine can cause acute toxicity and possibly death.1 This is particularly true in children as calls to poison control centers have increased nationwide. Tragically, one child died from acute e-cigarette poisoning in 2014, attributed to the ingestion of liquid nicotine from an e-cigarette.

Secondhand Emissions from E-cigarettes?

As public spaces increasingly become smokefree, anecdotal reports show some people are attempting to use e-cigarettes indoors and in public spaces which are smokefree, like bars, restaurants and even public transit.

While e-cigarettes do not contain smoke, they do expose others to secondhand emissions. Two studies have found formaldehyde, benzene and tobacco-specific nitrosamines (all carcinogens) coming from those secondhand emissions. Other studies have shown that chemicals in the emissions contain formaldehyde, acetaldehyde and other potential toxins. The U.S. Surgeon General has concluded that e-cigarette aerosol is not harmless, and can contain harmful and potentially harmful chemicals, including nicotine.

The American Lung Association supports prohibiting the use of e□cigarettes in worksites and public places, and including e-cigarettes under smokefree laws with other tobacco products. Currently, nine states, the District of Columbia and hundreds of communities have prohibited e-cigarette use in the same places where smoking is already prohibited.

Bottom Line

E-cigarettes are a tobacco product. The American Lung Association remains concerned about their impact on the public health, given the dramatic increase in use among youth. As FDA begins its oversight of these products, we will learn more about them and more safeguards will be put in place to protect the public health.