CH4 PRODUCTION VS INPUTS

	INPUTS	
4.79 Standard deviation of CH4		**286.56** Average of FEED(X)
22.96 Variance of CH4	FEED · ALKALINITY · VFA · LIME · COD	**491** Max of FEED(X)

SCATTER POINT AFTER DATA CLEANING	CURVE FITTING	CURVE FITTING DATA VALUES

FEED(X) and CH4
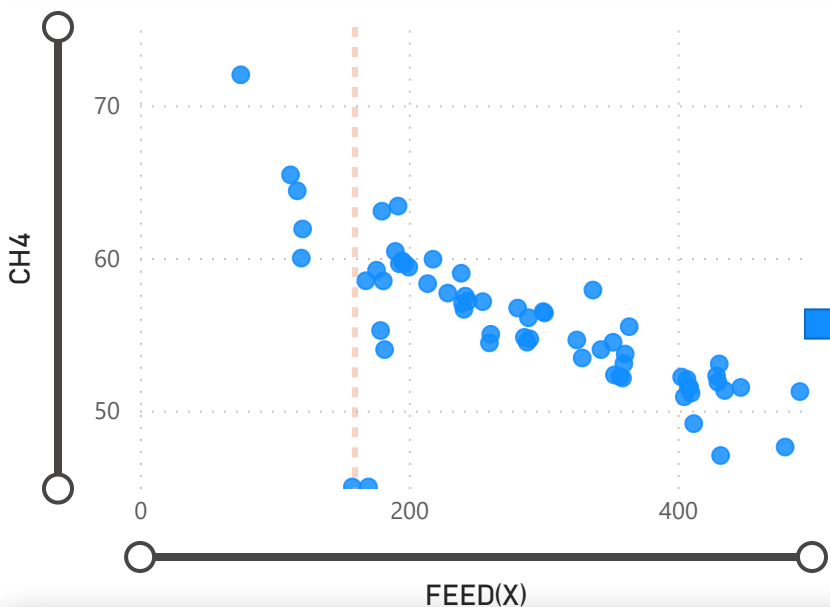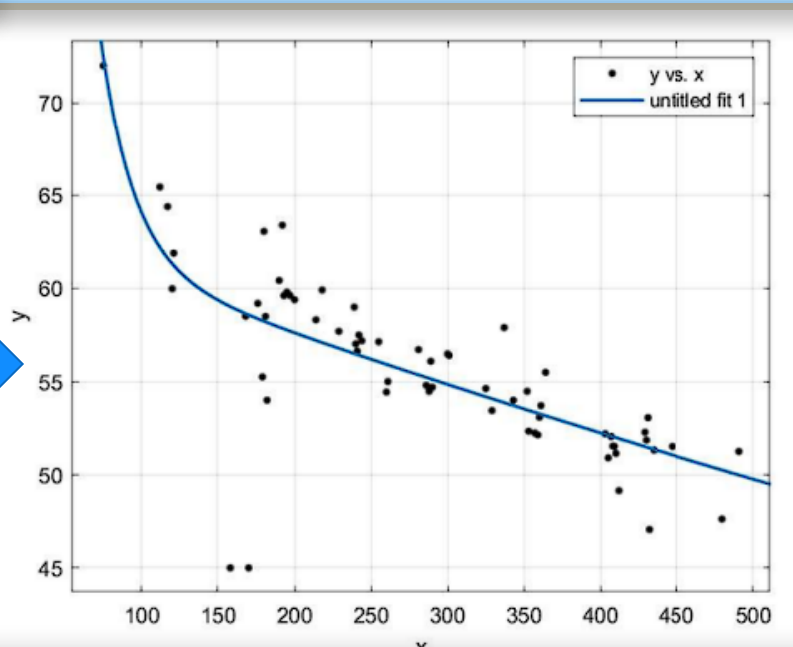
CURVE FITTING DATA VALUES

Fit Name: Exponential

Exponential Curve Fit (exp2)
$f(x) = a*exp(b*x) + c*exp(d*x)$
x is normalized by mean 286.6 and std 105.9

Coefficients and 95% Confidence Bounds

	Value	Lower	Upper
a	55.2090	54.3025	56.1155
b	-0.0515	-0.0706	-0.0324
c	0.0008	-0.0087	0.0103
d	-4.8023	-10.9616	1.3569

Goodness of Fit

	Value
SSE	604.1926
R-square	0.5822
DFE	59.0000

BRIEF ANALYSIS :

1. The company uses Raw PHL feed mostly between 150 to 450 m3/day. 160 m3/day (as marked) is the minimum daily lower limit for Raw PHL Feed.
2. The trend shows there is an inverse relation of CH4 production as we decrease the feed.
3. In between 150 to 450 there is almost a linear decrease. Below 150 m3/day there is an exponential increase but much can't be said because of lack of data points.

CH4 PRODUCTION VS INPUTS

INPUTS

5.43
Standard deviation of CH4

29.45
Variance of CH4

4.76K
Average of ALKALINITY

8660
Max of ALKALINITY

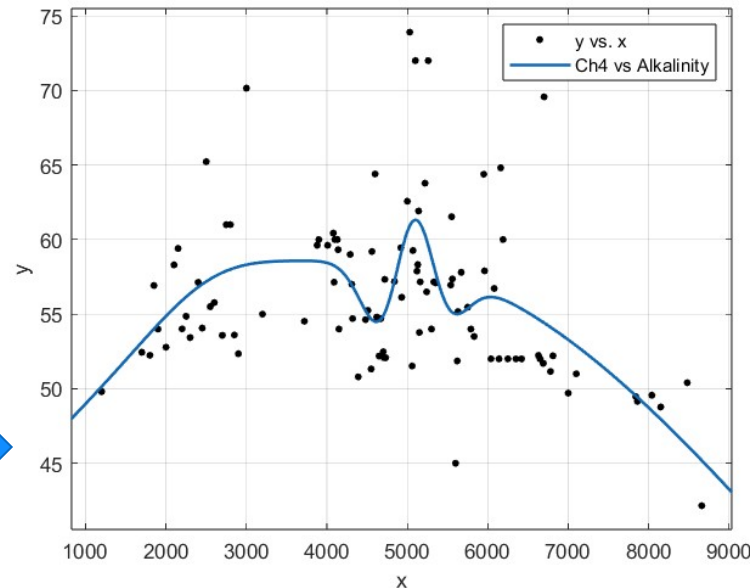| FEED	ALKALINITY	VFA	LIME	COD

SCATTER POINT AFTER DATA CLEANING

ALKALINITY and CH4
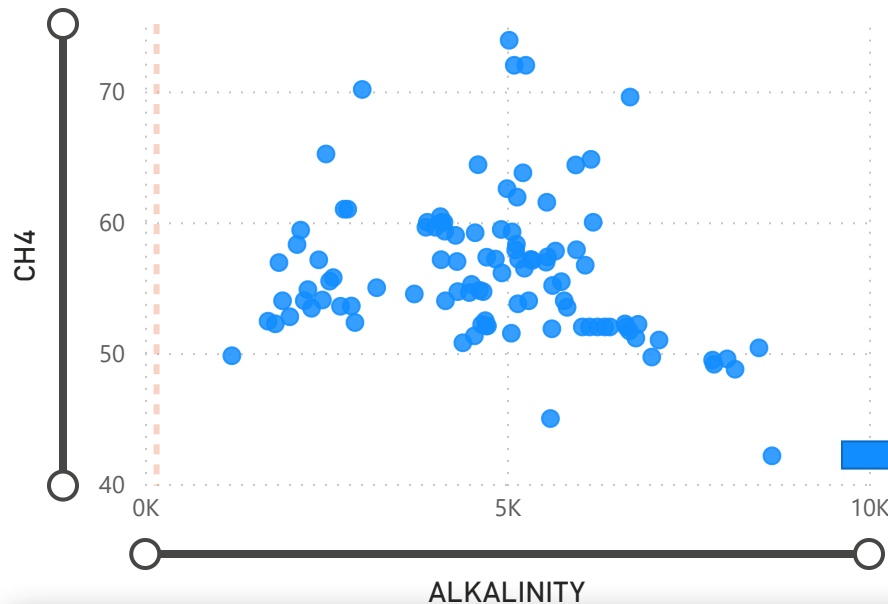
CURVE FITTING

CURVE FITTING DATA VALUES

Fit Name: CH4 vs Alkalinity

Gaussian Curve Fit (gauss4)
$f(x) = a1*exp(-((x-b1)/c1)^2) + a2*exp(-((x-b2)/c2)^2) + a3*exp(-((x-b3)/c3)^2) + a4*exp(-((x-b4)/c4)^2)$

Coefficients and 95% Confidence Bounds

	Value	Lower	Upper
a1	1.0526e+05	-6.8433e+13	6.8433e+13
b1	5.0707e+03	-1.6908e+06	1.7009e+06
c1	431.3834	-7.5714e+06	7.5723e+06
a2	2.0706	-11.4609	15.6022
b2	2.5592e+03	-29.6168	5.1481e+03
c2	1.0516e+03	-5.4592e+03	7.5624e+03
a3	58.4927	51.4723	65.5132
b3	4.4971e+03	2.4033e+03	6.5910e+03
c3	8.1942e+03	4.7170e+03	1.1671e+04
a4	-1.0525e+05	-6.8433e+13	6.8433e+13
b4	5.0707e+03	-1.6910e+06	1.7011e+06
c4	431.4067	-7.5720e+06	7.5729e+06

Goodness of Fit

	Value
SSE	2.0348e+03
R-square	0.3227
DFE	90
Adj R-sq	0.2399
RMSE	4.7548

BRIEF ANALYSIS :

1. **The Standard deviation is on the higher end for this dataset.**
2. **There is a tendency to increase exponentially between 4500 and 5500 but as variance is high, testing needs to be done**
3. **There is a gradual parabolic increase till near 4500 and a gradual decrease after 6000.**

CH4 PRODUCTION VS INPUTS

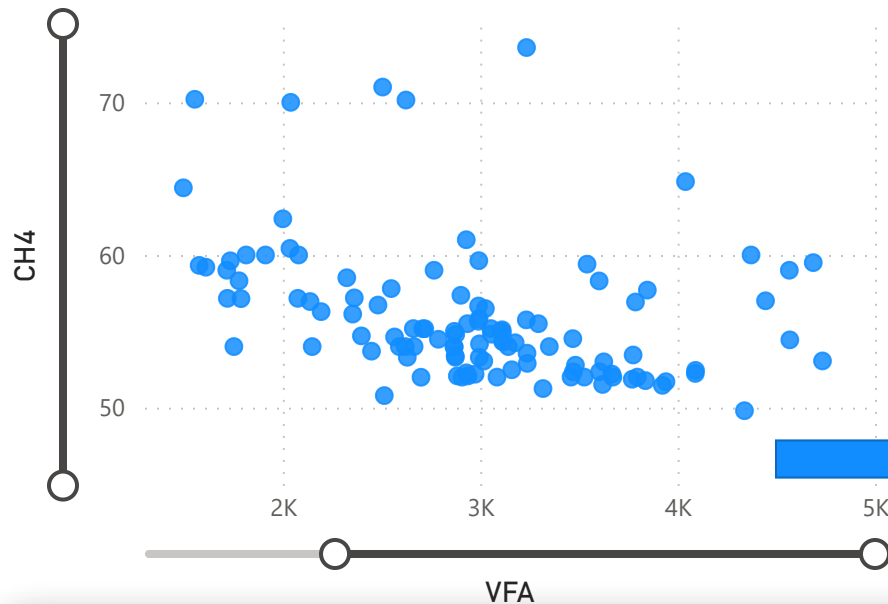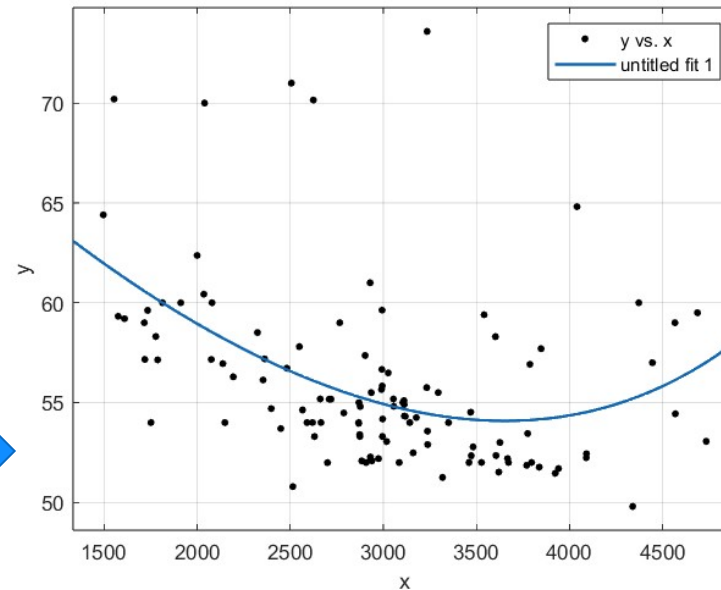| 4.41		2.98K
Standard deviation of CH4	**INPUTS**	Average of VFA
19.44	FEED ALKALINITY VFA LIME COD	4.73K
Variance of CH4		Max of VFA

SCATTER POINT AFTER DATA CLEANING

VFA and CH4

CURVE FITTING

CURVE FITTING DATA VALUES

Fit Name: CH4 vs VFA

Exponential Curve Fit (exp2)
$f(x) = a*exp(b*x) + c*exp(d*x)$
x is normalized by mean 2975 and std 747.5

Coefficients and 95% Confidence Bounds

	Value	Lower	Upper
a	46.9928	-1.0253	95.0108
b	-0.1098	-0.3751	0.1555
c	8.0000	-39.7017	55.7016
d	0.4046	-0.9645	1.7737

Goodness of Fit

	Value
SSE	1.6956e+03
R-square	0.2142
DFE	107
Adj R-sq	0.1921
RMSE	3.9808

BRIEF ANALYSIS :

1. The data points show an inverse parabolic trend. Most data points are between 2000 and 4300 VFA.
2. There is a gradual parabolic decrease till 3750 VFA, thereafter CH4 production tends to increase.
3. Analysis is done by not considering variations much using the bisquare method.

CH4 PRODUCTION VS INPUTS

5.37	INPUTS	21.65K
Standard deviation of CH4		Average of COD

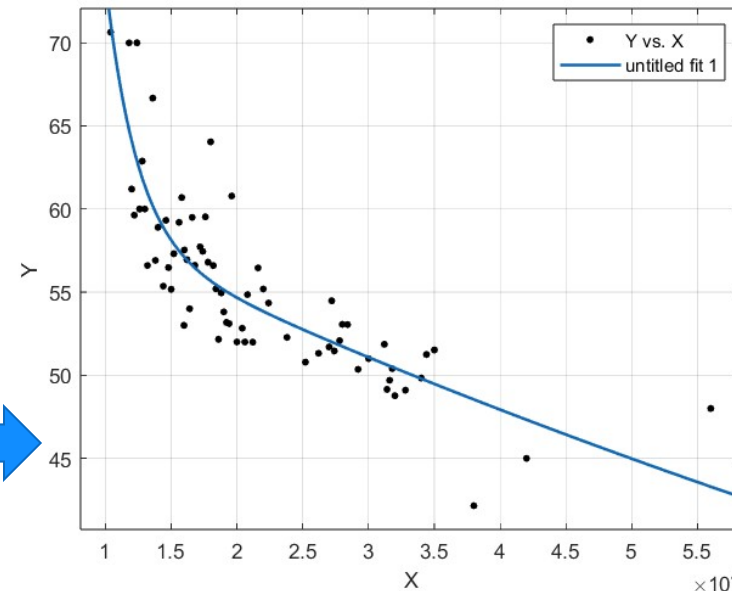| 28.79	FEED	ALKALINITY	VFA	LIME	COD	56K
Variance of CH4						Max of COD

SCATTER POINT AFTER DATA CLEANING | CURVE FITTING | CURVE FITTING DATA VALUES

COD and CH4
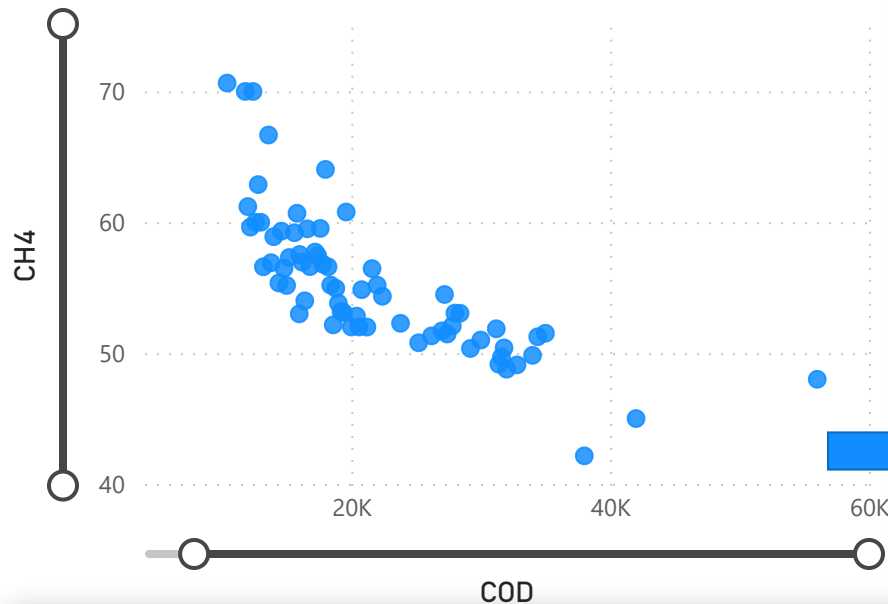
Fit Name: CH4 VS COD

Exponential Curve Fit (exp2)
$f(x) = a*exp(b*x) + c*exp(d*x)$

Coefficients and 95% Confidence Bounds

	Value	Lower	Upper
a	1.0371e+03	-2.0914e+03	4.1656e+03
b	-4.1850e-04	-6.9812e-04	-1.3888e-04
c	61.8014	57.1097	66.4931
d	-6.3554e-06	-9.0248e-06	-3.6859e-06

Goodness of Fit

	Value
SSE	525.9928
R-square	0.7353
DFE	65.0000
Adj R-sq	0.7230
RMSE	2.8447

BRIEF ANALYSIS :

1. **The data points show a decreasing exponential trend.**
2. **There is rapid decrease till 1.5 x 10^4 COD. Thereafter the decrease tends to be more or less linear.**
3. **This graph shows similarity with Ch4 vs Feed. One can argue that there is a linear relationship between Feed and COD.**

CH4 PRODUCTION VS INPUTS

INPUTS

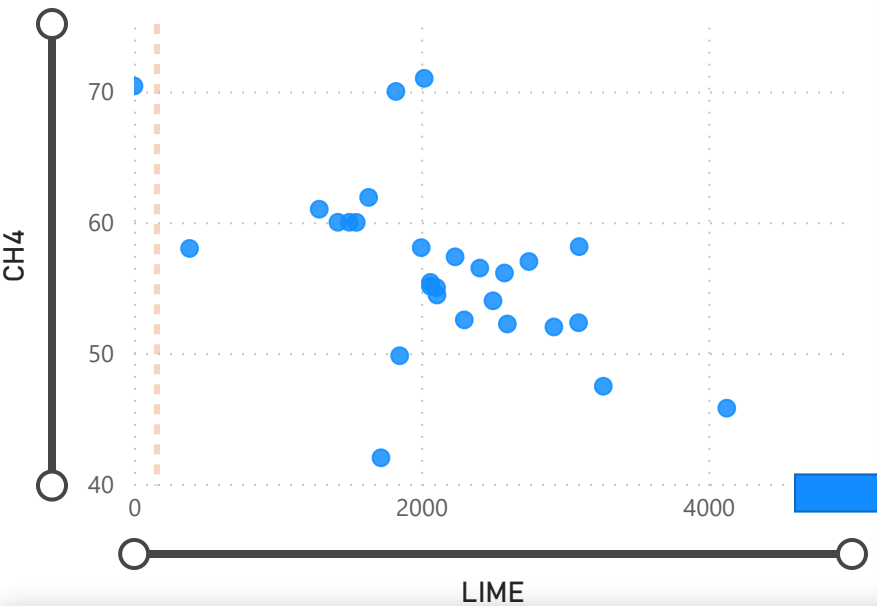|	
6.60 — Standard deviation of CH4	**2.12K** — Average of LIME
43.55 — Variance of CH4	**4128** — Max of LIME

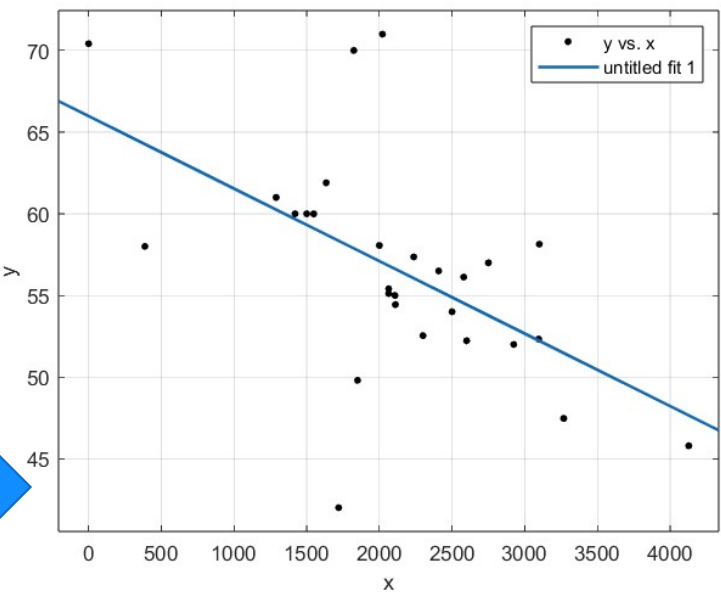**FEED** **ALKALINITY** **VFA** **LIME** **COD**

SCATTER POINT AFTER DATA CLEANING

LIME and CH4

CURVE FITTING

CURVE FITTING DATA VALUES

Fit Name: CH4 VS LIME

Polynomial Curve Fit (poly1)
$f(x) = p1*x + p2$

Coefficients and 95% Confidence Bounds

	Value	Lower	Upper
p1	-0.0044	-0.0071	-0.0018
p2	65.9802	59.8589	72.1016

Goodness of Fit

	Value
SSE	845.0767
R-square	0.3070
DFE	26.0000
Adj R-sq	0.2804
RMSE	5.7011

BRIEF ANALYSIS :

1. **The data points are less and variance is high so not much analysis could be done.**
2. **There is a very crude linear decreasing trend.**