

**МІНІСТЭРСТВА  
ПРЫРОДНЫХ РЭСУРСАЎ І АХОВЫ  
НАВАКОЛЬНАГА АСЯРОДДЗЯ  
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**МИНИСТЕРСТВО  
ПРИРОДНЫХ РЕСУРСОВ И ОХРАНЫ  
ОКРУЖАЮЩЕЙ СРЕДЫ  
РЕСПУБЛИКИ БЕЛАРУСЬ  
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Dear Sir / Madam,

In accordance with the request of the Secretariat of the Stockholm Convention on persistent organic pollutants, Ministry of Natural resources and Environmental Protection of the Republic of Belarus direct information on «Production and use of fluorine-containing film-forming foaming agents in Belarus».

Yours sincerely,



Andrei Khudyk /  
Minister of Natural Resources  
and Environmental Protection  
of the Republic of Belarus

## **To the Secretariat Stockholm convention on POPs**

### **Production and use of fluorine-containing film-forming foaming agents in Belarus**

In Belarus, a fluorine-containing film forming foam agent called "Barrier Film Forming" is manufactured for extinguishing fires of combustible liquids. According to the Research Institute of Fire Safety and Emergencies of the Ministry of Emergency Situations of the Republic of Belarus, pentadecafluorooctanoic acid (PFOA) does not used for production of "Film-Forming Barrier". The following fluorinated surfactants are used for production of "Film-Forming Barrier": perfluoroalkyl betaine and perfluoroalkylamine oxide. No detailed information on the composition of the foaming agent was provided, since it is a commercial secret.

Probably the fluorinated surfactants used in Belarus correspond to the Forafac®1157 product, which is also used in Russia (*Bocharov, Raevskaya, 2014*) and in some European countries (*Per- and polyfluorinated substances..., 2013*). The main component of Forafac®1157 is 6:2 fluorotelomer sulfonamide alkyl betaine (6:2 FTAB); mixtures of C6/C8 homologues are also included.

In accordance with the specifications, several modifications of this foaming agent are made: 1H, 3H, 6H - to produce a foam of low frequency rate; 1HH, 3HH, 6HH, 3HH-II, 6HH-II - for the formation of foam of low and medium frequency rate (the first figure in the marking means the mixture rate with water). Depending on the modification, it can be used to extinguish polar flammable liquids (alcohols, ketones, etc.) or non-polar liquids (gasoline, diesel fuel, etc.). The density of the foaming agent at 20 ° C varies from 1,020 to 1,080 g / cm<sup>3</sup>.

In Belarus, 10 enterprises - users of fluorine-containing foaming agent "Film-Forming Barrier" were revealed; identified volume of this fire-fighting foam in 2016 is estimated about 130 tons.

Storage of fluorinated film-forming foaming agent at Belarusian enterprises is carried out in metallic (stainless steel), or polyethylene containers in accordance with regulatory documents (*State standard, 2000; Regulations for the Application..., 2010*). The volume of containers varies from 200 liters to 3000 liters and more. There are 2 special fire cars, where the storage of foaming agent is carried out in special tanks built into the machinery (tank trucks).

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The foaming agent (fire-fighting foam) at all enterprises is stored undiluted (as initial concentrates). If necessary, the foaming agent is mixed in the correct proportions with water to obtain a working solution, and then it enters to the foam generator.

## References

Bocharov V.V., Raevskaya M.V. Aqueous Film Forming Foam Contained Perfluorinated Surfactants. Assessment Of Their Biodegradability Rate And Investigation Of Utilization Methods. VESTNIK TGU. 2014.V.19 (5). P.1384-1387 (in Russian)

Per- and polyfluorinated substances in the Nordic Countries. Use, occurrence and toxicology. TemaNord 2013:542. [Electronic resource]. – Mode of access: [www.norden.org/en/publications](http://www.norden.org/en/publications). – Date of access: 20.11.2016.

State Standard of the Republic of Belarus STB GOST P 50588-99. Foaming Agents for Fire Extinguishing. General technical requirements and test methods (in Russian)

Regulations for the Application of Foam Converters for Fire Extinguishing. Resolution of the Ministry of Emergency Situations of the Republic of Belarus of 24.06.2009 N 32. Updated in February 2010 (in Russian)

Additional comment: Fire-fighting Foams or Aqueous Film Forming Foam (AFFF) means commercial products which content water, hydrocarbon foaming agents and highly fluorinated surfactants as well as others additives. It is a concentrate (agent/ mixture) which should be dilute with water in requested rate and after that may be used for foam generation.

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