

## Action Leakage Rate Calculations

$$Q = (2/3) d^2 (g h_{prim})^{1/2}$$

Leachate Flow Through Geomembrane Defect										
Value	Units	Variable	Definition	Additional Values						
60	mil	d	defect diameter (EPA HELP Model assumes equal to thickness of geomembrane)	60	60	60	60	60	60	60
1.524	mm	d	defect diameter	1.524	1.524	1.524	1.524	1.524	1.524	1.524
0.0015	m	d	defect diameter	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
9.8067	m/s <sup>2</sup>	g	acceleration due to gravity	9.8067	9.8067	9.8067	9.8067	9.8067	9.8067	9.8067
37	ft	$h_{prim}$	head of leachate on top of the primary liner (max height of 40' - freeboard of 3')	5	10	15	20	25	30	35
11.2776	m	$h_{prim}$	head of leachate on top of the primary liner	1.524	3.048	4.572	6.096	7.62	9.144	10.668
<b>Q =</b>	<b>1.63E-05</b>	<b>m<sup>3</sup>/sec</b>		<b>5.99E-06</b>	<b>8.47E-06</b>	<b>1.04E-05</b>	<b>1.20E-05</b>	<b>1.34E-05</b>	<b>1.47E-05</b>	<b>1.58E-05</b>

= Input Value

$h_{prim}$	Q (gad)	i	Qfull	FS
37	604.01	0.04895	784.18	1.30
5	222.04	0.01526	1282.42	5.78
10	314.01	0.02053	1131.68	3.60
15	384.58	0.02579	1027.73	2.67
20	444.08	0.03105	950.24	2.14
25	496.50	0.03632	889.47	1.79
30	543.88	0.04158	840.08	1.54
35	587.46	0.04684	798.86	1.36

