APPENDIX

1. Hasil Pengamatan

Tabel 1. Hasil Pengamatan Kondisi Air Laut Awal

v_{al1} (ml)	$\%_{g1}$ (%)	$\%_{a1}$ (%)	ρ_{al} (gram/ml)	m_{al1} (gram)	m_{a1} (gram)	m_{g1} (gram)
5000	2,5	97,5	1,0247	5123,6	4995,51	128,09

Keterangan Tabel :

v_{al1} = Volume Air Laut Awal (ml)

$\%_{g1}$ = Kadar Garam Awal (%)

$\%_{a1}$ = Kadar Air Awal (%)

ρ_{al} = Densitas Air Laut Awal (gram/ml)

m_{al1} = Massa Air Laut Awal (gram)

m_{a1} = Massa Air Awal (gram)

m_{g1} = Massa Garam Awal (gram)

Tabel 2. Hasil Pengamatan Kadar Garam Setelah Evaporasi

		d = 1 mm	d = 2 mm	d = 3 mm
Q (ml/menit)	t (menit)	$\%_{g2}$ (%)	$\%_{g2}$ (%)	$\%_{g2}$ (%)
1800	30	2,75	2,5	2,5
	60	3	2,75	2,75
	90	3,25	3	3
	120	3,5	3,25	3,25
	150	4,75	4,25	3,5
	180	6,25	5,5	4
	210	8	6,75	4,5
	240	11,25	8	6
1600	30	2,75	2,5	2,5
	60	3	2,75	2,75
	90	3,25	3	3
	120	3,5	3,25	3,25
	150	4,5	3,75	3,5
	180	6	4,5	4
	210	7,5	6	4,5
	240	10,25	7,5	5
1400	30	2,75	2,5	2,5
	60	3	2,75	2,5
	90	3,25	3	2,75
	120	3,5	3,25	2,75
	150	4,25	3,5	3,5
	180	5,5	4,25	3,5
	210	7	5,5	4
	240	9,5	6,75	4,5
1200	30	2,75	2,5	2,5
	60	3	2,75	2,5
	90	3,25	3	2,5
	120	3,5	3,25	2,75
	150	4,25	3,5	2,75
	180	5	3,75	2,75
	210	6,75	4,5	3

1000	240	9	6	3,75
	30	2,75	2,5	2,5
	60	3	2,75	2,5
	90	3,25	3	2,5
	120	3,5	3,25	2,75
	150	3,75	3,5	2,75
	180	4,5	3,75	2,75
	210	6,25	4	3
	240	8,5	5,25	3,25

Keterangan Tabel :

d = Diameter *Nozzle Sprayer* (mm)

Q = Laju Alir Umpan Air Laut (ml/menit)

t = Waktu Proses Evaporasi (menit)

$\%_{g2}$ = Kadar Garam Setelah Evaporasi (%)

Tabel 3. Hasil Perhitungan Laju Evaporasi Rata-Rata

Q (ml/menit)	t (menit)	$\%_{g2}$ (%)	$\%_{a2}$ (%)	v_{al2} (ml)	m_{a2} (gram)	m_{a3} (gram)	J (gram/menit)
	d = 1 mm						
1800	240	11,25	88,75	625	684,056	4388,41	18,285
1600	240	10,25	89,75	700	764,442	4309,42	17,9559
1400	240	9,5	90,5	850	927,316	4156,29	17,3179
1200	240	9	91	910	992,683	4092,17	17,0507
1000	240	8,5	91,5	1100	1199,4	3898,06	16,2419
	d = 2 mm						
Q (ml/menit)	t (menit)	$\%_{g2}$ (%)	$\%_{a2}$ (%)	v_{al2} (ml)	m_{a2} (gram)	m_{a3} (gram)	J (gram/menit)
1800	240	8	92	1300	1417,39	3691,51	15,3813
1600	240	7,5	92,5	1415	1542,66	3568,55	14,869
1400	240	6,75	93,25	1510	1646,13	3460,5	14,4187
1200	240	6	94	1655	1804,05	3299,7	13,7488
1000	240	5,25	94,75	1730	1885,7	3208,81	13,37
	d = 3 mm						
Q (ml/menit)	t (menit)	$\%_{g2}$ (%)	$\%_{a2}$ (%)	v_{al2} (ml)	m_{a2} (gram)	m_{a3} (gram)	J (gram/menit)
1800	240	6	94	1875	2043,26	3074,84	12,8118
1600	240	5	95	2150	2292,85	2817,3	11,7388
1400	240	4,5	95,5	2510	2644,08	2470,41	10,2934
1200	240	3,75	96,25	2825	2955,66	2150,69	8,9612
1000	240	3,25	96,75	3150	3248,37	1852,71	7,7196

Keterangan Tabel :

d = Diameter *Nozzle Sprayer* (mm)

Q = Laju Alir Umpan Air Laut (ml/menit)

t = Waktu Proses Evaporasi (menit)

$\%_{g2}$ = Kadar Garam Setelah Evaporasi (%)

$\%_{a2}$ = Kadar Air Setelah Evaporasi (%)

m_{a2} = Massa Air Setelah Evaporasi (gram)

m_{a2} = Massa Air yang Teruapkan (gram)

J = Laju Evaporasi Rata-Rata (gram/menit)

2. Perhitungan Laju Evaporasi Rata-Rata Hasil Penelitian pada Diameter *Noozle Sprayer* sebesar 1 mm dan Laju Alir Umpan Air Laut sebesar 1800 ml/menit

Volume Air Laut Awal (v_{al1}) = 5 Liter = 5000 ml

Kadar Garam Awal ($\%_{g1}$) = 2,5%

Kadar Air Awal ($\%_{a1}$):

$$\%_{a1} = 100\% - \%_{g1}$$

$$\%_{a1} = 100\% - 2{,}5\%$$

$$\%_{a1} = 97{,}5\%$$

Volume Pikno (v_p) = 10 ml

Berat Pikno Kosong (w_1) = 12,1009 gram

Berat Pikno Isi Air Laut Awal (w_2) = 22,3481 gram

Densitas Air Laut Awal (ρ_{al1}):

$$\rho_{al1} = \frac{w_2 - w_1}{vp}$$

$$\rho_{al1} = \frac{22{,}3481\ gram - 12{,}1009\ gram}{10\ ml}$$

$$\rho_{al1} = 1{,}0247\ gram/ml$$

Massa Air Laut Awal (m_{al1}):

$$m_{al1} = \rho_{al1}\, x\, v_1$$

$$m_{al1} = 1{,}0247\ gram/ml\ x\ 5000\ ml$$

$$m_{al1} = 5123{,}6\ gram$$

Massa Air Awal (m_{a1}):

$$m_{a1} = \%_{a1}\, x\, m_{al1}$$

$$m_{a1} = 97{,}5\%\ x\ 5123{,}6\ gram/ml$$

$$m_{a1} = 4995{,}5\ gram$$

Massa Garam Awal (m_{g1}):

$$m_{g1} = \%_{g1}\, x\, m_{al1}$$

$$m_{g1} = 2{,}5\%\ x\ 5123{,}6\ gram/ml$$

$$m_{g1} = 128{,}09\ gram$$

Waktu Evaporasi (t) = 4 Jam = 240 menit

Kadar Garam Setelah Evaporasi selama t (240 menit) ($\%_{g2}$) = 11,25%

Volume Air Laut Setelah Evaporasi selama t (240 menit) (v_{al2}) = 625 ml

Kadar Air Setelah Evaporasi selama t (240 menit) ($\%_{a2}$):

$$\%_{a2} = 100\% - \%_{g2}$$

$$\%_{a2} = 100\% - 11{,}25\%$$

$$\%_{a2} = 88{,}75\%$$

Berat Pikno Kosong (w_1) = 12,1009 gram

Berat Pikno Isi Air Laut Setelah Evaporasi (w_3) = 23,0458 gram

Densitas Air Laut Setelah Evaporasi (ρ_{al2}):

$$\rho_{al2} = \frac{w_3 - w_1}{vp}$$

$$\rho_{al2} = \frac{23{,}0458\ gram - 12{,}1009\ gram}{10\ ml}$$

$$\rho_{al2} = 1{,}0945\ gram/ml$$

Massa Air Laut Setelah Evaporasi selama t (240 menit) (m_{al2}):

$$m_{al2} = v_{al2}\ x\ \rho_{al2}$$

$$m_{al2} = 625\ ml\ x\ 1{,}0945\ gram/ml$$

$$m_{al2} = 684{,}0563\ gram$$

Massa Air Setelah Evaporasi selama t (240 menit) (m_{a2}):

$$m_{a2} = \%_{a2}\ x\ m_{al2}$$

$$m_{a2} = 88{,}75\%\ x\ 684{,}0563\ gram$$

$$m_{a2} = 607{,}0999\ gram$$

Massa Garam Setelah Evaporasi selama t (240 menit) (m_{a2}):

$$m_{g2} = \%_{g2}\ x\ m_{al2}$$

$$m_{g2} = 11{,}25\%\ x\ 684{,}0563\ gram$$

$$m_{g2} = 76{,}9563\ gram$$

Massa Air yang Teruapkan (m_{a3}):

$$m_{a3} = m_{a1} - m_{a2}$$

$$m_{a3} = 4995{,}51\ gram - 607{,}0999\ gram$$

$$m_{a3} = 4388{,}4101\ gram$$

Massa Garam yang Hilang (m_{g3}):

$$m_{g3} = m_{g1} - m_{g2}$$

$$m_{g3} = 128{,}09\ gram - 76{,}9563\ gram$$

$$m_{g3} = 51{,}1337\ gram$$

Laju Evaporasi Rata-Rata (J):

$$J = \frac{m_{a3}}{t}$$

$$J = \frac{4388{,}4101\ \ gram}{240\ menit}$$

$$J = 18{,}2850\ gram/menit$$

3. Analisis Regresi Linier Berganda

Tabel 4. Penentuan Estimasi Laju Evaporasi Rata-Rata Air Laut Melalui Permodelan Regresi Linier Berganda

Laju Alir Umpan Air Laut (ml/menit) (X_1)	Diameter Nozzle Sprayer (mm) (X_2)	Laju Evaporasi Rata-Rata Hasil Penelitian (gram/menit) (Y)
1800	1	18,2850
1600	1	17,9559
1400	1	17,3179
1200	1	17,0507
1000	1	16,2419
1800	2	15,3813
1600	2	14,8690
1400	2	14,4187
1200	2	13,7488
1000	2	13,3700
1800	3	12,8118
1600	3	11,7388
1400	3	10,2934
1200	3	8,9612
1000	3	7,7196

Tabel 5. *Regression Statistics*

Regression Statistics	
Multiple R	0,982358115
R Square	0,965027467
Adjusted R Square	0,959198712
Standard Error	0,656190411
Observations	15

Tabel 6. ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	142,5783524	71,2892	165,563	1,82963E-09
Residual	12	5,167030261	0,43059		
Total	14	147,7453827			

Tabel 7. *Coefficients* dan *Standard Error*

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	15,68715948	0,950910246	16,497	1,3E-09	13,61530404	17,7590149
X Variable 1	0,003849364	0,000599017	6,42613	3,3E-05	0,002544218	0,00515451
X Variable 2	-3,53266509	0,207505628	-17,024	9,1E-10	-3,984781019	-3,08054917

Permodelan Laju Evaporasi Rata-Rata (Y'):

$$Y' = 15{,}6871 + 0{,}0038X_1 - 3{,}5327X_2$$

Perhitungan Laju Evaporasi Rata-Rata Hasil Permodelan pada Diameter *Nozzle Sprayer* 1 mm dan Laju Alir Umpan Air Laut 1800 ml/menit:

$$Y' = 15{,}6871 + 0{,}0038(1800) - 3{,}5327(1)$$

$$Y' = 19{,}0833\ gram/menit$$

Persen Kesalahan:

$$\%Kesalahan = \left|\frac{Y-Y'}{Y} x100\%\right|$$

$$\%Kesalahan = \left|\frac{18{,}2850 - 19{,}0833}{18{,}2850} x100\%\right|$$

$$\%Kesalahan = 4{,}3659\%$$

Tabel 8. Persen Kesalahan Rerata antara Laju Evaporasi Rata-Rata Hasil Penelitian dengan Laju Evaporasi Rata-Rata Hasil Permodelan

X_1 (ml/menit)	X_2 (mm)	Y (gram/menit)	Laju Evaporasi Rata-Rata Hasil Persamaan (Y')	% Kesalahan
1800	1	18,2850	19,0833	4,3659
1600	1	17,9559	18,3135	1,9912
1400	1	17,3179	17,5436	1,3035
1200	1	17,0507	16,7737	1,6244
1000	1	16,2419	16,0039	1,4658
1800	2	15,3813	15,5507	1,1013
1600	2	14,8690	14,7808	0,5928
1400	2	14,4187	14,0109	2,8283
1200	2	13,7488	13,2411	3,6927
1000	2	13,3700	12,4712	6,7228
1800	3	12,8118	12,0180	6,1960
1600	3	11,7388	11,2481	4,1796
1400	3	10,2934	10,4783	1,7963
1200	3	8,9612	9,7084	8,3380
1000	3	7,7196	8,9385	15,7898
		% Kesalahan Rerata =		4,1326

LAMPIRAN

Gambar 1. Analisis Awal Kadar Garam Air Laut

Gambar 5. Pengukuran Volume Akhir Air Laut

Gambar 2. Pengukuran Volume Air Laut Sebanyak 5 Liter

Gambar 6. Penimbangan Piknometer Berisi Air kadar Garam Awal

Gambar 3. Persiapan Bahan Baku Air Laut Sebanyak 5 Liter Ditempatkan pada Bak Penampung

Gambar 7. Penimbangan Piknometer Kosong

Gambar 4. Analisis Akhir Kadar Garam Air Laut

Gambar 8. Penimbangan Piknometer Berisi Air kadar Garam Akhir