EPA concurs with the commenter's request. EPA is aware that the airline industry is conducting a strategic research effort to identify new agents for use in new aircraft. Meanwhile, airlines and aircraft manufacturers are maintaining banks of recycled halon to service existing aircraft as well as new aircraft being built before the new systems and aircraft design can be developed and implemented. To preserve the stock of recycled halon for critical onboard use, and to minimize emission of halon during testing, EPA is broadening the language in this final rulemaking to allow the use of $SF_6$ as a discharge test agent in commercial as well as military aircraft fire suppression systems.

One commenter took issue with the use of the EPA's statement that PFCs are agents of ''last resort'' and that ''in most total flooding applications, the Agency believes that alternatives to $C_3F_8$ exist.'' The commenter cited cases where confusion resulted in no action being taken by the user to move into an alternative. The commenter took no issue with the use conditions or the narrowed use limits imposed on PFCs in previous SNAP rulemakings. The commenter requested that EPA issue guidance on the 'narrowed use limits' evaluation.

EPA's use of the term 'agent of last resort' is intended to further explain, in simple terms, EPA's intention to the end-user. Further, EPA cannot agree to eliminate the statement ''in most total flooding applications, the Agency believes that alternatives to $C_3F_8$ exist.'' This same language was used in the original SNAP rulemaking (59 FR 13109, 13110), and conveys to the user that most applications can be served by non-PFC technology and should be evaluated as such.

The narrowed use restriction imposed on PFCs was developed with the input of users and industry. EPA was requested to leave the technical evaluations to end-users and fire protection engineers, as each use scenario presented its own challenges and requirements. It was felt that specific guidance by EPA would limit the ability of the fire protection community to select and design the most appropriate system for each application. Thus, EPA requires that end-users conduct an evaluation of the alternatives, and maintain documentation in the event a PFC is selected. EPA regrets there is some confusion in the market concerning the determination that other alternatives are not technically feasible, but to be more specific may inadvertently limit a user's choices. EPA is expressly leaving technical evaluations to the user community.

2. Listing Decisions

a. Acceptable Subject to Use Conditions

(1) Total Flooding Agents. (a) $C_3F_8$. *$C_3F_8$ is acceptable as a Halon 1301 substitute where other alternatives are not technically feasible due to performance or safety requirements: (a) Due to their physical or chemical properties or (b) where human exposure to the agents may approach cardiosensitization levels or result in other unacceptable health effects under normal operating conditions.* This agent is subject to the same use conditions stipulated for all total flooding agents, that is:

- Where egress from an area cannot be accomplished within one minute, the employer shall not use this agent in concentrations exceeding its NOAEL.
- Where egress takes longer than 30 seconds but less than one minute, the employer shall not use the agent in a concentration greater than its LOAEL.
- Agent concentrations greater than the LOAEL are only permitted in areas not normally occupied by employees provided that any employee in the area can escape within 30 seconds. The employer shall assure that no unprotected employees enter the area during agent discharge.

Cup burner tests in heptane indicate that $C_3F_8$ can extinguish fires in a total flood application at concentrations of 7.30 per cent and therefore has a design concentration of 8.8 per cent. The cardiotoxic NOAEL of 30 per cent for this agent is well above its extinguishment concentration and therefore this agent is safe for use in occupied areas. This agent can replace Halon 1301 by a ratio of 2 to 1 by weight.

Using agents in high concentrations poses a risk of asphyxiation by displacing oxygen. With an ambient oxygen level of 21 per cent, a design concentration of 22.6 per cent may reduce oxygen levels to approximately 16 per cent, the minimum level considered to be required to prevent impaired judgement or other physiological effects. Thus, the oxygen level resulting from discharge of this agent must be at least 16 per cent.

$C_3F_8$ has no ozone depletion potential, and is nonflammable, essentially non-toxic, and is not a VOC. However, this agent has an atmospheric lifetime of 3,200 years and a 100-year GWP of 6100. Due to the long atmospheric lifetime of $C_3F_8$, the Agency is finding this chemical acceptable only in those limited instances where no other alternative is technically feasible due to performance or safety requirements. In most total flooding applications, the Agency believes that alternatives to $C_3F_8$ exist. EPA intends that users select $C_3F_8$ out of need and that this agent be used as the agent of last resort. Thus, a user must determine that the requirements of the specific end-use preclude use of other available alternatives.

Users must observe the limitations on $C_3F_8$ acceptability by undertaking the following measures: (i) Conduct an evaluation of foreseeable conditions of end use; (ii) determine that human exposure to the other alternative extinguishing agents may approach or result in cardiosensitization or other unacceptable toxicity effects under normal operating conditions; and (iii) determine that the physical or chemical properties or other technical constraints of the other available agents preclude their use.

EPA recommends that users minimize unnecessary emissions of this agent by limiting testing of $C_3F_8$ to that which is essential to meet safety or performance requirements; recovering $C_3F_8$ from the fire protection system in conjunction with testing or servicing; and destroying or recycling $C_3F_8$ for later use. EPA encourages manufacturers to develop aggressive product stewardship programs to help users avoid such unnecessary emissions.

(b) $CF_3I$ *$CF_3I$ is acceptable as a Halon 1301 substitute in normally unoccupied areas.* Any employee that could possibly be in the area must be able to escape within 30 seconds. The employer shall assure that no unprotected employees enter the area during agent discharge.

$CF_3I$ (Halon 13001) is a fluoroiodocarbon with an atmospheric lifetime of only 1.15 days due to its rapid photolysis in the presence of light. The resulting GWP of this agent is less than one, and its ODP when released at ground level is likely to be extremely low, with current conservative estimates ranging from .008 to .01. Complete analysis of the ozone depleting potential of this agent will be available in the near future.

Anticipating EPA's concern about releases of $CF_3I$ from aircraft, and the associated likelihood of increased ozone-depleting effectiveness when released at higher altitudes, the military has conducted an analysis of historical releases of Halon 1301 from both military and commercial aircraft. Initial assessment indicates that emissions from U.S. military aircraft appear to have averaged about 56 pounds annually, of which 2 pounds were emitted above 30,000 feet. Commercial