

## **HALON REPLACEMENT- Case Study**

**Location:** Princeton Plasma Physics Laboratory in Princeton, NJ

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**Process:** Fixed fire suppression Halon replacement

### **The Facility:**

Princeton Plasma Physics Laboratory (PPPL) is a single-purpose fusion laboratory funded by the U.S. Department of Energy (DOE) and operated by Princeton University in New Jersey. For four decades, PPPL has been a world leader in research and development of magnetic fusion energy as a safe, economical, and environmentally acceptable method of generating electricity. Due to its technical research mission, the PPPL facility consists primarily of laboratory and office spaces.

### **Background:**

In May 1993, DOE Headquarters issued a memo, *Managed Phase Out of Halon Fixed Fire Suppression Systems*, asking field elements to identify essential and non-essential Halon fire suppression systems. Staff at PPPL had already submitted a line-item proposal to upgrade their old fire suppression systems. These upgrades included maintaining the Halon systems, but upgrading control panels. Since the evaluation concluded that nearly all of these Halon systems were non-essential, the staff decided to alter their proposal to find non-ozone-depleting alternatives. This change of course after the proposal had already been submitted was decided to be a cost saving measure in the long term since projected cost to purchase Halon in the future was high.

### **The Approach:**

PPPL removed their Halon-1301 systems and replaced them with either water sprinkler systems or carbon dioxide underfloor systems. Prior to the removal of the Halon systems, none of the areas were equipped with water sprinklers, so these were all new sprinkler systems. Areas that were fitted with water sprinkler systems were primarily rooms where occupancy was common, so non-toxic alternatives were favored.

For the underfloor applications, carbon dioxide was the only EPA-approved alternative at the time. All substitutes for Halon and other ozone-depleting substances must be approved by the EPA and listed in the Clean Air Act, Title VI, Section 612 (*Safe Alternatives Policy*).

The spaces at PPPL that are still protected by Halon-1301 fire suppression systems are those where alternatives are not yet readily available or in experimental areas where the experimental schedule has not yet been able to accommodate the disruption involved with replacing a fire suppressions system. Some areas are extremely difficult to fit with the carbon dioxide underfloor systems, so PPPL will not be decommissioning those systems yet.

**Funding:**

Since PPPL had the fire suppression system upgrade in their budget as a line item, obtaining funding was a lengthy process. There was a three year delay from the time the proposal was submitted to when the funding was finally approved. This lengthy delay should be an impetus for other sites to not wait until they have problems or discharges to begin planning for system conversions. Approximately \$250K was spent for carbon dioxide and water sprinkler systems in areas formerly protected by Halon-1301 systems. Funding was obtained in 1992, and by early 1996, the project was almost completed.

**Accomplishments:**

As of early 1996, approximately two-thirds of the Halon systems at PPPL have been taken out service and replaced with non-ozone-depleting alternatives. This accounts for roughly 9,670 pounds of Halon that have been removed from systems.

**Special Considerations:**

PPPL had designated all the replaced Halon systems as non-essential. Because users of ozone-depleting substances are not required to eliminate their use of these chemicals, the decision to upgrade the Halon systems was not originally driven by a desire to convert these systems to a non-ozone-depleting alternative. The upgrade was based on a need to improve the fire protection systems. After considering the implications of the Halon production phaseout, PPPL used the planned upgrade as an opportunity to convert to Halon alternatives. The systems that have not been converted present special problems. Many of them do not have underfloor spaces where carbon dioxide systems could be installed, and where water sprinkler systems alone are not deemed sufficient to provide the required level of protection.

**The Future:**

PPPL plans to eventually replace all Halon systems, but does not currently have a schedule for replacing the remaining fire protection systems. Many of these systems

are in buildings where experiments are being conducted, so replacement will have to wait until the experiments have been concluded. PPPL has chosen not to modify its remaining systems to manual only operation because of the importance of applying Halon early in the event of a fire.

**Excess ODSs:**

PPPL had transferred most of the Halon-1301 removed from service to the Strategic Petroleum Reserve to serve as a replacement in critical mine systems there. The mine system had accidentally discharged and released its Halon. Without replacement Halon, the mine would have been inoperative.

**Lessons Learned:**

It is unusual for a facility to have replaced fixed fire suppression systems prior to system discharge or a fire event. PPPL used the opportunity presented by the planned fire suppression system upgrade to think in the longer-term and balance the costs of changing the system with the estimated increases in cost for replacement Halon in the future. Although significant costs were incurred in installing new systems, PPPL is likely to benefit in the long-term by not being tied to a fire suppression agent that is becoming increasingly harder to obtain.