Defense Intelligence Agency
Joint Intelligence Task Force – Combating Terrorism

SPECIAL ANALYSIS

10 June 2005

This is a revised and reclassified version of a previous JITF-CT Special Analysis titled "North America: Threats for Ammonium Nitrate" released on 19 May 2004.

(U//FOUO) Worldwide: Threats from Bulk Ammonium Nitrate

(U//FOUO) Terrorists typically favor basic tactics, techniques, and procedures (TTP), off-the-shelf technology and readily available resources when planning and carrying out an attack. While simplistic in effort, these factors can be a lethal and destructive combination. Terrorists also continue to explore innovative attack options that take advantage of overlooked vulnerabilities inherent to the civilian sector. One such vulnerability is transporting bulk quantities of ammonium nitrate (AN) via the road, rail and waterway network. Using a region's bulk AN transportation network to attack critical infrastructure and urban centers would arguably qualify as a high probability — high casualty/destruction threat scenario.

(U) Forms of AN

(U) The process of neutralizing nitric acid with ammonia produces ammonium nitrate (NH_4NO_3). The resulting solution is evaporated and converted into one of the solid forms of AN: prilled, dense flake, or grained.

(U) The prilling tower method is the most prevalent method of manufacturing AN; the resulting product is in the shape of small compressed pellets, commonly referred to as prills. AN produced by this method falls into one of two categories: agricultural-grade that is dense and dusty due to a high clay content and industrial-grade that is lower in density and more porous.

(U) Prilled Ammonium Nitrate

(U) Ammonium Nitrate fertilizer

(U) Ammonium Nitrate/Fuel Oil Explosive Blasting Agent

(U) The Potential Threat

(U//FOUO) The primary industrial use of AN is for explosives applications; a fuel additive combined with industrial grade AN produces an explosive blasting agent called ammonium nitrate fuel oil (ANFO). While distinctive properties are desired for industrial-grade AN prills, an individual with basic "text book" knowledge can readily transform agricultural or industrial grade AN into a high explosive with minimal effort. Several terrorist groups understand this concept and several recovered terrorist training manuals document the associated procedures. Terrorists are also familiar with fuel alternatives other than fuel oil to increase the sensitivity and energy output potential.

(U//FOUO) Agricultural grade AN generally is safe to handle and not designed to function as an explosive. The explosive sensitivity of agricultural grade AN depends on a number of factors, primarily its moisture content, particle size, and contamination levels. Agricultural grade AN will detonate, but a larger explosive booster is required compared to the booster charge required for industrial grade AN.

(U//FOUO) AN is inexpensive and widely available throughout the world; 2001 international trade for agricultural grade AN exceeded 2.7 million tons. Mass stocks of AN are available at AN production plants, agricultural supply stores and aboard transport means, specifically truck, rail, and barge. Barge transport via river intracoastal networks is extensively used in transporting AN. Table 1 summarizes the capacities of the three modes of transportation used to transport AN. Note the substantial TNT equivalency for each mode.

(U//FOUO) Table 1. Capacity Summaries of AN Transportation Modes

			
Mode	Hopper Truck	Hopper Railcar	Barge
AN Capacity	48,000 pounds 24 tons	192,000 pounds 96 tons	2,880,000 pounds 1,440 tons
TNT Equivalent	10,560 pounds 5.28 tons	42,240 pounds 21.12 tons	633,600 pounds 316.80 tons

(U) AN Transport Means - Truck, Rail, Barge and Ship

(U//FOUO) Each hopper truck is equivalent to over five tons of TNT if an explosive booster charge is used to detonate the AN. This is a serious and credible threat. A single terrorist could commandeer, explosively prep and drive a highjacked truck to a target with relative ease and speed. This scenario illustrates the basic TTP, low technology and nominal resources necessary for preparing and conducting an attack.

(U//FOUO) AN hopper railcars also pose a considerable threat to industrial, commercial and residential locations adjacent to rail lines. Plausible scenarios for accessing and preparing hopper railcars for detonation are too numerous to list. Most involve basic TTP, low technology and nominal resources.

(U//FOUO) The worse case scenario involves transporting AN by barge via the inland waterways. Based on the gross tonnage of AN, riverside cities, industrial complexes, and critical infrastructure on the river network are vulnerable. During a 14-day period in spring 2004, 56 barges carrying AN transited the lower Mississippi river network. While thorough pre-operational planning and good operational security (OPSEC) is required for all terrorist operations, the overall TTP is well within the capability of most criminal and terrorist organizations. Lacking local waterborne security, commandeering an unprotected tug and barge in the target's vicinity would not be difficult. Applying basic demolition skills, a multi-barge tow could be easily prepared for detonation in 30 minutes or less using a nominal amount of commercially available explosives. A single barge could be prepared within minutes.

(U) Murrah Federal Building, Oklahoma City, 1995

(U) World Trade Center Bombing, 1993

(U) Two Case Studies of Damage Caused by an AN Explosion

(U//FOUO) While there is no precedence for terrorists using bulk unmixed AN in an attack, there is precedent for bulk AN causing mass casualties and substantial destruction. The following two case studies illustrate the potential for extreme destruction in a terrorist attack employing bulk AN.

(U) Texas City, Texas

(U) On the morning of 16 April 1947, a disaster occurred in Texas City, Texas, a port on the Galveston Bay. Just before 0800 hours, a fire was reported in a cargo hold onboard the freighter SS *Grandcamp, which* contained approximately 2,300 tons of AN fertilizer. At approximately 0912 hours, the *Grandcamp's* ammonium nitrate cargo detonated (up to 500 tons TNT equivalency), producing a huge mushroom-like cloud that billowed more than 2,000 feet into the air and was heard over 150 miles away. The explosion's shockwave knocked two light planes flying overhead out of the sky. The *Grandcamp* explosion ignited a fire on the nearby ship SS *High Flyer* (carrying 961 tons of ammonium nitrate and 2,000 tons of sulfur), which burned until it exploded the next morning.

(U) The explosions caused extensive devastation, destroying the entire dock area, the nearby Monsanto Chemical Company, other smaller companies, grain warehouses, and numerous oil and chemical storage tanks. Flying debris initiated a series of smaller

explosions and fires not only along the industrial area, but throughout the city. Heavy debris, some weighing several tons, extended the range of casualties and property damage well into the business district, approximately a mile away. The explosion produced a 15-foot tidal wave that swept the dock area, and the blast damaged or destroyed over 1,000 residences and buildings throughout Texas City. One-third of the town's 1,519 houses were condemned, leaving 2,000 persons homeless. Aggregate property loss amounted to a conservative figure of $100 million, or more than $700 million in today's monetary value.

(U) Although not all casualties were residents of Texas City, the total was equivalent to 25 percent of the town's estimated population of 16,000. While the exact number of people killed is unknown, a monument to the disaster honors 576 known dead (with 398 identified) and 178 missing persons. Approximately 3,500 people were injured.

(U) Fires resulting from the explosions burned in Texas City for days

(U) Damage to Texas City was extensive, as indicated by these damaged and destroyed houses

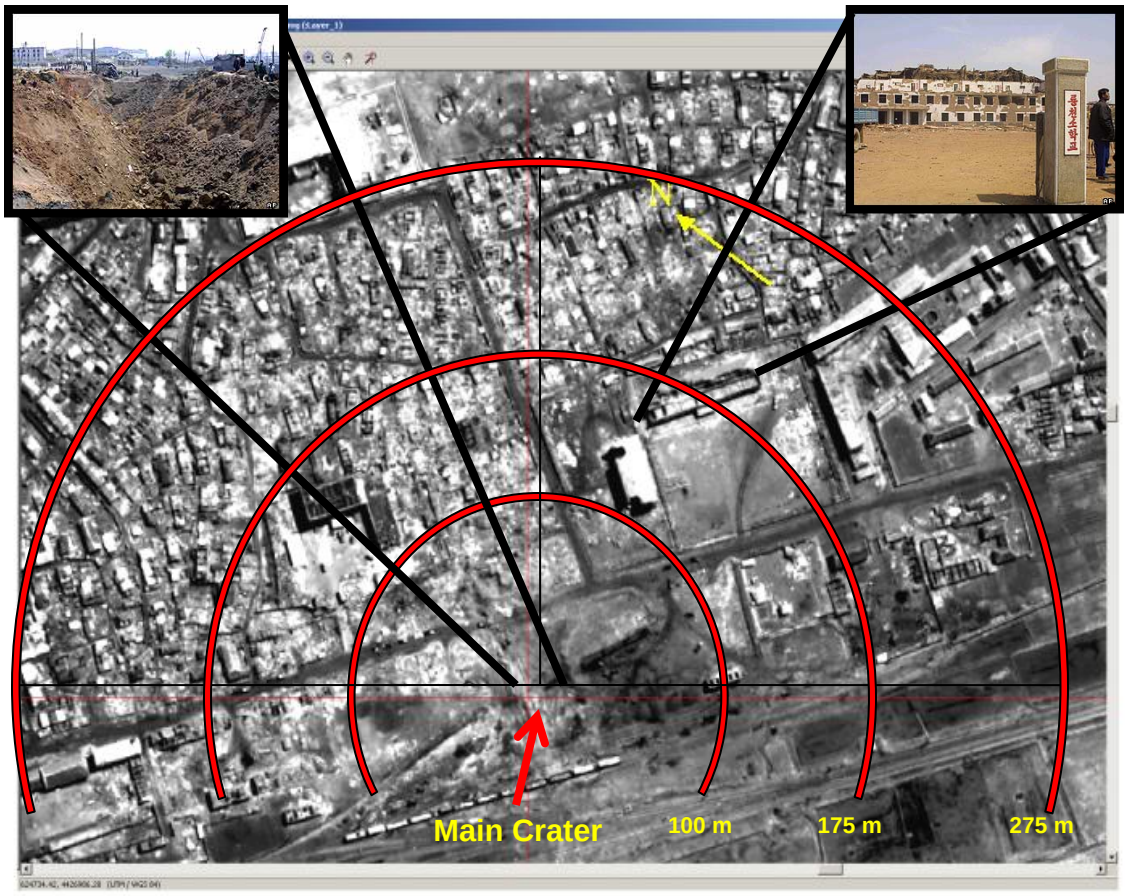
(U) Ryongchon Station, North Korea

(U) The 22 April 2004 AN explosion at Ryongchon Station, Ryongchon County, North Phyongan Province, North Korea, produced extensive damage.

(U//FOUO) Commercial imagery revealed the blast destroyed approximately 30 buildings, heavily damaged a larger number of buildings, and caused roof damage on buildings up to 500 meters distant from the explosion. The blast occurred on the easternmost track at Yongch'on RR Siding, and the explosion created an approximately 60-meter gap in the rails on that track.

(U//FOUO) Open sources reported that the incident involved two to three AN hopper railcars and an oil tank car from a single train. Reportedly, an electrical wire and carelessness caused a fire, detonating the AN (based on Table 1 estimates, the TNT equivalency is approximately 42 tons). Analysis of the commercial imagery showed that the blast created two craters, one approximately 24 meters in diameter and the other approximately 32 meters in diameter (refer to the imagery below). Subsequent press and collateral reporting indicated the accident occurred through human error as the train set moved onto the siding.

(U) The blast killed 161 people and injured approximately 1,300—370 people were severely wounded. Local authorities stated that 1,850 homes were destroyed or totally damaged, while a further 6,360 sustained partial damaged. Among the large number of public buildings damaged were schools, the county hospital, a factory and an agricultural college.



(U) Commercial imagery of AN explosion at Ryongchon Station, North Phyongan Province, North Korea

(U) Transporting of AN via Ocean Vessels

(U//FOUO) Ships commercially transport large amounts of AN worldwide. If terrorists boarded or crewed one of these vessels to conduct an attack, they would present a significant threat to American and foreign assets.

(U//FOUO) In June 2003 following a tip from undisclosed sources reporting suspicious activities, Greek authorities seized the cargo ship *Baltic Sky* after it entered Greek territorial waters. Authorities found roughly 750 tons of industrial grade AN explosives and 8,000 detonators. The ship's documents showed the cargo was destined for a company in Sudan, but the address proved to be a post office box. Authorities detained the captain and six crew members (who were from the Ukraine and Azerbaijan) and charged them with illegal possession and transfer of explosives. It is unknown why the ship veered off course on its way to Sudan, but substantial damage would have occurred had it made port in one of Greece's harbors and subsequently detonated.

(U) The Baltic Sky cargo ship

(U//FOUO) Cargo ships carrying bulk cargoes of up to 50,000 metric tons of AN regularly transit the lower Mississippi River to off load in the New Orleans – Baton Rouge area. Generally most international shipments of AN enter the country by container ship in smaller quantities that are in the 100-1000 metric ton range, though some shipments are larger.

(U) Outlook

(U//FOUO) Terrorists who commercially appropriate AN and mix other readily available explosive precursors present a perceivable worldwide threat, as demonstrated by the explosive used in the vehicle-borne improvised explosive device (VBIED) attack against the Murrah Federal Building attack in Oklahoma City in 1995. Less recognized by law enforcement and DoD force protection is the potential for terrorists to exploit the bulk AN transportation networks of the United States and other countries to attack critical infrastructure and urban centers. Terrorist organizations that apply basic TTPs, off-the-shelf technology, and readily available resources against AN shipments pose a credible threat to the US and assets abroad.