

**STAFF REPORT: Fire Department**

**REPORT TO:** Council  
**MEETING DATE:** April 23, 2012  
**REPORT NO.:** FD.12.2  
**SUBJECT:** Fire Control Concentrates  
**PREPARED BY:** Scott Wright, Training Officer

**A. Recommendations**

THAT Council receive Staff Report FD.12.2 “Fire Control Concentrates” for information purposes;

AND THAT Council of the Town of The Blue Mountains request the Province of Ontario work with the Underwriters Laboratories of Canada to review the accreditation of fire control concentrates for the purposes of fire suppression for Superior Tanker Shuttle Accreditation.

**B. Background**

At the February 8, 2012 Special Meeting of Council, Council requested that the Fire Department provide Council with a staff report noting the benefits of Aqueous Film Forming Foam (“AFFF”). AFFF has been used in the fire service for many years. The Blue Mountains Fire Dept has incorporated foam induction systems using AFFF, into several of its pumpers since 1995. Depending on circumstances, AFFF has proven to be an effective tool in reducing fire spread, initial knock down, over haul and water conservation.

AFFF or Class “A” fire control concentrate works in two ways. First, Class “A” improves the penetrating capability of water. It reduces the surface tension of plain water, which allows it to penetrate surfaces where water might normally run off, to reach deep-seated fires. This helps reduce the amount of water required to extinguish the fire and also provides quicker knockdown.

Secondly, Class “A” increases the heat absorbing capabilities of water. Foaming ingredients give water, also known as “wet water”, the ability to adhere to vertical surfaces, which allows the water longer contact with the fuel. The longer the water is in contact with the fuel, the more heat it is able to absorb. A coating of Class “A” foam may also be used for exposure protection to prevent fuels from igniting, by raising their moisture content and providing a tough protective barrier to an oncoming flame front.

The wetting and penetrating characteristics of Aqueous Film Forming Foam, reduces the combustibility of Class A fuels and makes water up to five (5) times more effective. In rural fire fighting applications, the use of these products often provide the fire department with a more effective and water efficient knock down of the fire, as mobile water supplies for further suppression operations are replenished.

Large volumes of water will always be required for most fire suppression operations and structural firefighting. However, when municipal water supplies are not present or do not provide adequate flows for fire suppression operations, AFFF is an additional tool used by the fire service to maximize the effectiveness of onboard water supplies.

### **C. The Blue Mountains' Strategic Plan**

Providing a strong, well managed municipal government.

### **D. Environmental Impacts**

No environmental impact. The Class A fire control concentrate used by the Blue Mountains Fire Department does not contain Environmental Protection Agency reportable contents. The solution does not destroy or retard forest growth, will not harm fish or wildlife and is biodegradable in soils, aquatic ecosystems and sewage treatment facilities.

### **E. Financial Impact**

None

### **F. In Consultation With**

A. J. Lake, Deputy Fire Chief

### **G. Attached**

ANSUL – Silv-ex Plus – Data/Specifications

Respectfully submitted,

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Scott Wright, Training Officer, Fire Department

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Ron Doherty, Fire Chief, Fire Department

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by Tyco Fire Suppression & Building Products

# SILV-EX PLUS "CLASS A" FIRE CONTROL CONCENTRATE

Data/Specifications

## FEATURES

SILV-EX PLUS is a low, medium, and high expansion, Class A foam concentrate formulated from specialty hydrocarbon surfactants, stabilizers, corrosion inhibitors and solvents. This formulation provides superior cold weather performance. The latest development in the *original* forest fire control concentrate, SILV-EX PLUS has been proven effective on many deep-seated Class A fires such as tire fires, paper fires, coal fires, structure fires, and wild fires.

SILV-EX PLUS foam concentrate can be proportioned from 0.1% to 1.0% in fresh, brackish or sea water. When used as a pre-mixed solution, only fresh or potable water should be used if the premix is to be stored over long time periods. Due to its extremely low proportioning rate, SILV-EX PLUS foam concentrate offers outstanding economy in concentrate storage space, cost (compared to conventional 3% and 6% foaming agents) and water hauling requirements.

### Example:

*How much SILV-EX PLUS concentrate is required to make 500 gallons (1893 L) of foam solution?*

Final solution volume X concentration percentage = foam concentrate required

At 0.1% concentration:

$$500 \text{ gal (1893 L)} \times 0.001 = 0.5 \text{ gal (1.9 L) of concentrate}$$

At 0.6% concentration:

$$500 \text{ gal (1893 L)} \times 0.006 = 3 \text{ gal (11.4 L) of concentrate}$$

At 1.0% concentration:

$$500 \text{ gal (1893 L)} \times 0.01 = 5 \text{ gal (19 L) of concentrate}$$

Fire extinguishment mechanisms in effect when using SILV-EX PLUS "Class A" Fire Control Concentrate include:

- Reduction of the surface tension of water, which provides the SILV-EX PLUS solution with superior wetting and penetrating characteristics. This renders Class A fuels less combustible and allows the solution to penetrate past the char to control deep seated fires.
- Extended drain time provides longer surface wetting, reducing the risk of ignition/reignition.
- SILV-EX PLUS agent creates a foam blanket which provides an insulating barrier between the fuel and air.
- SILV-EX PLUS foam suppresses combustible vapors while cooling the fuel.

In addition, SILV-EX PLUS concentrate offers fire fighting characteristics:

- The brilliant white foam reflects heat.
- SILV-EX PLUS solution creates a dense foam blanket with excellent insulating properties.
- SILV-EX PLUS foam clings to vertical surfaces for structure protection.
- The wetting and penetrating characteristics of the SILV-EX PLUS solution reduce the combustibility of Class A fuels and makes water five times more effective.

Applicable extinguishment mechanisms and some properties of SILV-EX PLUS foam depend on the type of foam delivery device used. SILV-EX PLUS has a reduced environmental signature and does not have any EPA reportable contents. The solution does not destroy or retard new forest growth, and will not harm fish or wildlife; it is biodegradable in soils, aquatic ecosystems, and sewage treatment facilities.



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## Typical Physicochemical Properties at 77 °F (25 °C)

Appearance	Light Amber Clear Liquid
Density	1.010 g/ml ± 0.010
pH	7.0 – 8.5
Refractive Index	1.3660 ± 0.0035
Viscosity	12 ± 3 centistokes
For comparison purposes, the viscosity of 10W40 motor oil is 160 centistokes at 77 °F (25 °C) and 800 centistokes at 12 °F (-11.1 °C).	
Surface Tension	
Water	66 to 76 dynes/cm
0.1% SILV-EX PLUS solution	27.20 dynes/cm
0.6% SILV-EX PLUS solution	26.80 dynes/cm
1.0% SILV-EX PLUS solution	26.60 dynes/cm
Flash Point	> 200 °F (93.3 °C)
Pour Point	22 °F (-5.5 °C)

## APPLICATION

SILV-EX PLUS concentrate is designed specifically for use on Class A fuel fires including wood, paper, coal, and rubber. SILV-EX PLUS foam gives the fire fighter extinguishment capabilities, exposure protection, and increased safety.

Although designed for Class A fires, SILV-EX PLUS foam can be effective on some Class B flammable liquid fires when applied by medium and high expansion devices.

SILV-EX PLUS solution can be used with aspirating and non-aspirating discharge devices, compressed air foam systems (CAFS), or dropped from fixed or rotary wing aircraft.

## ENVIRONMENTAL AND HEALTH INFORMATION

1. Biodegradability Test – the concentrate is readily biodegradable
2. Mammalian Toxicity Tests
  - a. Acute Oral Toxicity in Rats
    - i. Concentrate: LD<sub>50</sub> > 5050 mg/Kg
    - ii. 1.0% Dilution: LD<sub>50</sub> > 5050 mg/Kg
  - b. Acute Dermal Toxicity in Rabbits
    - i. Concentrate: LD<sub>50</sub> > 2020 mg/Kg
    - ii. 1.0% Dilution: LD<sub>50</sub> > 2020 mg/Kg

## ENVIRONMENTAL AND HEALTH INFORMATION (Continued)

### 3. Mammalian Irritation Tests

- a. Primary Eye Irritation in Rabbits
  - i. Single-Wash Eyes
    1. Concentrate: mildly irritating
    2. 1.0% Dilution: minimally irritating
  - ii. Double-Wash Eyes
    1. Concentrate: minimally irritating
    2. 1.0% Dilution: practically non-irritating
- b. Primary Dermal Irritation in Rabbits
  - i. Concentrate: non-irritating
  - ii. 1.0% Dilution: non-irritating

### 4. Aquatic Toxicity Tests

- a. Fish:
  - i. Rainbow Trout: Concentrate:  
96 hour  $LC_{50}$  = 56.6 mg/L
  - ii. Threespined Stickleback: Concentrate:  
96 hour  $LC_{50}$  = 7.31 mg/L
- b. Daphnids, Daphnia Magna: Concentrate:  
48 hour  $LC_{50}$  = 62.7 mg/L

## PERFORMANCE

**Standards/Specifications** – The performance of SILV-EX PLUS concentrate is measured against and/or is on the approved list of the following:

- NFPA 1150 – Foam Chemicals for Fire in Class A Fuels
- Canadair Corporation – Approved for use in the CL-215 and CL-415 Aircraft and foam metering systems
- USDA Forest Service Specification 307a – Fire Suppressant Foam for Wildland Firefighting

**Foaming Properties** – When used with fresh, sea or brackish water at the correct proportioning rate, the expansion will vary depending on the performance characteristics of the foam making equipment.

**Proportioning** – SILV-EX PLUS concentrate can be proportioned using most conventional proportioning equipment such as:

- Flow-Mix™ Model 500 foam proportioner
- Hypro FoamPro™ injection system
- Balanced pressure pump or bladder tank fixed sprinkler system
- In-line fixed or portable venturi type proportioners (eductors)

### TYPICAL PROPORTIONING RATES FOR COMMON APPLICATIONS:

Fixed Wing Aircraft	0.6% to 0.7%
Rotary Wing Aircraft	0.2% to 0.5%
Air Aspirating Devices	0.2% to 1.0%
Non-Air Aspirating Devices	0.5% to 1.0%
Compressed Air Foam Systems (CAFS)	0.1% to 0.3%

### ANSUL Handline Nozzles

HL-60 Low Expansion	0.3% to 1.0%
HL-95 Low Expansion	0.3% to 1.0%
KR-S2 Low Expansion	0.3% to 1.0%
KR-M2 Medium Expansion	0.3% to 1.0%
KR-S/M2 Dual Expansion	0.3% to 1.0%

Flow-Mix is a registered trademark of Robwen Inc., Los Angeles, CA.

Hypro and FoamPro are registered trademarks of the HyPro Corporation, New Brighton, MN.

**Storage/Shelf Life** – When stored in the original packaging supplied (polyethylene drums or pails) or in equipment recommended by the manufacturer as part of the foam system and within the temperature limits specified, the shelf life of SILV-EX PLUS concentrate is normally about 20-25 years. The recommended storage temperature for SILV-EX PLUS concentrate is 30 °F (-1 °C) to 120 °F (49 °C).

**If the product is frozen during storage or transportation, thawing will render the concentrate completely usable and ready for proportioning.**

**Compatibility** – Because of the many products available, consult with ANSUL before mixing SILV-EX PLUS concentrate with other manufacturer's products.

**Materials of Construction Compatibility** – Tests have been performed with SILV-EX PLUS concentrate verifying its compatibility with the steel, stainless steel, yellow brass, magnesium and aluminum alloys found in aerial and ground-based fire fighting equipment. SILV-EX PLUS is also compatible with standard fire fighter turn out gear and hose material.

**Packaging** – SILV-EX PLUS concentrate is packaged in opaque white 5 gallon (19 L) plastic (polyethylene) containers with 2 3/4 in. (6.9 cm) capped openings. 55 gallon (208 L) drum size is blue polyethylene with sealed 2 1/4 in. (5.7 cm) closures. All containers are marked "SILV-EX PLUS Class A Fire Control Concentrate."

**Equipment Clean-up** – The standard procedure of flushing with fresh water should be used with all equipment used with SILV-EX PLUS concentrate or foam solution.

**Additional Information** – Request the following ANSUL Forms:

- MSDS Sheet – F-2009065

## ORDERING INFORMATION

SILV-EX PLUS concentrate is available in the following sizes:

Part No.	Size	Shipping Weight	Cube
434467	5 gallon (19 L)	45 lb (20.4 kg)	1.25 ft <sup>3</sup> (0.0353 m <sup>3</sup> )
434469	55 gallon (208 L)	495 lb (224.5 kg)	11.83 ft <sup>3</sup> (0.3350 m <sup>3</sup> )
▶ 434471	265 gallon (1003 L)	2465 lb (1118 kg)	50.05 ft <sup>3</sup> (1.42 m <sup>3</sup> )
434463	Bulk (contact ANSUL about domestic truckload delivery)		