U.S. ARMY PUBLIC HEALTH CENTER

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ANTIFREEZE RECYCLING

BACKGROUND

The main reasons to recycle used antifreeze are to reduce the cost of purchasing new antifreeze, to reduce the cost of disposing of used antifreeze, and to conserve resources. In addition, State and local governing agencies are enacting increasingly stricter regulations regarding the handling and disposal of substances such as ethylene glycol (a major component of most antifreeze in use today). As a result, recycling and reuse will help ease the regulatory burdens associated with using and disposing of antifreeze. Under Federal procurement guidelines resulting from various Executive Orders and the Federal Acquisition Regulation, it is recommended that Federal fleet managers establish a program for antifreeze recycling that consists of reclaiming spent antifreeze on-site or establishing a service contract for recycling it off-site.

RECYCLING EQUIPMENT

Several kinds of recycling units are available, which are able to recover spent antifreeze for reuse. While different recycling units may use different types of technologies to accomplish this, antifreeze recycling basically involves removing contaminants and restoring the antifreeze's properties with additives. Importantly, while many recycling units are able to restore commercial grade antifreeze back to its original specifications, only a few are effective in restoring antifreeze to military specifications. Therefore, before purchasing a recycling unit, determine whether it will be used to service commercial vehicles or tactical vehicles.

COMMERCIAL VEHICLES

Typically, any recycling unit available would be acceptable for recovering used antifreeze for reuse in commercial vehicles. Many domestic and a majority of import vehicle manufacturers have approved antifreeze recycling, provided the recycled antifreeze meets their quality specifications and/or the American Society of Testing Materials (ASTM) standards. Most vehicle manufacturers list specific machines that have been tested and approved as meeting their requirements, so check with the manufacturer or dealer to determine which antifreeze recycling equipment or process is appropriate. Before purchasing any equipment, examine the warranties of the vehicles to be serviced. Although the recycled antifreeze may be suitable for use in the vehicle, the warranty may have provisions that exclude certain coverage if the owner uses recycled antifreeze. Such exclusions are probably unlikely, but examining the warranty beforehand is the only way to be certain. During an engine's warranty period, the manufacturer's instruction, as to the use or nonuse, of recycled antifreeze takes priority.

TACTICAL VEHICLES

In March 2005, the U.S. Army Research, Development and Engineering Command (RDECOM) Tank-Automotive Research, Development, and Engineering Center (TARDEC), which are now the U.S. Army Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center (GVSC), in Warren, Michigan, released the "Antifreeze Recycling User's Guide." This User's Guide provides recommendations on procedures to be followed for recycling used military antifreeze procured under Commercial Item Description (CID) A-A-52624.

The User's Guide discusses previous testing and evaluation of commercial methods for recycling antifreeze, and only two units were found to be acceptable for Department of Defense (DOD) use in returning the used antifreeze to military specifications. These units are the KFM, LLC Coolant Purification System (formerly the BG Products Inc. Cool'r Clean'r Recycling System), which uses ion exchange technology, and the Finish Thompson, Inc. BE Series Recycler, which uses vacuum distillation technology. A copy of the User's Guide can be obtained online at: http://kfmllc.com/wp-content/uploads/2018/09/TACOM-RDECOM-AF-Recycling-Users-Guide-0305-.pdf.

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Using other recycling systems, services, or products may not adequately recycle CID A-A-52624 antifreeze or may produce a product that is not compatible with CID A-A-52624 antifreeze. These incompatibilities may lead to increased cooling system maintenance and possible premature failure of water pumps, heater cores, and other cooling system components.

ENVIRONMENTAL ANALYSIS

The ion exchange unit does not produce any liquid hazardous waste residue; however, it does require the deionization resin tanks to be recharged for reuse. The resin tanks accumulate metals and may be considered hazardous waste when disposed. However, once the deionization resin tanks are spent, they can be shipped back to the manufacturer for regeneration. The spent deionization resin tanks are not generally treated as a hazardous waste since they are re-used after regeneration and are not disposed.

Distillation systems produce larger quantities of waste residue than ion exchange units do. Residue production by distillation systems is approximately 3 gallons of residue per 75 gallons of spent antifreeze. This residue may be hazardous waste since the lead contamination is often greater than 5 parts per million, and a Toxicity Characteristics Leaching Procedure (TCLP) analysis must be performed prior to disposal to determine whether the waste has this hazardous characteristic.

ECONOMIC ANALYSIS

The following economic analysis uses assumptions and estimates and is intended to provide only a basic evaluation of the potential payback period of antifreeze recycling. Assume the average cost of procuring a recycling unit capable of meeting military specifications is approximately $12,000. The cost to recycle used antifreeze is estimated as $5 per gallon (which includes the cost of additives, maintenance, replacement filters, etc.). The cost of purchasing antifreeze is approximately $10 per gallon. Therefore, in this example, using recycled antifreeze instead of purchasing new antifreeze can save $5 per gallon. Additionally, recycling 1,000 gallons of antifreeze per year would result in an annual savings of $5,000 (1,000 gallons x $5/gallon) and a payback period of about 2.5 years ($12,000 divided by $5,000/year).

PROCUREMENT INFORMATION

For each TARDEC-recommended recycling unit, the following table provides the model number, the manufacturer's name and contact information, and the national stock number.

Antifreeze Recyclers Recommended by the TARDEC

Model/Technology	Manufacturer	NSN
BE-55C (55 gallon capacity) Vacuum Distillation	Finish Thompson Inc. 921 Greengarden Road Erie, PA 16501 Toll Free: (800) 934-9384 Fax: (814) 459-3460 www.finishthompson.com	4250-01-387-2551 (MFR Part # PBER005)
CC1 Coolant Purification System (CPS) (Formerly BG Products Cool'r Clean'r) 1 set of deionization tanks Ion Exchange	KFM, LLC 480 Douglas Street, Suite A Mount Gilead, OH 43338 Toll Free: (800) 736-1404 Local Phone: (419) 946-4200 www.kfmllc.com	4250-01-380-9047
CC2 Coolant Purification System (CPS) (Formerly BG Products Cool'r Clean'r) 2 sets of deionization tanks Ion Exchange	KFM, LLC 480 Douglas Street, Suite A Mount Gilead, OH 43338 Toll Free: (800) 736-1404 Local Phone: (419) 946-4200 www.kfmllc.com	4250-01-380-9034