



GOVERNMENT - INDUSTRY DATA EXCHANGE PROGRAM

AGENCY ACTION NOTICE

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4. SUBMITTING AGENCY DEFENSE LOGISTICS AGENCY, HEADQUARTERS 8725 JOHN J. KINGMAN ROAD FORT BELVOIR, VA 22060-6221	5. AGENCY POC (NAME, ADDRESS, PHONE, MAIL) PAULA M. GEORGE – J3314 FORT BELVOIR, VA 22060-6221 (703) 767-3390 Paula.george@dla.mil	

6. DISCUSSION

Since the Montreal Protocol on Substances that Deplete the Ozone Layer went into effect in 1989, there has been a world-wide issue with counterfeit and / or illegal refrigerants. Counterfeiting can cover a wide array of commerce, but in this case, we are most concerned with product counterfeiting, meaning filling a container with a product other than that listed on the label. Most of the previous issues with the counterfeit refrigerants involved environmental concerns, or equipment performance. However, this situation has recently changed due to the emergence of an extremely dangerous and damaging counterfeit refrigerant that has been substituted in containers marked as R-134a. R-134a is a hydrofluorocarbon also known as HFC-134a, and is a major refrigerant used in the automotive and air conditioning markets world-wide.

The previous counterfeiting method was to recover various refrigerants from many pieces of old refrigeration and air conditioning equipment and use them to fill or refill "R-134a marked cylinders", but now more dangerous schemes have surfaced. Analysis of counterfeit cylinders labeled R-134a reveals that they may contain banned chlorofluorocarbons (CFCs), banned hydrochlorofluorocarbons (HCFCs), and sometimes flammable hydrocarbons such as methane, ethane, propane or butane. One of the worst counterfeit / contaminate material being used involves R-40 (or a mix of R-40 and other materials) and labeling it (counterfeiting) as R-134a.

R-40 (chloromethane, also called methyl chloride) was previously used as a refrigerant before CFCs were developed (prior to 1929); however, its use was discontinued due to safety issues. According to the Material Safety Data Sheet for R-40, it is a toxic colorless gas with a faint sweet smell that is not noticed until it reaches dangerous concentrations and it is a suspected human carcinogen. Ingestion of R-40 can damage the kidneys, the reproductive system, liver, skin, and central nervous system; and it may be absorbed through the skin in toxic amounts. Methyl chloride also is a potent narcotic. It reacts with moisture in air or with water to form hydrochloric acid, and explodes on contact with magnesium, sodium & alkali metals.

R-40 is also extremely flammable, and extremely corrosive to plastics and aluminum. Furthermore, when corroding aluminum, R-40 also reacts with the aluminum to form trimethyl aluminum (a clear fluid), which is pyrophoric in air, and reacts violently with oxidizers, water, alcohols, carbon dioxide, carbon tetrachloride, halon, halogens and halogenated hydrocarbons, oxides of nitrogen or sulfur; and many other substances. (In other words, when exposed to air, water, or other substances, trimethyl aluminum can spontaneously combust or explode violently.) After a sufficient time, the aluminum components of a refrigeration or air conditioning system can be completely dissolved by the counterfeit refrigerant, which will then allow the escape of the toxic and flammable R-40. If counterfeit refrigerant containing R-40 is used in ground vehicles or helicopters (both having lightweight aluminum components), there exists the possibility of toxic R-40 or trimethyl aluminum infiltrating into the cabin or crew areas. Even air conditioning systems at stationary facilities could leak toxic fumes into personnel areas if the system was contaminated with counterfeit refrigerant containing R-40.

The first recognized incidences of R-40 being used to counterfeit R-134a involved explosions of compressor units fitted to refrigerated shipping containers (called reefers) owned by the Maersk Line in Vietnam and Brazil, which caused 3 civilian fatalities and multiple physical injuries to personnel. In Southern Europe, there have been multiple physical injuries (poisonings / explosions), and a maintenance facility fire at a public transportation service caused by counterfeit R-134a containing R-40. There have also been German Army trucks with air conditioners serviced in Afghanistan and approximately 60,000 Korean automobiles which were contaminated with counterfeit refrigerant containing R-40.

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The U.S. Military has recently issued various notifications on this subject; banning local procurement of R-134a refrigerant Outside the Continental United States (OCONUS), and giving directions on equipment being used or that was previously used OCONUS that may have had its cooling system serviced. Disposal of contaminated military equipment / counterfeit refrigerant (if and when it is located) is an unresolved issue.

Presently, there is no agreed-upon safe method of identifying systems that may have been contaminated with counterfeit refrigerant containing R-40 (the act of removing even small amounts of refrigerant to test may result in an explosion if the R-40 has reacted with aluminum and formed trimethyl aluminum). Then, if contaminated systems are actually found, a procedure for making them safe also needs to be identified, (again, there is no agreed-upon method to safely clean / decontaminate / remediate a refrigerator or air conditioner system containing aluminum parts that has been contaminated with R-40). The problem is that trimethyl aluminum is a liquid and will be sitting in the crankcase of the compressor. Adding or removing refrigerant or turning the equipment on could cause an explosion. There are sensors that can be used to detect trimethyl aluminum, but those sensors will not work in the presence of R-134a, so if a system has contained R-134a, the sensors cannot be used.

R-40 is being used to counterfeit R-134a because its cooling rate and reactions closely resemble those of R-134a, making it almost impossible to field-test the refrigerant to determine if it is genuine or not. At the present, there are no electronic refrigerant analyzers that can detect the presence of R-40. Gas chromatography is the only method that can determine the presence of R-40, however even with certified laboratories and proper reference standards there can be confusion in determining if the material is R-40 or R-22. Currently, the refrigerant analyzer manufacturers are considering development of test equipment, but they are concerned about a very high development cost and low demand for equipment designed to detect R-40. There is a halogen flame test that can identify the presence of chlorine in refrigerants, but if R-40 is present, testing with an open flame can be dangerous.

Of course, not all counterfeit refrigerants contain R-40, (according to the E. I. du Pont de Nemours and Company [DuPont], it is rare to find refrigerant gas with harmful, combustible or explosive blends). R-134a is also not the only refrigerant being counterfeited. There are world-wide reports of other counterfeit refrigerants being found, such as R-22, R-404, R-407C, R-410a, and etc., see Exhibit 1 from DuPont. Even if they do not contain R-40, counterfeit refrigerants are still a very serious issue. The use of counterfeit refrigerants may cause some or all of the following:

- They can damage the environment if released either inadvertently or intentionally, (destroy the planet's ozone layer and /or cause global warming).
- They can cause equipment to perform improperly or inefficiently, (the temperature / pressure characteristics curves will no longer agree).
- Standard pressure / temperature gages can no longer be used effectively on the equipment.
- They can cause equipment to overheat or may cause premature failures (the refrigerating machine oil may be adversely affected and may not lubricate properly).
- They can cause internal corrosion of the equipment, or may destroy hoses and other plastic / rubber components.
- Filling the equipment with refrigerant or adding to it may also be impossible, as the equipment fill amounts cannot be determined with the strange mixtures.
- Counterfeit refrigerants may void warranties on equipment.

Counterfeit refrigerants (which may or may not contain R-40, or may or may not be labeled R-134a) are flooding markets across Africa, the Middle East, West Asia, Central Asia and Southern Europe. The countries most prone to counterfeit refrigerants are Indonesia, China and the United Arab Emirates, but they can and have been identified world-wide, (Greece, Germany, Brazil, Columbia, Egypt, Philippines, Kuwait, Oman, Saudi Arabia, Afghanistan, Korea, Turkey, Vietnam, most African countries, and the USA). The areas targeted are typically hot climates with high demand for refrigerants, few regulations and / or a lack of general knowledge about the issues with counterfeit refrigerants.

Information provided by DuPont states that counterfeiters primarily target non-refillable / non-returnable 30 lb./13.62 kg portable cylinders of refrigerant gas (similar in size and appearance to propane tanks for outdoor gas grills). Also targeted for counterfeiting are 1 kg and 340g disposable cans of refrigerant gas used for mobile air conditioning and refrigeration applications. The counterfeiters may tamper with the non-refillable valves, and then refill fake branded cylinders or cans with some sort of refrigerant gas. Counterfeiters may change out the valve, weld in another, refill or top-off the contents, then repaint and re-stencil the exterior cylinder to more or less match genuine products. With cans, they can refill them or top-off the contents. They will reproduce the trademark and outer markings of genuine containers / gases on those generic cylinders. The counterfeiters may also reuse a genuine brand name original cardboard box from a legitimate manufacturer and put a re-marked generic cylinder with unknown contents inside.

According to the United Nations Environment Programme (UNEP) Report titled "Risk Assessment of Illegal Trade in HCFCs" dated 2011, the various smuggling schemes for refrigerants (which can include counterfeit or contaminated materials) are:

- **False Labeling** - Materials are smuggled in cylinders or packaging labeled as legal/legitimate products from recognized manufacturers.
- **Mis-Declaration** - Materials are disguised by putting the names (or/and customs codes and other specific designations) of other similar, legal chemicals on shipping documents and invoices. This method is often combined with "double-layering"; filling a shipping container with banned, production restricted, or counterfeit material except for a layer of the legitimate chemical stated on the Bill of Lading next to the container door.
- **Fake Recycled or Reclaimed Material** - Trade in recycled or reclaimed refrigerants is less regulated than for virgin chemical. Smugglers / counterfeiters claim the material is recycled or reclaimed on shipping documents and permits, when in fact it is virgin chemicals. They may even deliberately add a small amount of contaminant to the virgin chemical to make it appear the material has been used.
- **Concealment** - Materials are simply hidden in ships, cars, or trucks and moved across borders.
- **Transshipment Fraud** - Consignments of materials ostensibly destined for legitimate end markets are diverted onto black markets.
- **Double Layering** - Smugglers / counterfeiters can use tricks such as 'double layering', by hiding the illegal material behind a layer of legal product. Today, banned HCFCs, production restricted, or counterfeit materials are often hidden behind a layer of other chemicals such as HFCs or legitimate items.

The best defense against counterfeit refrigerants is to only purchase material from authorized distributors, (know your supply chain). The following are suggestions from refrigerant manufacturers & suppliers:

- Use only internationally known refrigerant brands purchased from authorized and reputable sources.
- Request a certificate of origin or chemical analysis documentation from your refrigerant supplier for each purchase or delivery. If your supplier is unable to provide this type of information, consider changing suppliers.
- Visually inspect every refrigerant package for misspelled words, incorrect text font type, unusual logos or other obvious changes from previous deliveries. Do not accept disposable cylinders that are not in their original, sealed cardboard box. Look at the cylinder design features, valve integrity, cylinder color, cylinder graphics, carton box design, carton box text and graphics. Check for incorrect cylinder weight or valve differences. Visually inspect every gas cylinder for any changes in shape, color or fittings on the bottle. Original product will have shrink-wrap on the valves.
- Some manufacturers use special labels and markings to assist customers to determine if material is genuine, and some offer assistance (web sites & phone numbers) to verify materials.
- Be cautious of refrigerant offered for sale at prices well below normal market price. Counterfeit refrigerant is frequently offered at a significant discount.
- Store refrigerant in a secure location.

In March 2012, there was a meeting between the Defense Logistics Agency (DLA), the Department of Homeland Security U.S. Immigration & Customs Enforcement (ICE), the Government-Industry Data Exchange Program (GIDEP) Program Manager, and E. I. du Pont de Nemours and Company to discuss concerns about the increasing proliferation of counterfeit refrigerants, and other counterfeit materials / chemicals. DLA personnel and the GIDEP PM discussed the need to report information about counterfeit material into GIDEP. DuPont has been very active in counterfeit prevention efforts world-wide, and they released much pertinent information about counterfeit refrigerants for this Notice. DuPont also offered on-site training for ICE personnel (inspectors and agents) at U.S. ports to prevent infiltration of counterfeit refrigerants into this country. ICE is also going to receive a list of all of authorized official DuPont shipments of refrigerants into U.S. ports, so that if there are other shipments marked as DuPont products, those shipments can be easily identified as suspect. In the future, DLA, ICE and DuPont will continue to work together to identify and report suspect counterfeit materials to GIDEP, (including refrigerant).

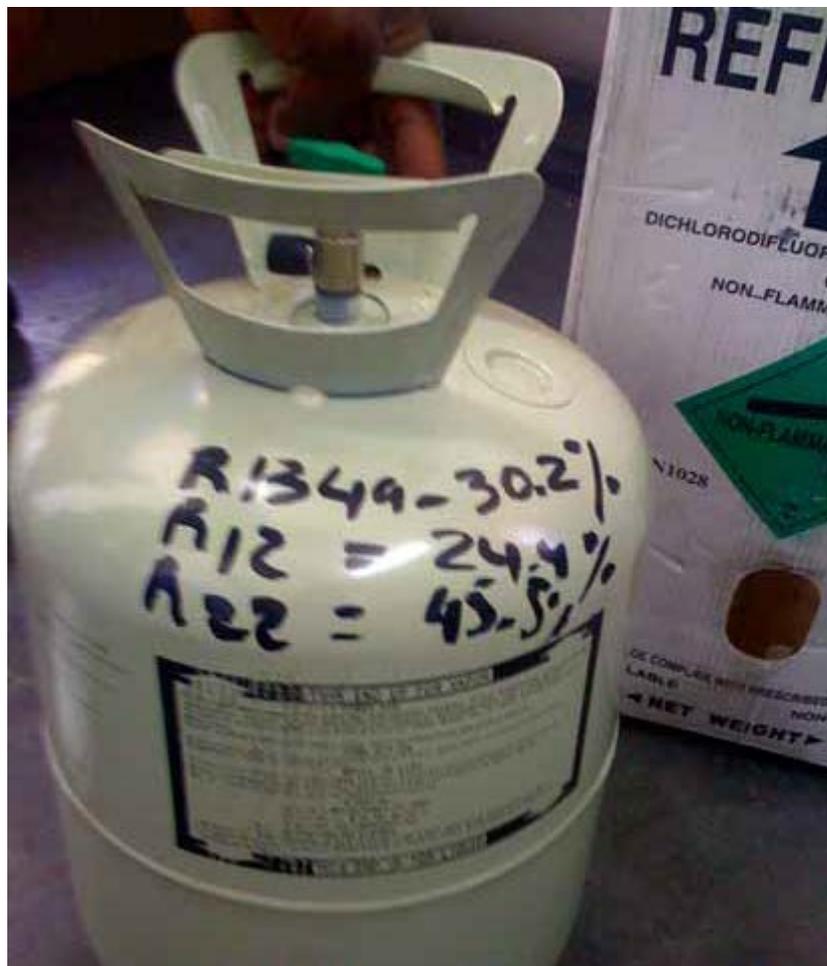
Some of the reasons for the world-wide problems with counterfeit refrigerants: After the Montreal Protocol on Substances that Deplete the Ozone Layer went into effect in 1989, an unintended consequence has been the illegal trade in ozone depleting substances (ODS) [chlorofluorocarbons (CFCs)] and various counterfeiting schemes regarding their replacement materials [hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs)]. Illegal trade in CFCs emerged due to the ability of black marketers, counterfeiters, and fraudsters to exploit the existing market conditions. While increasingly strict controls were progressively introduced in developed countries, latent demand for CFCs and then later HCFCs, to service existing equipment remained high. At the same time production of and need for refrigerants in developing countries grew rapidly. The interim replacements for CFCs were the HCFCs (such as R-22 & R-141b), but they are also damaging to the environment, and in 2007 a decision was made to accelerate their production phase-outs. These production phase-outs have made the hydrofluorocarbons replacement

refrigerants high-demand items, particularly in developing countries, and there have been numerous reports of various chemicals / ingredients being substituted for other materials and fraudulently sold.

Although ozone-depleting, methyl chloride (R-40) is not included within the restrictions of the Montreal Protocol. This highly flammable and toxic refrigerant faced a ban back in the 1920s following a number of deaths (due to fires and explosions) but rapidly fell out of use following the introduction of safe CFCs. Now R-40 has re-emerged and not just as a dangerous addition to fake blends – in some locations in the Far East it is openly being marketed as a refrigerant as reported by the Air Conditioning & Refrigerant (ARC) News . Methyl chloride needs to be brought within the Montreal Protocol as it was not included within the gases to be phased out. This was understandable at the time because methyl chloride was not being used as a refrigerant in 1989, but it is now occasionally being traded openly on world markets specifically for refrigeration purposes.

The following are some examples from United Nations Environment Programme (UNEP) Report titled “Risk Assessment of Illegal Trade in HCFCs” dated 2011.

Chemical Composition of a Contaminated Mixture Labeled as R-134a



CFCs Falsely Labeled as HFCs



<http://www.ameinfo.com/282230.html>

This website contains a press release from Honeywell International announcing the seizure of over 6,000 cylinders of counterfeit refrigerant.

PAGE 6

The following information is provided courtesy of E. I. du Pont de Nemours and Company and is a sample of some of recent counterfeiting activities they have identified:

EXHIBIT "1"

GIDEP MEMBERS

In DuPont experience fighting counterfeit refrigerants the countries most prone to counterfeit refrigerants are Indonesia, China and the United Arab Emirates. DuPont also has had active cases in Colombia, Egypt, Philippines, Kuwait, Oman, Saudi Arabia, Turkey, Vietnam, Ukraine, Russia, and the USA. The areas targeted are typically hot climates with high demand for refrigerants, few regulations and / or a lack of general knowledge about the issues with counterfeits.

As an example of the magnitude a total of 14 + cases have been identified in China since 2007, 18 + cases in Indonesia, 11 cases in the Philippines, more than 8 cases in the United Arab Emirates as well as recent cases open derived from the Maersk reefer explosion incident in Vietnam.

An image of a counterfeit cylinder of DuPont SUVA® 134a refrigerant gas follows with graphic examples of the print errors among other things commonly found on fake refrigerants:

