0068114

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

06-AMCP-0083

DEC 22 2005

Mr. A. W. Conklin, Supervisor
Air Emissions and Defense Waste Section
Washington State Department of Health
P.O. Box 47827
Olympia, Washington 98504

Dear Mr. Conklin:

B PLANT PREFILTER CHANGEOUT ALARACT DEMONSTRATION

The purpose of this letter is to formally transmit the requested B Plant Prefilter Changeout ALARACT Demonstration to the Washington State Department of Health. This information was previously requested by e-mail from John W. Schmidt, of your staff, on November 1, 2005. Mary F. Jarvis, Environmental Services Division, forwarded this information to Mr. Schmidt by e-mail on December 12, 2005.

If you have any questions, please contact me, or your staff may contact Frank Roddy, of my staff, on (509) 372-0945.

Sincerely,

Matthew S. McCormick, Assistant Manager
for the Central Plateau

AMCP:FMR

Enclosure

cc w/encl:
J. A. Bates, FHI
R. B. Evans, WDOH
G. J. LeBaron, FHI
J. J. Martell, WDOH, MSIN B1-42
J. W. Schmidt, WDOH, MSIN B1-42
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D. Zhen, EPA Region 10, Seattle
Administrative Record (B Plant Stack file)
Environmental Portal

B Plant Filter Change-Out ALARACT Demonstration Response

Purpose

The purpose of this document is to respond to a request from WDOH for an ALARACT demonstration. On 1 November 2005, WDOH requested a comparison between the radiological readings taken on the B Plant pre-filters during change-outs, including the time each filter bank was in service (e-mail JW Schmidt to GJ LeBaron and MF Jarvis, REQUESTED INFORMATION ON B PLANT PREFILTER CHANGEOUT -- ALARACT Demonstration on B Plant Filters, 11/1/2005), and what is being done to ensure the PTE is at or below that estimated for the stack downgrade request. This document provides information in response to the request.

Summary

Both the open- and closed-window time adjusted average pre-filter dose readings for the filters changed out in October 2005 are in the middle of the open and closed window time adjusted average pre-filter dose readings taken on filters changed at other times. This suggests that the B Plant exhaust radioactive emissions have not changed. The stack emissions data are also consistently low over the past several years, further suggesting that the B Plant exhaust emission levels are consistent.

While the open and closed window time adjusted average pre-filter radiological dose readings provide an indicator of the radiological material on the filters, these readings are considered just an indicator in that a broad range of radiological readings could represent the same dose, and the readings are only good to within an order of magnitude. Therefore, it is considered that the status of the building has not changed, in that there are no activities in the canyon area, from where the exhaust air is drawn, that would be expected to change the PTE. Radiological dose readings for the filters, collected with hand held radiation protection survey instruments, cannot replace more detailed air sampling or destructive filter analyses performed in the laboratory to determine the PTE. This is consistent with the regulations that identify methods for determining PTE (WAC 246-247-030(21)) do not list radiological surveys specifically as an acceptable approach for determining the PTE.

System Description

Air is drawn from the B Plant canyon through two inlet valves, one below the canyon deck and another above the deck. The air flows through the inlet valves into a duct and then splits before going through two parallel filter housings (ACT-B-001, referred to as ACT 1, and ACT-B-002, referred to as ACT 2), each containing a bank of pre-filters and two banks of HEPA filters. The two air streams rejoin in a duct leading to two parallel exhaust fans (only one operates at any one time) and up the stack (see Figure 1). Each of the pre-filter and HEPA filter banks consists of a three-by-three array with three filters in the top row, three filters in the middle row and three filters in the bottom row. This results in nine filters in each filter bank. Each pre-filter is approximately two feet square and two inches thick. Each HEPA filter is approximately 2 feet square and 1 foot thick.

Process Description

When the filters are changed out, the work is performed inside a containment tent. The door to the filter housing is removed and a plastic sleeve is attached to the filter housing with the other end attached to a Plexiglas waste box capable of holding three filters stacked on top of each other. Each filter in a row (top, middle or bottom) is pulled from the housing and passed through the plastic sleeve and placed in the Plexiglas waste box until all three filters in a row have been removed and placed in the box. This Plexiglas waste box subsequently is placed in a burial box and transported to a solid waste disposal site.

As an individual filter is passed through the plastic sleeve, a radiological dose reading, window open and window closed, is taken of the filter using a hand held field survey instrument (CP). For ALARA reasons and to minimize dose to personnel, a detailed radiological survey of the filter is not performed. Once all three filters are in the waste box, the box is field surveyed using the CP before being placed in the burial box.

Data Comparison

Radiological dose readings of the filters for the four filter change-outs (September 1999, April 2002, June 2004 and October 2005) are provided in Table 1. The readings for the prior years were taken in a somewhat consistent manner and so may be roughly comparable. It appears that the radiological dose readings taken during the September 1999 change-out were not performed in the same manner as the readings taken during subsequent change-outs, especially the closed window readings. Therefore, some of those readings may need to be viewed separately.

The average of the radiological dose readings for each bank of nine filters is shown in the Summary Information in Table 1. Below the Summary Information for each bank of filters in both ACT 1 and ACT 2, data are provided showing the average of the radiological dose readings, open-window and closed-window, for all the pre-filters in both ACT 1 and ACT 2. These data are presented according to the date the filters were changed out. The dates the filters were placed in operation and changed out with the number of months in operation are also shown in Table 1. Using the number of months each filter bank was in operation, the average radiological dose readings were time adjusted to show the dose buildup for a 12 month period. The summary information is presented in Table 2; the open- and closed-window time adjusted average pre-filter radiological dose readings are shown in Figures 2 and 3 respectively.

Analysis

As shown in Tables 1 and 2 and Figures 1 and 2, both the open- and closed-window time adjusted average pre-filter dose readings for the filters changed out in October 2005 are in the middle of the open and closed window time adjusted average pre-filter dose readings taken on filters changed at other times. This suggests that the B Plant exhaust radioactive emissions have not changed. The stack emissions data shown in Table 3 are also consistently low over the past several years, further suggesting that the B Plant exhaust emission levels are consistent.

While the open and closed window time adjusted average pre-filter radiological dose readings provide an indicator of the radiological material on the filters, these readings are considered just an indicator in that a broad range of radiological readings could represent the same dose, and the readings are only good to within an order of magnitude. Therefore, it is considered that the status of the building has not changed, in that there are no activities in the canyon area, from where the exhaust air is drawn, that would be expected to change the PTE. Radiological dose readings for the filters, collected with hand held radiation protection survey instruments, cannot replace more detailed air sampling or destructive filter analyses performed in the laboratory to determine the PTE. This is consistent with the regulations that identify methods for determining PTE (WAC 246-247-030(21)) do not list radiological surveys specifically as an acceptable approach for determining the PTE.

Methods to Maintain the PTE

The primary methods to maintain the PTE are: 1) to maintain the status of the building by not changing the type of activities conducted in the building or changing the conditions in the building. The type of activities conducted at the building have not changed since the facility was deactivated in October 1998 and nothing has been done to change the conditions in the building. However, weather conditions such as temperature, humidity, dust loading in the air, etc. may have minor effects on the PTE. 2) Review the stack emissions data to ensure they are consistent from year to year; and 3) Comply with conditions and limitations WDOH identified for the stack downgrade.

The data indicate that the interval between filter change-outs decreased during the last interval. The filters had to be changed due to dust loading and an increasing differential pressure across the filters, not due to the levels of radiation. Increased differential pressure across the filters is presumably due to increased dust carried into the building which, according to the time-adjusted radiological readings shown in Tables 1 and 2, are within the range observed during previous change-outs.

Figure 1 -- B Plant Ventilation System Schematic

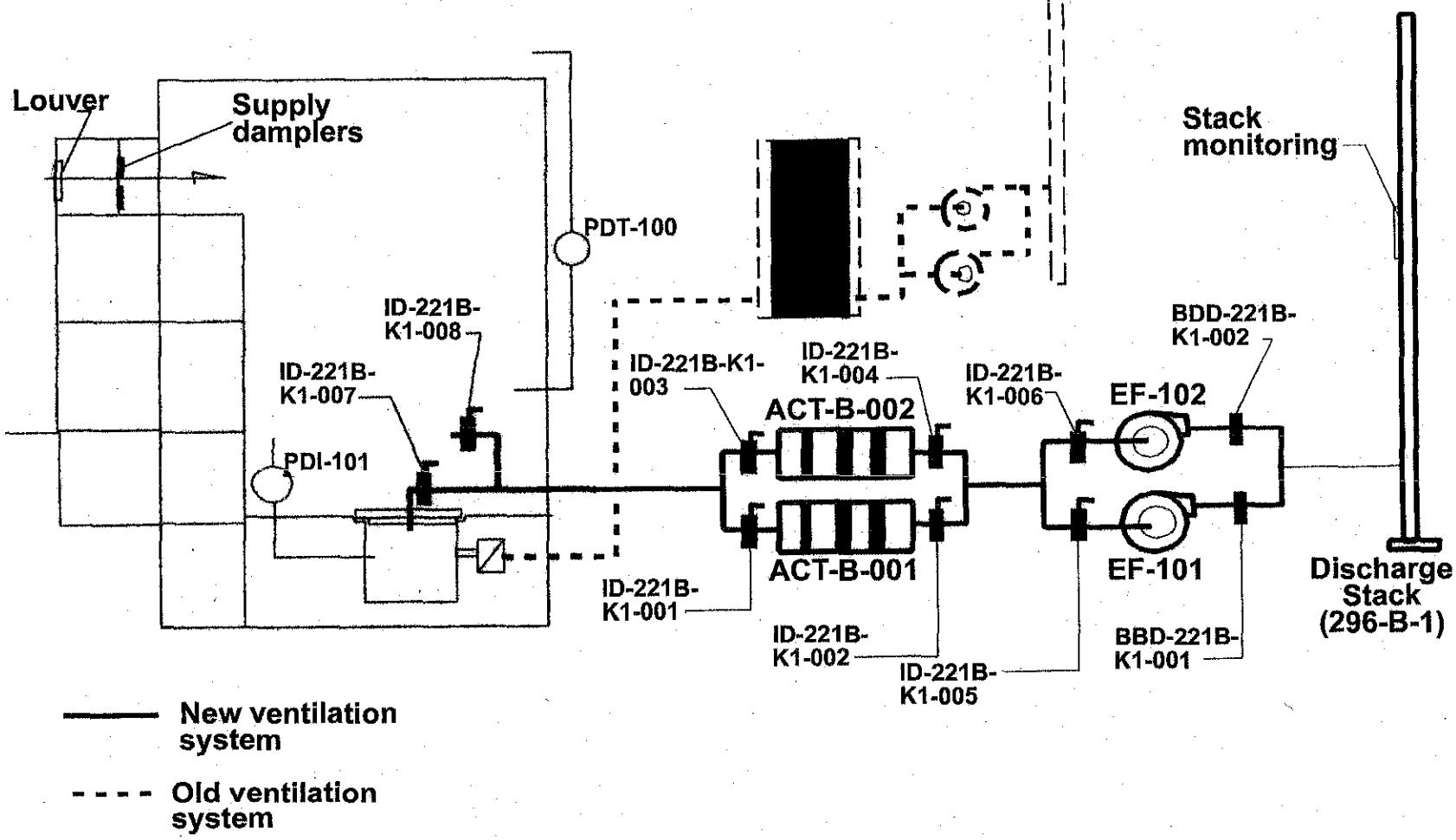


Table 1 -- Rad Scans/Surveys of B Plant Pre Filters During Change-Out

All measurements are contact readings (mR/hr)

	Top Row			Middle Row			Bottom Row			Summary Information	
	Filter 1	Filter 2	Filter 3	Filter 1	Filter 2	Filter 3	Filter 1	Filter 2	Filter 3	Filter Bank Average	[5]Time Adj/yr
ACT-B-001											
Open Window											
Oct '05[1]	2200	2700	3000	2500	3500	3300	3000	3500	3200	2,989	2,174
Jun '04[2]	2700	3300	3000	2800	4000	2500	2500	3000	2700	2,944	1,442
Apr '02[3]	6840	7700	13600	11700	13700	13600	7780	9440	13760	10,902	6,382
Sep '99[4]	10000	1000	13000	7000	15000	10000	8000	15000	10000	9,889	8,476
Closed Window											
Oct '05[1]	100	100	**200**	100	**200**	**200**	100	**200**	**200**	156	113
Jun '04[2]	200	**300**	200	200	200	200	100	200	200	200	98
Apr '02[3]	80	150	**200**	150	150	150	110	80	120	132	77
Sep '99[4]	1500	1000	2000	1000	**5000**	2000	2000	2000	2000	2,056	1,762
ACT-B-002											
Open Window											
Oct '05[1a]	3400	3800	3900	3100	4300	3700	4000	3400	2800	3,600	2,618
Jun '04[2a]	--	3500	3000	4300	3300	2700	3200	4700	2000	3,338	1,635
Apr '02[3a]	9800	9800	9800	6700	9700	6800	9800	9800	8820	8,903	5,211
Sep '99[4a]	7000	10000	10000	--	10000	10000	15000	10000	10000	10,714	9,184
Closed Window											
Oct '05[1a]	100	100	100	**200**	**200**	**200**	**200**	100	**200**	156	113
Jun '04[2a]	**500**	--	--	300	300	**500**	200	**500**	300	371	182
Apr '02[3a]	100	100	100	**150**	**150**	100	100	100	90	110	64
Sep '99[4a]	500	500	500	--	1000	1000	**1500**	1000	1000	875	750

[1] Radiological Survey Report # RC-03092, 10/26/05

[1a] Radiological Survey Report # RC-03095, 10/27/05

[2] Radiological Survey Report # RC-02429, 6/10/04

[2a] Radiological Survey Report # RC-02423, 6/8/04

[3] Radiological Survey Report #RSR-IFSM-02-0353, 4/11/02

[3a] Radiological Survey Report #RSR-IFSM-02-0339, 4/10/02

[4] Radiological Survey Report # RC-0058, 2/13/00

[4a] Radiological Survey Report # RC-0016, 1/16/00

Bold - Maxmium values

Months/Dates Operational

16.5	10-Jun-04	26-Oct-05	
24.5	25-Apr-02	7-Jun-04	(outage Mar 25 - May 7 '03)
20.5	17-Jul-00	5-Apr-02	
14.0	22-Jul-98	30-Sep-99	(outage Sep '99 - Jul '00)

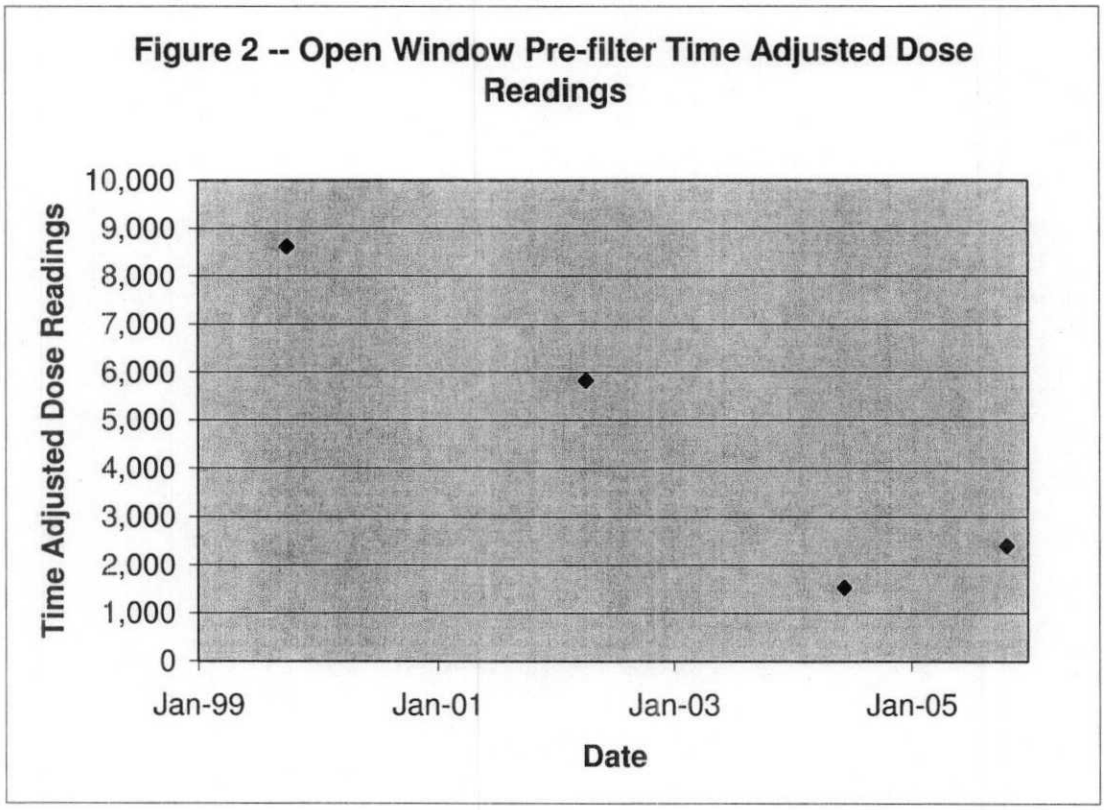
Overall Filter Avg Information

	Open Window	
Oct '05	3,294	2,396
Jun '04	3,129	1,533
Apr '02	9,952	5,826
Sep '99	10,059	8,622

	Closed Window	
Oct '05	156	113
Jun '04	275	135
Apr '02	121	71
Sep '99	1,500	1,286

[5] Average dose on filters standardized per year (avg dose/mo service*12)

Graphs Showing Pre-filter Time Adjusted Dose Readings



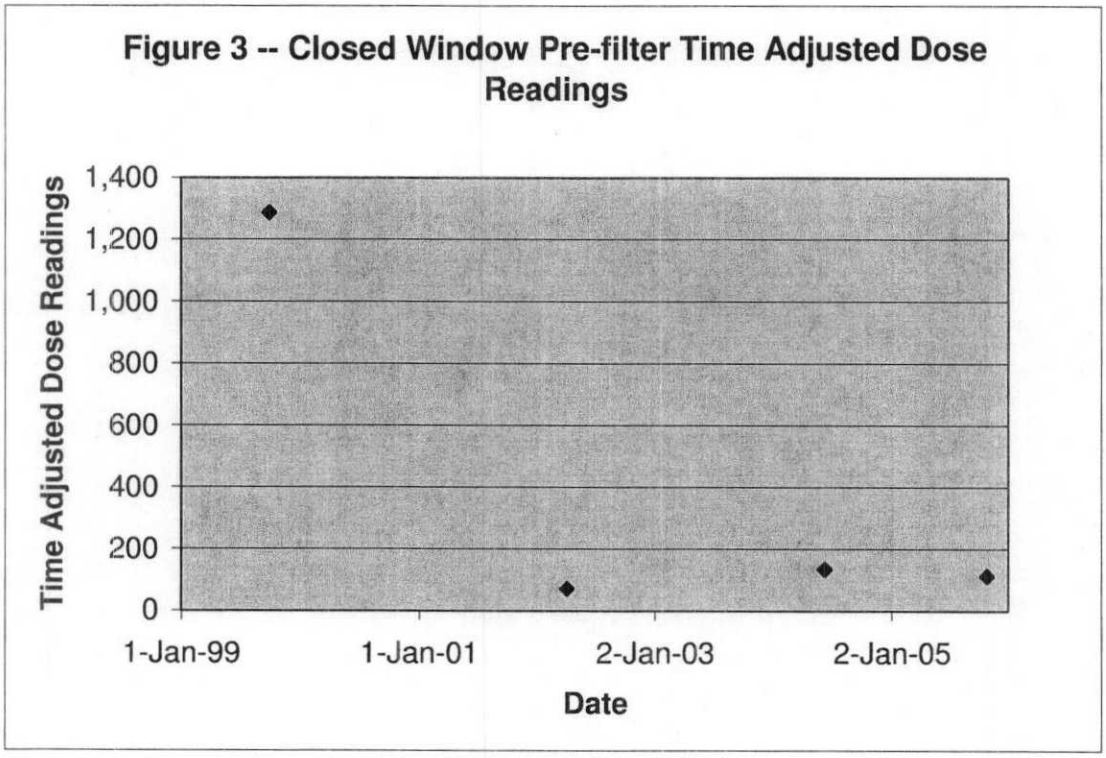


Table 2 -- 296-B-1 Filter Change Out Summary of Filter Readings

All measurements are contact readings, closed window (mR/hr)

	Highest	Average	Ave/yr
1st change out 07/22/1998 - 09/30/1999 (approx 14 months)			
ACT 1	5000	2,056	1762
ACT 2	1500	875	750
Overall		1,500	1286
2nd change out 07/17/2000 - 04/05/2002 (approx 20.5 months)			
ACT 1	200	132	77
ACT 2	150	110	64
Overall		121	71
3rd change out 04/25/2002 - 06/07/2004 (approx 24.5 months)			
ACT 1	300	200	98
ACT 2	500	371	182
Overall		275	135
4th change out 06/10/2004 - 10/26/2005 (approx 16.5 months)			
ACT 1	200	156	113
ACT 2	200	156	113
Overall		156	113

Table 3 -- Effective Dose Equivalent for Maximally Exposed Individual (mrem/yr)

Radionuclide	^{90}Sr	^{137}Cs	$^{239/240}Pu$	^{241}Am	total α	Total
2004[g]	8.2E-10	0	0	0	1.3E-08	**1.3E-08**
2003[f]	5.9E-12	--	--	--	9.0E-09	**9.0E-09**
2002[e]	1.3E-09	NA	--	--	5.6E-08	**5.7E-08**
2001[d]	8.7 E-12	--	ND	ND	7.7E-09	**7.7 E-09**
2000[c]	4.2 E-11	ND	ND	ND	ND	**4.2 E-11**
1999[b]	2.1 E-09	--	3.1 E-09	1.2 E-08	--	**1.7 E-08**
1998[a]	1.3 E-07	6.6 E-06	1.0 E-06	1.4 E-07	--	**7.9 E-06**

[a] DOE/RL-99-41, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 1998; B Plant deactivation completed September 1998

[b] DOE/RL-2000-37, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 1999

[c] DOE/RL-2001-32, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2000

[d] DOE/RL-2002-20, Rev 0, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2001

[e] DOE/RL-2003-19, Rev 0, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2002

[f] DOE/RL-2004-09, Rev 0, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2003

[g] DOE/RL-2005-06, Rev 0, Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2004