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Perfluorocarbons as Halon Replacement Fire Extinguishing Agents

3M Halon Replacement Program Objectives: **3M** is committed to developing efficient, safe, viable halon replacement agents which will not contribute to the destruction of stratospheric ozone.

Description: Perfluorocarbons are fully fluorinated compounds which have been manufactured by **3M** for over forty years for use as heat transfer fluids, electronic testing fluids and in other applications requiring stable inert fluids. Low molecular weight perfluorocarbons have recently been tested and shown to effectively extinguish fires when used in a similar manner to halon **1301** and halon **1211**.

Fire Extinguishing Performance:

Extinguishment Concentration Using Cup Burner Method

Agent	N-Heptane % Volume
Perfluorocarbons	5.5-7.0*
Halon **1301**	3.7
Halon **1211**	4.1

'Concentration varies depending on particular perfluorocarbon compound tested.

Total Flood Applications: Perfluorocarbons have been tested in total flood applications using standard halon 1301 equipment pressurized to 360 psi with nitrogen. When tested on class A and **B** fires, the fire performance of *a* perfluorocarbon compound at a concentration of 7 percent was comparable to halon 1301 at a concentration of 5 percent. On a weight basis, perfluorocarbons require approximately twice the quantity of agent as halon **1301** for similar fire scenarios.

Streaming Applications: Perfluorocarbons have been tested in hand held portable extinguishers and demonstrate potential as a replacement to halon 1211.

Ozone Depletion Potential: Perfluorocarbons do not contain chlorine or bromine and do not contribute to the destruction of the stratospheric ozone. Perfluorocarbons have an ozone depletion potential of zero.

Toxicity: **A** sub-acute inhalation study on a commercial perfluorocarbon, Fluorinert"' FC-72, indicates the toxicity of FC-72 is low. Although the perfluorocarbons under consideration as halon replacements are similar in chemical structure to FC-72, inhalation studies will be required to determine the toxicity of these halon replacements. **These** toxicity **tests** are in progress with initial **test** results expected in **1991.**

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Electronic Equipment Compatibility: Perfluorocarbons are electrically nonconductive. Perfluorocarbons are commonly used in direct contact with sensitive electronic components and will not damage these components or leave a residue.

Materials Compatibility and Storage: Perfluorocarbons exhibit excellent materials compatibility with the possible exception of some heavily fluorinated polymers.

Perfluorocarbons are extremely stable and will not degrade during long term storage.

Additional Information: For additional information on 3M perfluorocarbons as halon replacement fire extinguishing agents, please call (612) 733-7937.

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