ASTM EMERGENCY STANDARD, ES-24, SPECIFICATION FOR HALON 1301, BROMOTRIFLUOROMETHANE (CF3Br)

PRESENTED TO

HALON ALTERNATIVES TECHNICAL WORKING CONFERENCE
NEW MEXICO ENGINEERING RESEARCH INSTITUTE
ALBUQUERQUE, NEW MEXICO
MAY 11 - 13

BY
DR. DANIEL P. VERDONIK
ARMY ACQUISITION POLLUTION PREVENTION SUPPORT OFFICE

OUTLINE

- WHY HALON 1301?
- WHY HALON 1301 BANKING/RESERVE?
- WHY A NON-GOVERNMENT STANDARD?
- WHY ASTM?
- PARTICIPANTS
- CONTENTS OF STANDARD
- SUMMARY

WHY HALON 1301?

- ONLY ODC RECOGNIZED BY ALL SERVICES AND INDUSTRY USERS AS CRITICAL TO THE MISSIONS.
- OUT OF PRODUCTION BY 1 JANUARY 94.
- POSSIBLE ALTERNATIVES DECREASING.
- RECYCLE/RECLAIMATION UNITS DESIGNED AND MARKETED WITHOUT "RECYCLE" PURITY STANDARDS.
- "BANK" HALON 1301 TO MEET EXPLOSION/FIRE SUPPRESSION REQUIREMENTS.

WHY HALON 1301 BANKING/RESERVE?

- DOD RESERVE
  - PUBLIC LAW 102-484 SEC 325
  - TO MAINTAIN MISSION CAPABILITY
  - USES CRITICAL TO THE MISSIONS ONLY
- NOT LONG TERM SOLUTION
  - CONTINUE RDT&E
  - ENVIRONMENTAL ACCEPTABLE
  - TOXICOLOGICALLY SAFE
- COMMERCIAL BANK

WHY ASTM?

- EXISTING ORGANIZATIONAL AND SUPPORT ELEMENTS
- RECOGNIZED/ACCEPTED DOCUMENTATION
- WILLING TO EXERCISE "EMERGENCY" RESPONSE
- "BUYS" INDUSTRY CONCERNS
- LEVERAGES EXISTING MOA

WHY A NON-GOVERNMENT STANDARD?

- DoD INSTRUCTION 4120.20 REQUIRES IT.
- NEW USD(A) (DR. PERRY) WANTS IT.
- CONTINUED USES INCLUDE BOTH MILITARY AND COMMERCIAL.

WHY ASTM VS. MIL-SPEC

ASTM	MIL-SPEC
• ACCEPTED BY INDUSTRY	• NOT USUALLY ACCEPTED AS INDUSTRY STANDARD
• INDUSTRY AND EXPERT CONSULTANTS COLLABORATE ON THE EFFORT	• MUST MEET DIFFERENT GUIDELINES THAN INDUSTRY - NOT NECESSARILY ANY EXTRA BENEFIT
• FROM CONCEPTION TO APPROVAL IN 5 MONTHS	• COULD TAKE 2 - 3 YEARS FOR COMPLETION

PARTICIPANTS

MR. DAVID CATCHPOLE - BRITISH PETROLEUM, LTD
- NORTH SLOPE

MR. DANIEL W. MOORE - E.I. DU PONT DE NEMOURS & CO, INC
- INVOLVED IN THE ORIGINAL SPECIFICATION FOR MANUFACTURED HALON 1301

MR. JACK RILEY - UNDERWRITERS LABORATORIES, INC
- INVOLVED IN THE ORIGINAL SPECIFICATION FOR MANUFACTURED HALON 1301

MR. GARY TAYLOR - TAYLOR/WAGNER, INC
- INTERNATIONAL FIRE PROTECTION CONSULTANT

DR. DANIEL P. VERDONIK - ARMY ACQUISITION POLLUTION PREVENTION SUPPORT OFFICE
- MANAGER, ARMY ODC ELIMINATION PROGRAM FOR WEAPON SYSTEMS

SECTION 4 MATERIAL REQUIREMENTS

- "4.1 THE NITROGEN (N2) PARTIAL PRESSURE SHALL BE SUCH THAT THE SAFE WORKING PRESSURE OF THE RECEIVING VESSEL IS NOT EXCEEDED.

  - e.g. FOR THE U.S. DOT 4BA500 CYLINDER THE NITROGEN PARTIAL PRESSURE SHALL NOT EXCEED 161 PSIG AT 70° F FOR A 75 LB/CUBIC FT. FILL DENSITY (YIELDING A TOTAL PRESSURE OF 360 PSIG AT 70° F.)"

2000 • 4.2 HALON 1301 SHALL CONFORM WITH THE REQUIREMENTS PRESCRIBED IN TABLE 1, WHEN TESTED BY THE APPROPRIATE METHOD(S) LISTED IN SECTION 6.

TABLE 1 - REQUIREMENTS

PROPERTY	HALON 1301
PURITY % (MOL/MOL)	99.6 MIN
ACIDITY, PPM BY MASS (AS Br)	3 MAX
WATER CONTENT, PPM BY MASS	10 MAX
NON-VOLATILE RESIDUE, % (MIN)	0.05 MAX
HALOGEN ION	PASSES TEST
SUSPENDED MATTER OR SEDIMENT	NONE VISIBLE

SUMMARY

- COMPLETED IN 5 MONTHS
- ASTM EMERGENCY STANDARD APPROVED - MARCH 1993
- PUBLICATION AVAILABLE MAY 1993 FOR DISTRIBUTION
- ASTM EMERGENCY STANDARD, ES-24 SPECIFICATION FOR HALON 1301 BROMOTRIFLUOROMETHANE (CF3Br)

- *Metrology-high precision measurement*—e.g., laser interferometry, three-dimensional topographic analysis;
- *Precision physio-chemical fabrication processes*—e.g., electro-discharge machining, titanium nitride coatings, electron lithography;
- *Precision materials, component and design*—e.g., sintered ceramics, mechatronics, sensor technology, computer-aided design/computer-aided manufacturing;
- *Application and new developments in precision engineering.*

Materials Technology

- Topics to be announced.

The Congress will also provide a chance for presenters to display and demonstrate their products and technology in its Pavilion of Technovation which is located in the Third Asian Industrial Expo, organized by Business and Industrial Trade Fairs Ltd. It attracts more than 50,000 people and 700 corporations from 35 countries.

To encourage and facilitate the transfer of technology and to establish business partnerships among participants, AITC '93 will also provide matching services to link technology suppliers and buyers and help them explore their business opportunities.

For a brochure that includes registration information, contact Kathe Hooper, ASTM, 1916 Race St., Philadelphia, Pa. 19103 (215/299-5431); or Venus Lee in Hong Kong (852/528-6136; FAX: 852/865-1528). SN

Emergency Standard Under Development for Halon 1301

An emergency standard (ES) regarding Halon 1301 is now under development by Subcommittee D26.09 on Recycled Halon 1301. A firefighting agent, which has no foreseeable drop-in replacement, Halon 1301 falls into the category of several ozone-depleting chemicals (OCDs) that must be phased out of production by 1995, in adherence to a requirement announced by President Bush. It is expected that the Montreal Protocol will also ban production as early as Jan. 1, 1994.

Due to the limited amounts of Halon 1301 that will be available, producers and users need to take measures now to reclaim Halon 1301 for reuse. However, there is no specification for producers and users that addresses recycled Halon. "The specification typically used to produce new Halon 1301 is a military specification and the requirements for composition and purity are based on new production, not on what is required for recycled material," says Dan Verdonik, a member of the task group. "We need to develop this ES for recycled material so that we recycle uniformly throughout the United States," he says.

Verdonik believes the ES will be more workable. "The military specification is overly restrictive regarding the removal of nitrogen used as an expellant gas. Because the specification is overly restrictive, we think we can relax that in this ES and make the best trade-off between non-condensable gas concentration and the recovery of the Halon 1301." Verdonik expects that the issue will be resolved by citing in the standard either a maximum value for nitrogen content or no value at all.

The ES is the first standardization effort initiated under a memorandum of agreement that has been established between the U.S. Army Acquisition Pollution Prevention Support Office (AAPPSO) and ASTM. The standard is based on the existing military specification and is the product of the efforts of the AAPPSO, British Petroleum, the Halons Technical Options Committee of the United Nations Environment Programme, and a number of producers. The ES is currently being balloted at the subcommittee level.

Three task groups have been established within the subcommittee: D26.09.01 on Material Specifications, D26.09.02 on Hardware, and D26.09.03 on Transportation, Storage and Handling.

Interested parties are invited to attend the next meeting of the subcommittee during the Jan. 20-21, 1993, meetings of Committee D-26 on Halogenated Organic Solvents in San Antonio, Texas. For more information about the ES on Halon 1301 or the subcommittee, contact: Joseph A. Macko, AAPPSO, Headquarters, U.S. Army Material Command, 5001 Eisenhower Ave., Alexandria, Va. 22333 (703/274-0815); or John Vowell, ASTM (215/299-5496). SN

Enhancing the Visibility of Pedestrians During the Day and Night

Nighttime drivers strike and kill an annual average of more than 4,000 pedestrians and injure more than 30,000. Lack of pedestrian visibility has been found to be a major contributing factor. In fact, seven out of eight drivers (87 percent) who hit pedestrians at night claimed to have had difficulty seeing the pedestrian. Committee E-12 on Appearance, specifically Subcommittee E12.08 on High Visibility Materials for Individual Safety, has taken a major step toward reducing these numbers with the publication of standard E 1501, "Specification for Nighttime Photometric Performance of Retroreflective Pedestrian Markings for Visibility Enhancement."

The first in a series of standards addressing overall visibility for individual safety, E 1501 establishes minimum retroreflective performance requirements and provides test methods for retroreflective pedestrian markings, the material appearing on items such as coats, vests, trousers, back packs, hats, footwear, and more, that create a visible return when exposed to bright lights, such as those of an automobile.

At night, retroreflective material is much brighter than the whitest white fabrics. Through a study prepared for the Netherlands by the Institute for Road Safety Research, ordinary bright clothing including white and yellow was found to be ineffective at increasing pedestrian visibility. E 1501 is an attempt to ensure that reflective clothing is effectively manufactured so the greatest possible visibility can be achieved. Gary Lesley, chairman of E12.08, says the subcommittee has established a world-quality standard. "Our novel approach allows full design freedom. In Europe, they tend to mandate how the reflective markings must appear. In the United States, our markets don't work well that way." Lesley says the subcommittee has stayed sensitive to the needs of the manufacturer and created E 1501 to minimize interference with the manufacturer's need to create an appealing design that consumers will accept and purchase.

The performance requirements included in the standard state the minimum value required for an object's retroreflective return, or luminous intensity.

Emergency Standard Published for Ozone-Depleting Fire-Fighting Agent

Development of voluntary consensus standards can be a long process, as many ASTM members know. But if the need is urgent enough and the members are determined enough, standards can be developed quickly and with the same technical quality the standard ASTM process demands.

Committee D-26 on Halogenated Organic Solvents and its new subcommittee, D26.09 on Recycled Halon 1301, is the proof in the pudding. Consider these facts: D26.09 held its first meeting in August 1992; by September 1992, an emergency standard (ES) was prepared for balloting; by January 1993, voting was completed, and by April 1993, the emergency standard, ES 24, Specification for Halon 1301, Bromotrifluoromethane (CF_3Br), was available for purchase. Eight months—not a bad statistic.

What's the rush, you ask? Production of Halon 1301 will be discontinued in the United States on Jan. 1, 1994. One of the best fire extinguishers around, with no foreseeable replacement, existing Halon 1301 must be salvaged by producers and users and stored for future use.

"Halon 1301 is the most effective and least toxic fire-fighting and explosion suppressant agent available for occupied areas of combat vehicles," explains Joe Macko, chairman of the subcommittee and special liaison on toxicity issues from the Army Environmental Hygiene Agency at the U.S. Army Acquisition Pollution Prevention Support Office (AAPPSO).

Macko explains that Halon 1301 is used by the Army in mission-critical applications where, in case of a fire or explosion in an Army combat vehicle, Halon 1301 is used to extinguish the fire without harming the individuals occupying the vehicle. "There's nothing else to use in the occupied area," says Macko. "That's why it's so important to be able to recycle the Halon 1301 in order to be prepared for future combat scenarios." Other applications for Halon 1301 are specific to fire-fighting where hand-held extinguishers are used or where computer rooms and other facilities require extinguishing techniques that will not cause damage to equipment.

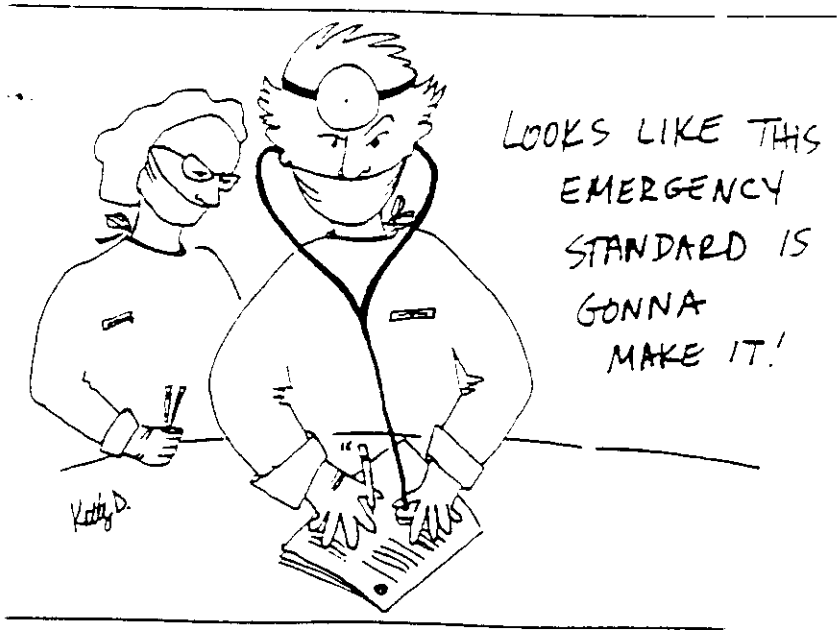
ES 24 is the first standardization effort initiated under a memorandum of agreement (MOA) that has been established between the AAPPSO and ASTM. Macko explains that the MOA was initiated as part of an effort by the U.S. Department of Defense to reduce reliance on using military standards and specifications while emphasizing use of international and national non-government standards. The MOA is also meant to help the AAPPSO comply with the latest national and international environmental policies and restrictions.

The objective of the MOA is to develop ASTM standards, specifications and test methods for substitutes of hazardous and environmentally unacceptable materials. The ES for Halon 1301 was the initial effort made under the MOA.

As the need to reclaim Halon 1301 was realized, the need for a new standard was also realized. The specification typically used to produce Halon 1301 is a military specification and the requirements for composition and purity are based on new production. "So many MIL specs reference Halon 1301 but, when you have pure Halon 1301, there is no nitrogen involved," says Macko. This is not the case, however, with recycled Halon 1301. Macko explains that nitrogen is used as the propellant in hand-held fire extinguishers to help propel the Halon 1301. "When Halon 1301 is removed, nitrogen is also removed. The equipment to remove all the nitrogen is costly and in many cases not necessary. The pressure caused by the nitrogen in the vapor phase has to be addressed and that's one of the purposes of the ES."

The standard includes test methods to measure purity, acidity, water content, halogen ions, suspended matter and sediment, and non-volatile residue. Additional sections of the standard cover material requirements, sampling and container marking. The standard is based on three ISO documents, four military specifications and the work of the AAPPSO, British Petroleum, the Halons Technical Options Committee of the United Nations Environment Programme, and a number of producers. Storage, handling and transportation issues are expected to be addressed in future standards.

In addition to assisting in the fight against ozone depletion, ES 24 is a significant accomplishment for another reason. ES 24 brought two forces together, explains Carmen DiGiandomenico, AAPPSO director. "As a joint industry and government consensus standard, industry acceptance is guaranteed. This has been a major problem in recent years when government specifications and standards were not accepted by industry." ES 24 is another example of how valuable the ASTM philosophy of cooperation and consensus really is.



Carla Juliani