

[Report summary of PNNL-26821.](#)

[Overview of 2016 Testing of Respirator Cartridge Performance on Multiple Hanford Tank Headspace and Exhausters](#)

During 2016, Washington River Protection Solutions conducted a series of tests on two air purifying respirators (APR). The purpose of the testing was to determine how long the cartridges would stand up to tank vapors before chemical breakthrough occurred. For the purpose of the tests, time-to-breakthrough for any chemical of potential concern (COPC) is defined as the time from the start of cartridge exposure to tank vapors (inlet side) to the time the cartridge outlet concentration (outlet side) exceeds 10% of the occupational exposure limit (OEL).

Vapor streams from four Hanford Tank headspaces and four exhausters under static, meaning non-waste disturbing, conditions were fed to multipurpose respirator cartridges, SCOTT 7422-SD1 and SCOTT 7422-SC1. Each cartridge was tested over a 16-hour period on several different days, as tabulated on **Table 1** below.

Table 1. Summary of 2016 Respirator Cartridge Testing

PNNL Report Number ¹	Tank Headspace	Exhauster	SCOTT 7422-SD1 ²	SCOTT 7422-SC1 ²
PNNL -25860	***	AP Exhauster	6/24/16	6/25/16
PNNL- 26041	241-SY-102	***	7/8/16	7/9/16
PNNL-26180	241-BY-108	***	7/15/16	7/16/16
PNNL-26131	241-A-101	***	7/22/16	7/23/16 1
PNNL-26243	***	702-AZ Exhauster	8/26/16	8/27/16
PNNL- 26254	241-AX-101	***	9/9/16	9/10/16
PNNL-26337	***	AW Exhauster	9/23/16	9/24/16
PNNL-26317	***	AN Exhauster	9/30/16	10/1/16

1 - The corresponding reports for these studies are located on the vapors website

2 - A new cartridge was used at each location

The test focused on 59 COPCs. The cartridges were not tested with nitrous oxide or methanol. There are no known APR filters for nitrous oxide. Methanol was not included because it is used as a standard solvent and calibration standard in the analytical procedures used for the tests.

Three COPCs broke through with outlet concentrations that reached or exceeded 10% of their corresponding OELs. These COPCs are ammonia, mercury, and 1, 3-butadiene. Of these, ammonia had the shortest breakthrough time. The results of the cartridge testing indicate that APR cartridges can be used for work activities within the tank farms. Chemical breakthrough data obtained by these tests is an important tool for determining an APR change out schedule on a farm by farm basis. See HanfordVapors.com for more information on [this report](#) and the individual testing events.