Office of Intelligence and Analysis
Homeland Security

Federal Bureau of Investigation

Joint Homeland Security Assessment

(U//FOUO) Peroxide-Based Explosives: Terrorist Interest Growing

10 October 2007

(U//FOUO) Prepared by the DHS/Borders and CBRNE Threat Analysis Division, CBRNE Branch and the FBI/Threat Analysis Unit.

(U) Scope

(U//FOUO) DHS and the FBI are providing this assessment for general terrorism-related awareness. This bulletin discusses peroxide-based explosives and indicators of their production. ***DHS and the FBI lack specific, credible intelligence that terrorists are planning to use peroxide-based explosives in an attack against the Homeland. Law enforcement agencies and Homeland Security officials, however, should be cognizant of the threat posed by peroxide-based explosives and the relative ease with which they can be manufactured.***

(U) Key Findings

(U//FOUO) Recent intelligence indicates an increased terrorist interest in the use of hydrogen peroxide to manufacture homemade explosives (HMEs). The widespread availability and ease of purchase of off-the-shelf products containing hydrogen peroxide—coupled with the inherent difficulties in obtaining commercial and military explosives—make hydrogen peroxide an ideal material for manufacturing HMEs.

- ***(U//FOUO) Highly concentrated hydrogen peroxide solutions can be mixed with a number of fuels to create a liquid high explosive.***

- ***(U//FOUO) Hydrogen peroxide solutions can be used to synthesize the solid explosives triacetonetriperoxide (TATP) and hexamethylene triperoxide diamine (HMTD).***

(U//FOUO) Terrorists have used both solid and liquid peroxide-based explosives in operations overseas. Terrorists and others also have used solid peroxide-based explosives in the Homeland.

(U) Liquid Peroxide-Based Explosive

(U//FOUO) Terrorist operations overseas have demonstrated numerous plots and attacks using concentrated hydrogen peroxide (CHP) solutions blended with fuel to create liquid high explosives.

- (U//FOUO) In September 2007 German authorities foiled a bombing plot in which terrorists were planning to use CHP to make an explosive.

- (U//FOUO) CHP-blended formulations were to be used in the disrupted August 2006 airline plot originating from the United Kingdom.

- (U//FOUO) The London transit system attacks of July 2005 involved CHP formulations.

- (U//FOUO) The failed 2004 bombing of U.S. Consulate Karachi in Pakistan used a CHP-based device.

(U//FOUO) Liquid homemade explosives can be formed by blending a strong oxidizer, such as hydrogen peroxide, with an organic material used as a fuel. Based on the fuel and the concentration of hydrogen peroxide, the resulting HME will vary in its ease of detonation and its explosive energy. In 2005 the FBI conducted a series of tests to evaluate various CHP-blended mixtures and determine their feasibility as liquid HMEs.

The fuels used in these tests included liquids—acetone, ethanol, and nitro methane—and solids—black pepper, cumin, flour, and a sucrose-based powdered drink mixture—that were blended with CHP in a fixed CHP/fuel ratio. The concentration of hydrogen peroxide was varied for the tests. Some generalized results from the FBI tests are as follows:

— (U//FOUO) Some of the liquid CHP/fuel mixtures, when initiated, ***exhibited a detonation velocity similar to that of trinitrotoluene (TNT)—a powerful military and commercial explosive.***[*]

— (U//FOUO) Blended mixtures are ***less sensitive and more difficult to detonate than TATP and HMTD.***

— ***(U//FOUO) As the concentration of the CHP decreases, blended mixtures generally are more difficult to initiate and their detonation velocity decreases.*** Some liquid CHP/fuel mixtures using highly concentrated CHP required initiation by a primary explosive. Those using moderately concentrated CHP solutions combined with fuels such as black pepper, cumin, and flour required booster charges to detonate—classifying them as tertiary explosives. Detonation velocities for mixtures using moderately concentrated CHP decreased by approximately 20 percent from those using highly concentrated CHP.

(U//FOUO) FBI testing of CHP and a variety of fuels is ongoing. DHS and the FBI will issue reports of their results—including safety, initiator sensitivity, detonation velocity, and air blast data—as results are obtained.

(U) Explosive Classifications

(U) Primary explosives are extremely sensitive to electrostatic discharge, friction, heat, and shock, to which they will respond by burning rapidly or detonating. They are mostly used as initiators or blasting caps to detonate secondary explosives. TATP and HMTD are considered primary explosives.

(U) Secondary explosives are relatively insensitive to electrostatic discharge, friction, heat, and shock. Secondary explosives usually need primary explosives to initiate them. Tests have shown that blended mixtures of CHP and appropriate fuels generally need to be initiated by a primary explosive.

(U) Tertiary explosives (blasting agents) such as ammonium nitrate/fuel oil (ANFO) are, in general, so insensitive to external stimuli that typical detonators are insufficient to initiate them. They usually require an intermediate secondary explosive or booster. Tests have shown that ANFO can be initiated without the use of boosters by using HMTD or TATP in quantities larger than what one would use in a standard detonator.

[*] (U//FOUO) These test results do not indicate that the resulting air blast damage potential of the CHP/fuel mixture is comparable to that of TNT. Further testing is under way to determine the TNT equivalence.

(U) Concentrating Commercially Available Hydrogen Peroxide

DHS

(U//FOUO) Tests have shown that over-the-counter hydrogen peroxide solutions can be distilled with unsophisticated techniques to concentrations suitable for use in liquid explosive formulations.

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(U) Liquid Hydrogen Peroxide Solution.

(U//FOUO) Hydrogen peroxide is available at many retail vendors in the United States. Concentrations range from low 3 percent in over-the-counter antiseptics and 12 percent in hair coloring products, to 35 percent in wood bleaches. ***Sandia National Laboratories research has shown that even 3-percent concentrations of hydrogen peroxide can be distilled with unsophisticated techniques to yield concentrations suitable for use in liquid explosive formulations***.

(U) Solid Peroxide-Based Explosives

(U//FOUO) The most frequently documented terrorist use of hydrogen peroxide is in the synthesis of the explosives TATP and HMTD. ***No commercial producers of TATP and HMTD*** exist because these materials are too thermally unstable and chemically reactive, resulting in inadvertent explosions. The inherent dangers of TATP and HMTD have not deterred terrorists or other individuals from making and using these compounds, including in the Homeland.

— (U) An individual was killed in July 2006 in a Texas City, Texas apartment complex when a small amount of TATP he manufactured exploded in his lap.

— (U) An Oklahoma State University engineering student was killed in October 2005 when an improvised explosive device he constructed detonated outside a football stadium. Examination of his residence revealed extensive TATP production.

— (U) Richard Reid in December 2001 used TATP as the initiator in the shoe bomb that he attempted to detonate onboard an overseas airliner destined for Miami.

(U) TATP crystals in various forms.

— (U//FOUO) HMTD was one of the explosive materials discovered in the car of "Millennium Bomber" Ahmed Ressam in December 1999 as he attempted to cross the Canadian border into Port Angeles, Washington.

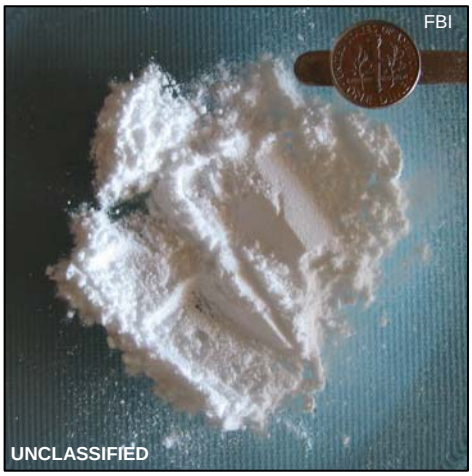
(U//FOUO) The precursors used to form TATP and HMTD can be obtained at various retail outlets, including hardware stores and pharmacies. Moreover, instructions and safety protocols for making these two explosives are readily available on the Internet.

— (U//FOUO) Valid recipes for making TATP and HMTD are taught in terrorist training camps, are published in widely circulated terrorist manuals, and have been recovered from terrorist safehouses.

(U//FOUO) TATP is formulated from a reaction involving acetone, hydrogen peroxide, and a strong acid, such as sulfuric acid.

— (U//FOUO) HMTD is formulated from a reaction involving hydrogen peroxide, a weak acid—such as citric acid—and hexamine solid fuel tablets that are used to fuel some types of camp stoves and can be purchased in many outdoor recreational stores.

— (U//FOUO) TATP and HMTD frequently are erroneously described as liquid explosives; however, both are solids.



(U) HMTD powder.

(U//FOUO) TATP and HTMD—because of their ease of preparation and sensitivity to initiation—are attractive primary explosives to use in homemade initiating systems. FBI tests have shown that TATP and HMTD are effective in detonating less sensitive secondary and tertiary explosive charges, including ANFO mixtures.

(U) Outlook

(U//FOUO) DHS and the FBI judge that the use of HMEs—especially peroxide-based HMEs—in terrorist operations will grow. Since law enforcement is alerted when individuals steal or purchase large quantities of commercial or military explosives, making homemade explosives is one way for terrorists and other malicious actors to avoid detection. Purchasing the precursor chemicals for the manufacture of peroxide-based HMEs is unlikely to draw attention.

(U//FOUO) Homeland Security and law enforcement personnel should be familiar with the prevalence of peroxide-based explosives and other HMEs, and be able to recognize some of the indicators that could be a tip-off to HME production.

(U) Potential Indicators of Explosives Manufacturing

(U//FOUO) Because of the bleaching properties of hydrogen peroxide, an individual involved in peroxide-based explosive manufacturing might experience a gradual lightening of head and body hair. For example, the July 2005 London subway bombers' hair had become bleached during their production of peroxide-based explosives. Individuals using CHP also might exhibit white-colored peroxide burns on skin that has come in direct contact with CHP.

(U//FOUO) In general, almost every HME manufacturing process affects the immediate environment. Some indicators that may point to HME production include the following:

- (U//FOUO) Foul odors or caustic fumes coming from a room or building.
- (U//FOUO) Damage to ceilings and walls—such as corrosion of metal surfaces or structural damage—and paint discoloration from harsh chemical fumes.
- (U//FOUO) Strong chemical odors emanating from sewers and drain ditches.
- (U//FOUO) Large industrial fans or multiple fans in windows.
- (U//FOUO) Dead vegetation in the surrounding area.
- (U//FOUO) Presence of metal or plastic drums for storing explosives.
- (U//FOUO) Machinery—such as gas burners or mixers—for processing raw materials.
- (U//FOUO) Refrigerators or coolers used to store volatile chemicals and finished products.

(U) **Reporting Notice:**

(U) DHS and the FBI encourage recipients of this document to report information concerning suspicious or criminal activity to DHS and/or the FBI. The DHS National Operation Center (NOC) can be reached by telephone at 202-282-9685 or by e-mail at NOC.Fusion@dhs.gov. For information affecting the private sector and critical infrastructure, contact the National Infrastructure Coordinating Center (NICC), a sub-element of the NOC. The NICC can be reached by telephone at 202-282-9201 or by e-mail at NICC@dhs.gov. The FBI regional phone numbers can be found online at http://www.fbi.gov/contact/fo/fo.htm. When available, each report submitted should include the date, time, location, type of activity, number of people and type of equipment used for the activity, the name of the submitting company or organization, and a designated point of contact.

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