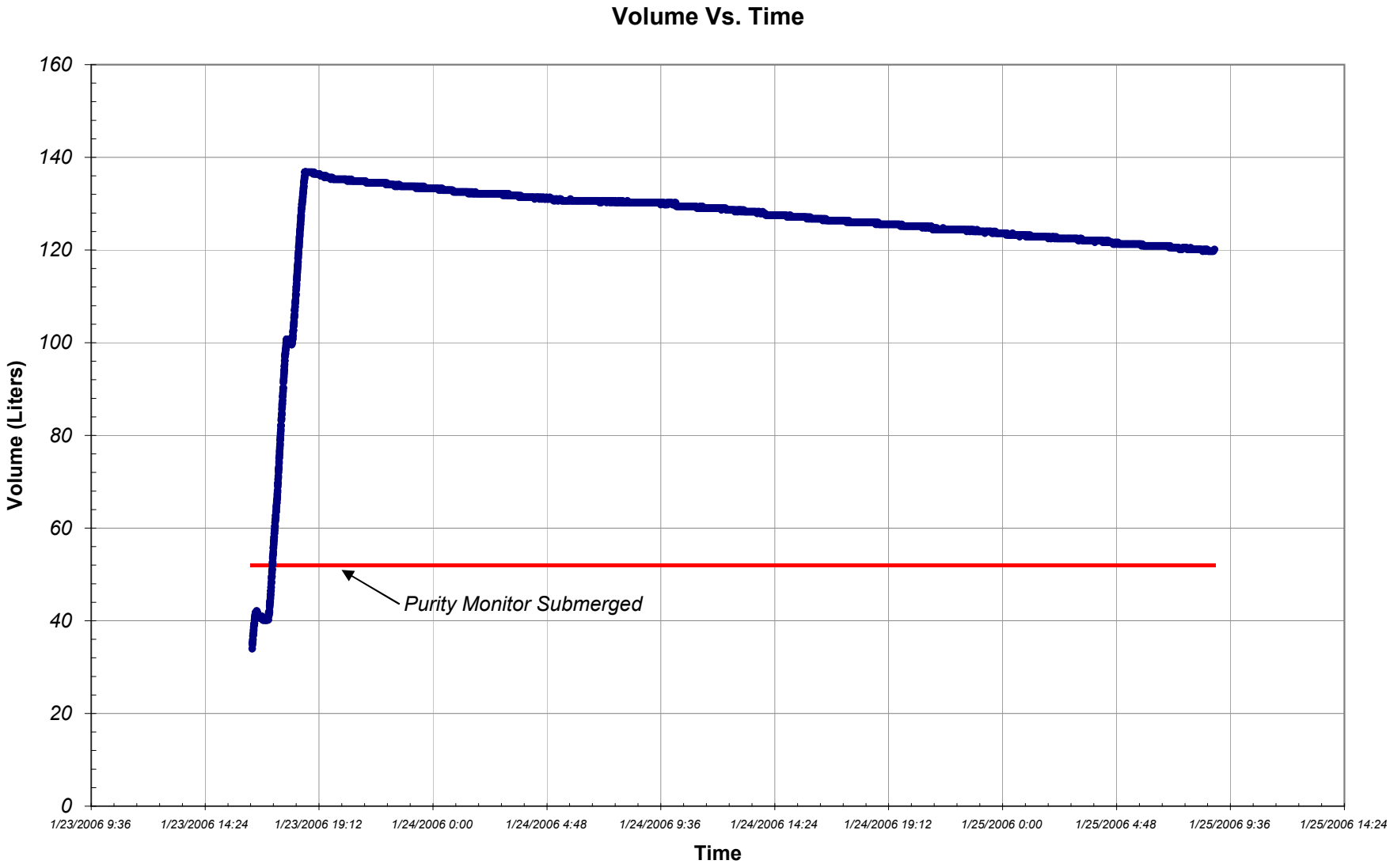
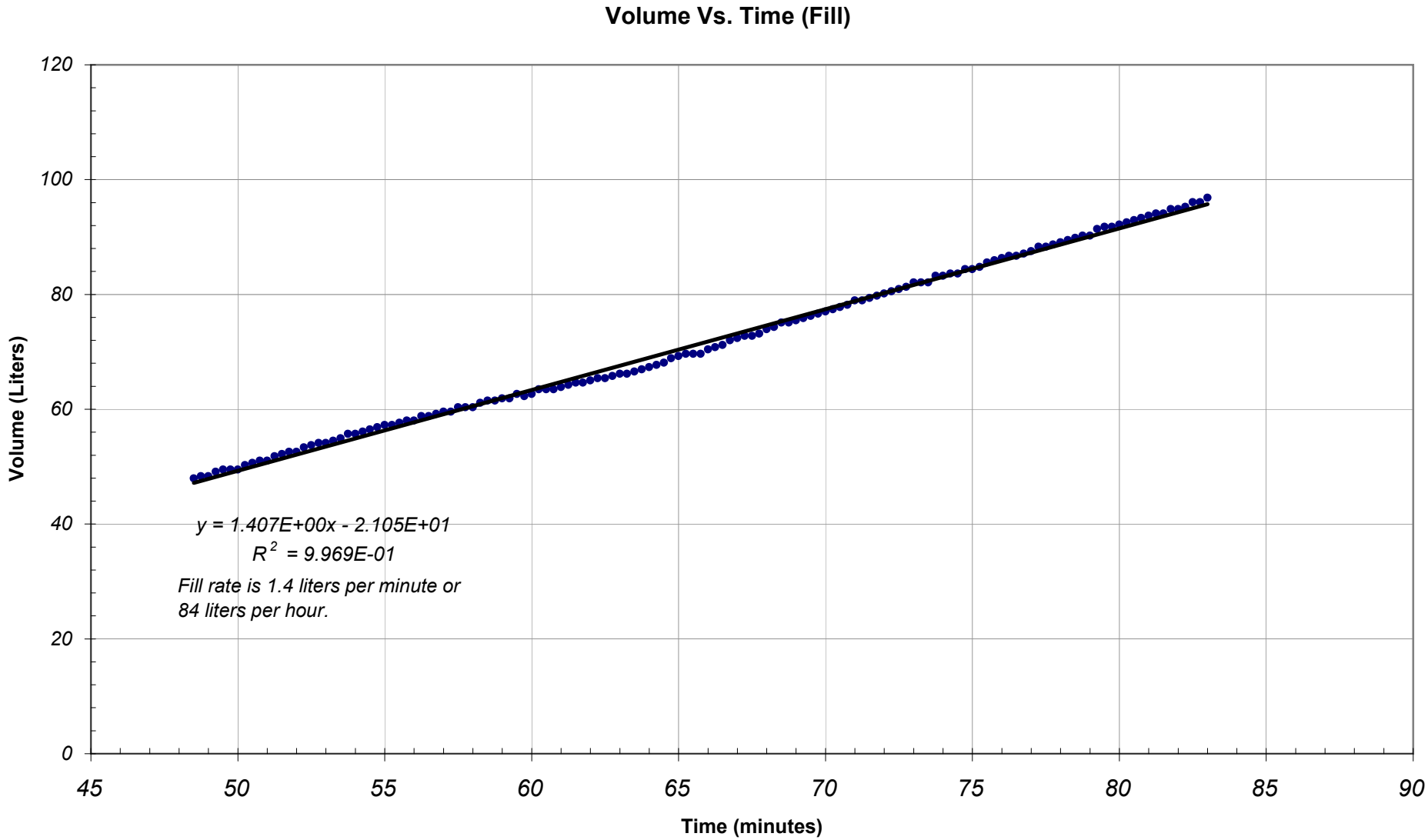
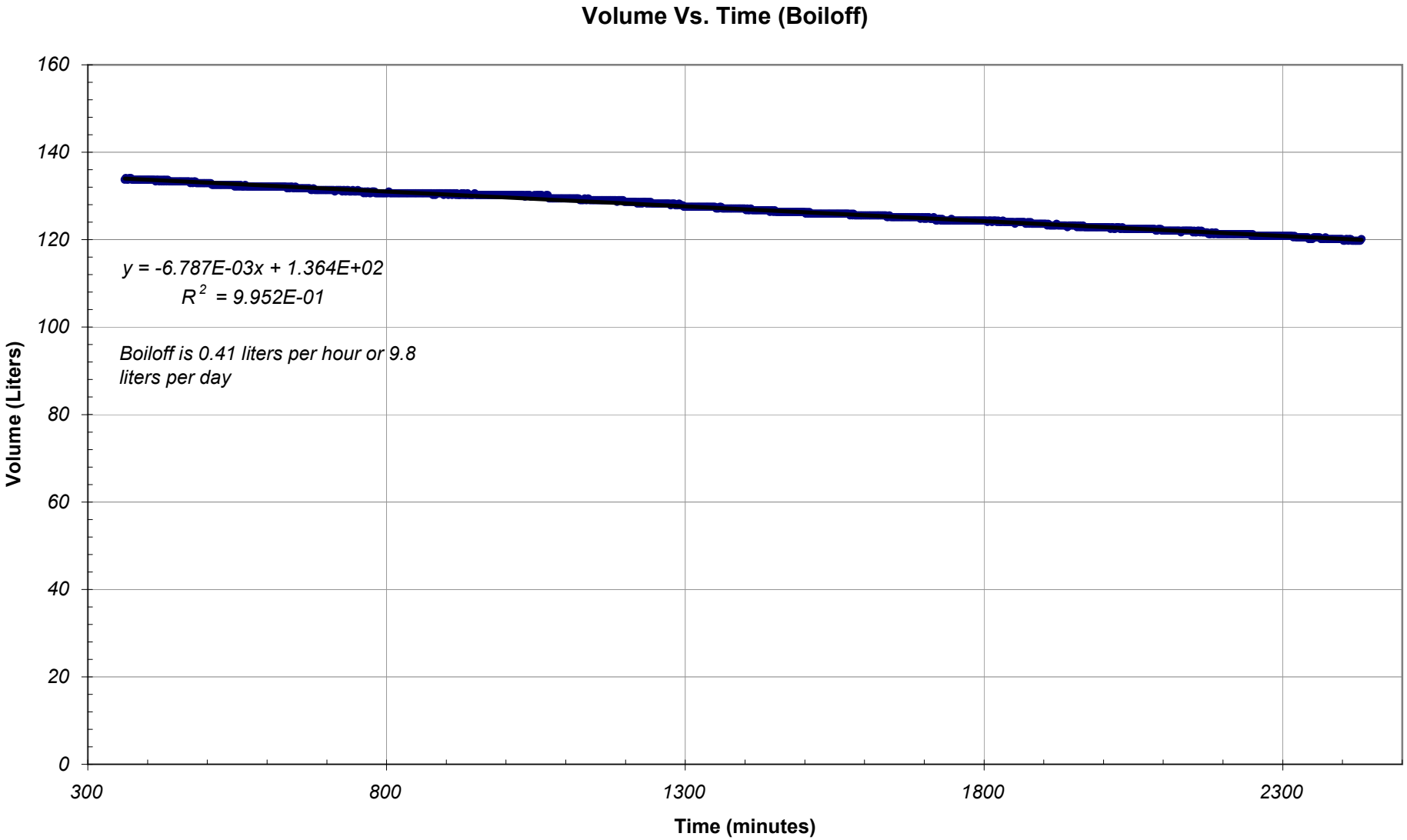
Comparison of Icarus Cold Filter Test to Flare PAB Setup

	Cryostat	O2 filter	O2 filter capacity	O2 filter description	H2O filter
Icarus – 93	LAr immersion	Oxisorb – 4 liters	30 liters O2 at std. cond., cold capacity unclear but > 130 liters of 0.5 ppm liquid	Chromium Oxide on SiO2.	5A type molecular sieve
FLARE PAB	Vacuum insulated	Trigon – 1.72 liters	Based on student measurements capacity would be 4.5 to 6.1 liters O2 at std. cond. which would clean 2883 to 3870 liters of liquid starting at 1.5 ppm (assuming 100% efficiency)	12.5% copper oxide on a high surface area alumina sphere catalyst	None
	H2O filter capacity	Initial contamination	Cleaning	Initial Vacuum	Purified Volume
Icarus – 93	120 liters water vapor	0.5 ppm O2 "equivalent"	All mechanical parts degreased with demineralized water and baked to 150 C	< 7.5E-8 Torr	130 liters
FLARE PAB	None	0.75 to 1.5 ppm O2 observed	Cleaned with alcohol	2.5E-6 Torr	137 liters
	Purification flow rate	Electron lifetime	O2 level	Purity monitor location	
Icarus – 93	14, 125, 400, 470, 800 liters per hour	> 3-4 milliseconds for all flow rates	< 0.1 ppb for all flow rates	Bottom (purity monitor gets cold faster which limits out gassing)	
FLARE PAB	84 liters per hour	48 microseconds	< 0.10 ppm on O2 Analyzer	middle	

Icarus 93 -> "Argon Purification in the Liquid Phase published in NIM A 333, 567 (1993)


Volume Vs. Time
Volume (Liters)
160
140
120
100
80
60
40
20
0
Purity Monitor Submerged
1/23/2006 9:36
1/23/2006 14:24
1/23/2006 19:12
1/24/2006 0:00
1/24/2006 4:48
1/24/2006 9:36
1/24/2006 14:24
1/24/2006 19:12
1/25/2006 0:00
1/25/2006 4:48
1/25/2006 9:36
1/25/2006 14:24
Time


Volume Vs. Time (Fill)
Volume (Liters)
Time (minutes)
0
20
40
60
80
100
120
45
50
55
60
65
70
75
80
85
90
y = 1.407E+00x - 2.105E+01
R2 = 9.969E-01
Fill rate is 1.4 liters per minute or
84 liters per hour.


Volume Vs. Time (Boiloff)
160
140
120
100
80
60
40
20
0
Volume (Liters)
y = -6.787E-03x + 1.364E+02
R2 = 9.952E-01
Boiloff is 0.41 liters per hour or 9.8 liters per day
300
800
1300
1800
2300
Time (minutes)