Nueces Electric Cooperative, Inc. (NEC)
2024 Distribution Loss Factor Calculation Summary

The following summary contains the methods used to develop the adjusting factors for use in calculating Nueces Electric Cooperative, Inc (NEC) loss adjustments to be applied to load profiles as per ERCOT protocols. These factors apply to 2025 intervals.

ERCOT protocols include the following equation for the factor to be applied to each 15-minute interval of day ahead profiled load.

$$SILF_i = F1*(SIEL_i/AAL) + F2 + F3/(SIEL_i/AAL)$$

Where,

SILF$_i$ = Settlement Interval Distribution Loss Factor
SIEL$_i$ = Settlement Interval ERCOR Load
AAL   = Annual Interval Average ERCOT System Load
F1, F2, & F3 = Coefficients derived from regression analysis of the TDSP loss study results.

and where,

AAL   = Annual ERCOT Total System MWH / Total annual intervals
= 12,969 (to be used for 2025 loss calculations)

Comparing NEC and ERCOT Demand Profiles

ERCOT Values for 2024
ERCOT Annual MWH = 455,663,780
ERCOT AAL (15-min intervals) MWH = 12,969
ERCOT Peak MW = 85,311
Peak Date = 08/20/2024 @ IE 17:00

NEC Values
NEC 2024 Peak (MW) = 122.15
NEC AAL (15-min intervals) MWH = 17.54

NEC had an overall peak of 404.40 MW, however 282.25 MW of demand was metered on primary side of substation transformer. The peak to be used for the Distribution Loss Calculation will be 122.15 MW

	15 mins	1 hour
NEC Peak (MW)	30.54	122.15
NEC AAL (MWH)	17.54	70.17
ERCOT Peak (MW)	21,328	85,311
ERCOT AAL (MWH)	12,969	51,876

Methodology for Losses

NEC wire loads have been compensated for all substation transformer losses. Distribution primary conductor losses, distribution transformer losses and secondary conductor losses were calculated based on load levels using the following equation:

$$Losses = AX^2 + B$$
$$A = Constant$$
$$B = Constant\ (No - Load\ Losses)$$
$$X = Input\ to\ System\ (MW)$$

The equation was solved for the A constant for each potential loss level in the distribution system. With the A constant for each level, losses can be determined based on the input to the system.

Primary Conductor
NEC uses Milsoft Engineering Analysis – Windmil modeling software to find primary conductor losses on every substation distribution feeder. kW demands are entered into each substation at a specific time to find line losses at that time with given load. The time used was 08/20/2024 17:00, ERCOT's 2024 time of Peak demand. Line losses were calculated to be 5.8 MW.

Distribution Transformers
NEC's GIS model contained 18,619 transformers with most of them being single phase transformers. Averages and typical losses of transformers were used to find total losses of 1.89 MW.

Secondary Conductor
An average load per customer was calculated for single phase and three phase services. An assumed service length and resistance of service was determined to find secondary line loss. 0.24MW

NEC Customer Coding

NEC customers are divided into two groups, 'A' & 'B'. A group customers are primary metered at medium voltage with respect to distribution transformer. B group customers are secondary metered with respect to distribution transformers. F1, F2, & F3 were selected to match the curve of losses calculated based on system data.

Group A Coefficients: F1 = 0.0234   F2 = 0.000141   F3 = 0.00012

Group B Coefficients: F1 = 0.0256   F2 = 0.000120   F3 = 0.02500

Distribution Loss Factor Results

Group A Customers - Primary		Group B Customers - Secondary	
DLF at AAL	DLF at Peak	DLF at AAL	DLF at Peak
2.37%	6.10%	5.07%	7.63%

Loss Calculations

The equation from page 2 re-arranged to solve for A:

$$AA = \frac{Losses - B}{X^2}$$

Primary Conductor
Total Losses = 5.80 MW
No Load Losses = 0 MW
Input = 122.15 MW

$$A = \frac{5.80 - 0}{122.15^2}$$

A = 3.889E-04
B = 0

Distribution Transformer
Total Losses = 1.89 MW
No Load Losses = 1.456 MW
Input = 116.35 MW

$$A = \frac{1.89 - 1.456}{116.35^2}$$

A = 3.20E-05
B = 1.456

Secondary Conductor
Total Losses = 0.240 MW
No Load Losses = 0 MW
Input = 114.46 MW

$$A = \frac{0.240 - 0}{114.46^2}$$

A = 1.80E-05
B = 0

ERCOT Load (1 hr) MW	ERCOT Interval Load SIEL (15 min) MW	NEC Load MW	NEC Interval Load MW	Primary Conductor Losses MW	Primary Losses %	Input to Dist Trfs MW	Dist Trf Losses MW	Input to Secondary MW	Secondary Conductor Losses MW	Total Losses MW	Total Losses	DLF Secondary	DLF Primary	
9,557	2,389	9.37	2.34	0.03	0.36%	9.34	1.46	7.88	0.01	1.50	15.98%	11.88%	0.59%	
12,616	3,154	12.37	3.09	0.06	0.48%	12.31	1.46	10.85	0.01	1.53	12.34%	9.32%	0.74%	
15,675	3,919	15.37	3.84	0.09	0.60%	15.28	1.46	13.82	0.01	1.56	10.17%	7.83%	0.90%	
18,733	4,683	18.37	4.59	0.13	0.71%	18.24	1.47	16.78	0.01	1.61	8.75%	6.89%	1.06%	
21,792	5,448	21.37	5.34	0.18	0.83%	21.20	1.47	19.73	0.01	1.66	7.76%	6.26%	1.22%	
24,851	6,213	24.37	6.09	0.23	0.95%	24.14	1.47	22.67	0.01	1.72	7.05%	5.83%	1.38%	
27,910	6,977	27.37	6.84	0.29	1.06%	27.08	1.48	25.60	0.02	1.79	6.53%	5.54%	1.54%	
30,969	7,742	30.37	7.59	0.36	1.18%	30.01	1.48	28.53	0.02	1.86	6.13%	5.33%	1.71%	
34,028	8,507	33.37	8.34	0.43	1.30%	32.94	1.49	31.45	0.02	1.95	5.83%	5.20%	1.87%	
37,086	9,272	36.37	9.09	0.51	1.41%	35.86	1.50	34.36	0.03	2.04	5.60%	5.12%	2.04%	
40,145	10,036	39.37	9.84	0.60	1.53%	38.77	1.50	37.27	0.03	2.14	5.42%	5.08%	2.20%	
ERCOT AAL 43,204	10,801	42.37	10.59	0.70	1.65%	41.67	1.51	40.16	0.03	2.24	5.29%	5.07%	2.37%	ERCOT AAL
46,263	11,566	45.37	11.34	0.80	1.76%	44.57	1.52	43.05	0.04	2.36	5.20%	5.09%	2.53%	
49,322	12,330	48.37	12.09	0.91	1.88%	47.46	1.53	45.94	0.04	2.48	5.13%	5.12%	2.70%	
52,380	13,095	51.37	12.84	1.03	2.00%	50.35	1.54	48.81	0.05	2.61	5.08%	5.18%	2.86%	
55,439	13,860	54.37	13.59	1.15	2.11%	53.22	1.55	51.68	0.05	2.75	5.05%	5.25%	3.03%	
58,498	14,625	57.37	14.34	1.28	2.23%	56.09	1.56	54.54	0.06	2.89	5.04%	5.32%	3.19%	
61,557	15,389	60.37	15.09	1.42	2.35%	58.96	1.57	57.39	0.06	3.05	5.05%	5.41%	3.36%	
64,616	16,154	63.37	15.84	1.56	2.46%	61.81	1.58	60.23	0.07	3.21	5.06%	5.51%	3.52%	
67,675	16,919	66.37	16.59	1.71	2.58%	64.66	1.59	63.07	0.08	3.38	5.09%	5.62%	3.69%	
70,733	17,683	69.37	17.34	1.87	2.70%	67.50	1.60	65.90	0.08	3.56	5.12%	5.73%	3.85%	
73,792	18,448	72.37	18.09	2.04	2.81%	70.34	1.61	68.72	0.09	3.74	5.17%	5.85%	4.02%	
76,851	19,213	75.37	18.84	2.21	2.93%	73.16	1.63	71.54	0.10	3.93	5.22%	5.97%	4.18%	
79,910	19,977	78.37	19.59	2.39	3.05%	75.98	1.64	74.34	0.10	4.13	5.27%	6.10%	4.35%	
82,969	20,742	81.37	20.34	2.57	3.16%	78.80	1.65	77.14	0.11	4.34	5.33%	6.23%	4.51%	
ERCOT Peak 112,300	28,075	110.14	27.54	4.72	4.28%	105.42	1.81	103.61	0.20	6.73	6.11%	7.63%	6.10%	ERCOT Peak
117,398	29,349	115.14	28.79	5.16	4.48%	109.98	1.84	108.14	0.21	7.21	6.26%	7.89%	6.38%	
122,496	30,624	120.14	30.04	5.61	4.67%	114.53	1.88	112.65	0.23	7.72	6.43%	8.15%	6.65%	
127,594	31,899	125.14	31.29	6.09	4.87%	119.05	1.91	117.14	0.25	8.25	6.59%	8.42%	6.93%	
132,692	33,173	130.14	32.54	6.59	5.06%	123.55	1.94	121.61	0.27	8.80	6.76%	8.69%	7.20%	
137,790	34,448	135.14	33.79	7.10	5.26%	128.04	1.98	126.06	0.29	9.37	6.93%	8.96%	7.48%	
142,888	35,722	140.14	35.04	7.64	5.45%	132.50	2.02	130.49	0.31	9.96	7.11%	9.23%	7.76%	

ERCOT Load (1 hr)	ERCOT Interval Load SIEL (15 min)	NEC Load (1 hr)	NEC Interval Load (15 min)									DLF Secondary	DLF Primary	
42,832	10,708	42.37	10.59	1.00	2.35%	41.38	1.13	40.25	0.03	2.16	5.09%	5.07%	2.37%	At ERCOT AAL
73,316	18,329	72.53	18.13	2.92	4.03%	69.61	1.21	68.40	0.08	4.21	5.81%	5.85%	4.03%	At ERCOT Peak

	ERCOT		NEC			Group B - Secondary Coefficients				Group A - Primary Coefficients		
	1 Hour	15 min	1 Hour	15 min		F1	F2	F3		F1	F2	F3
AAL	43,204	10,801	42.37	10.59		0.0256	0.00012	0.025		0.0234	0.0001411	0.00012
Peak	73,650	18,413	110.14	27.54								

	Prim Conductor	Dist Trf	Sec Conductor
A Constant	0.000388858	3.20E-05	1.79769E-05
B Constant	0.00	1.456	0.00

2024 Nueces Electric Cooperative 'B' Customers Distribution Loss Factors
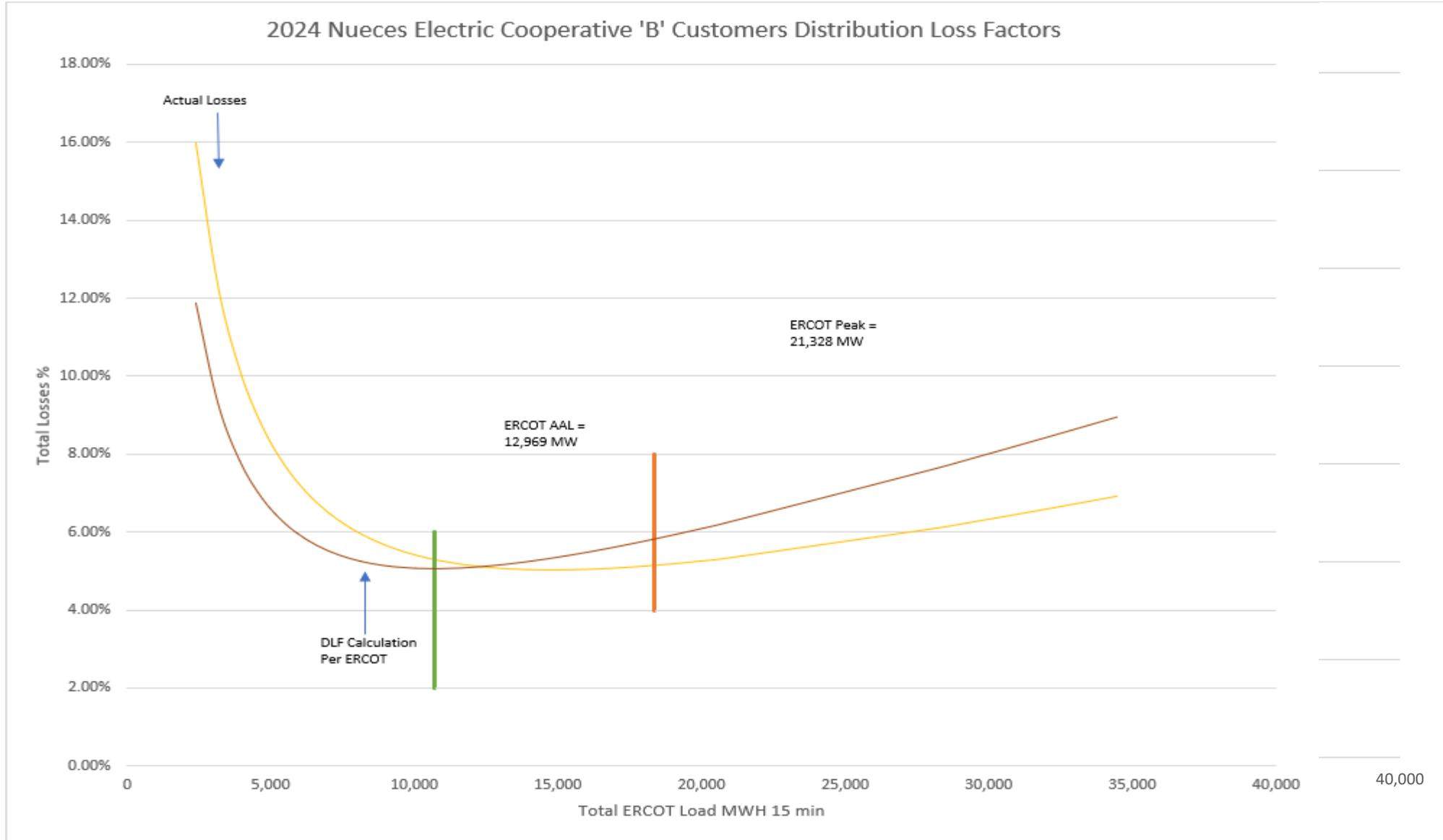
Group B - Secondary Coefficients		
F1	F2	F3
0.0256	0.00012	0.025

5

2024 Nueces Electric Cooperative 'A' Customers Distribution Loss Factors
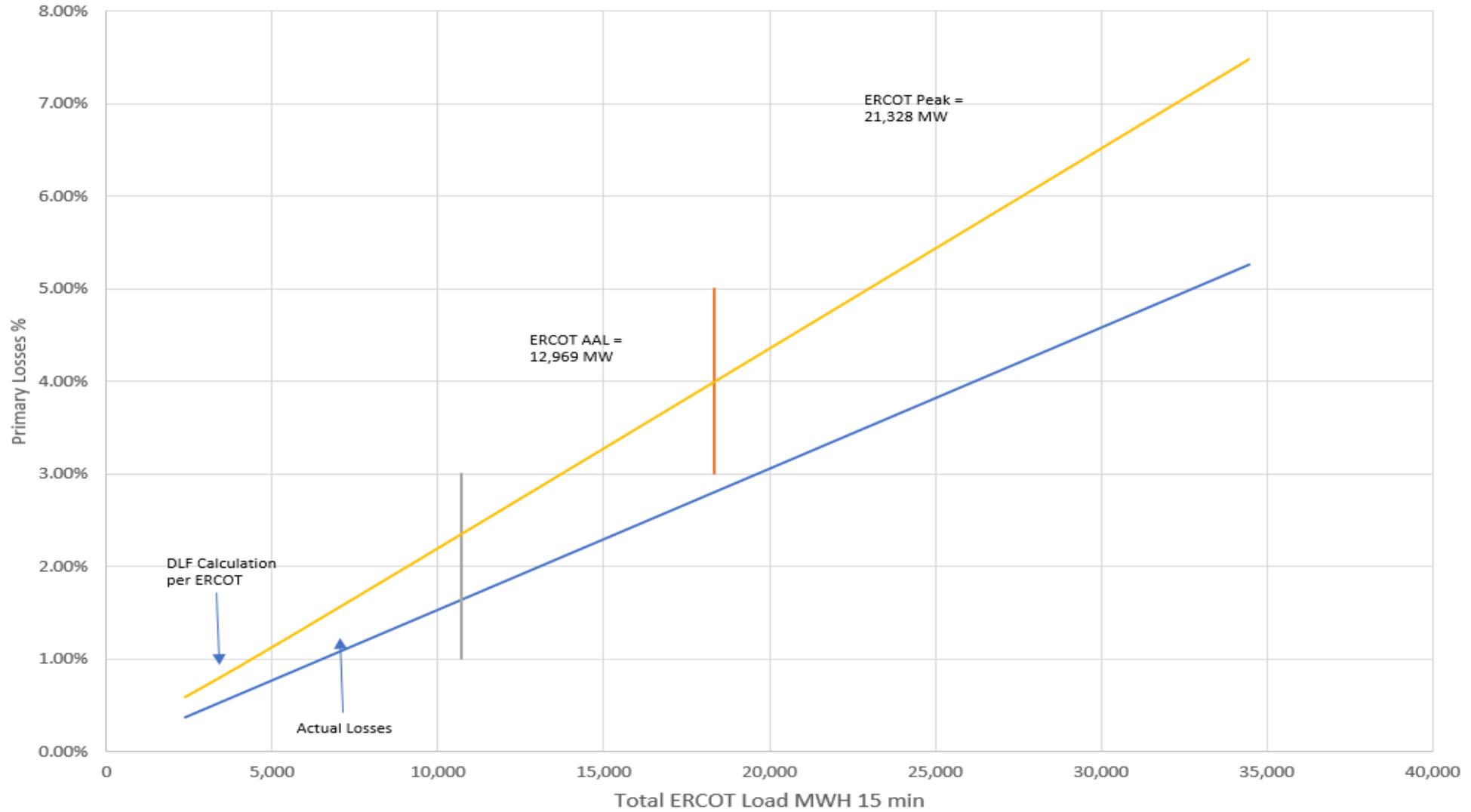
Group A - Primary Coefficients		
F1	F2	F3
0.0234	0.0001411	0.00012