Chevron

July 21, 1999

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Ms. Eva Chu
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

**Re: Former Chevron Service Station #9-7127**
**Interstate 580 and Grantline Road**
**near Tracy, California**

Dear Ms. Chu:

As noted in the previously sent Semi-Annual (Second Quarter) Groundwater Monitoring report for 1999, dated July 7, 1999, bio-parameters were taken at each well and this information was to be evaluated to determine the presence of intrinsic bioremediation within the hydrocarbon plume at the above noted site.

The evaluation of indicator parameters across a dissolved contaminant plume can be used in the demonstration of intrinsic bioremediation. One or more trends observed across a dissolved plume with increasing contaminant concentration would suggest the potential occurrence of intrinsic bioremediation.

With increasing BTEX concentrations, the expected trend in indicator parameter concentrations would be:

| Relative Decrease In: | Relative Increase In: |
|---|---|
| Dissolved Oxygen | Dissolved Iron (Ferrous) |
| Oxidation-Reduction Potential (ORP) | Alkalinity |
| Nitrate | |
| Sulfate | |

In the attached charts, the sampled wells are presented on the X-axis from the up-gradient wells to the down-gradient wells through the contaminant plume. The resulting order of the wells is MW-4, MW-3 and MW-6 through the plume. Well MW-1 was eliminated as a indicator well in this sampling event, since the bio-parameter results were incomplete and due to separate phase hydrocarbons detected, no BTEX concentrations were available. The

sum of the BTEX results for each well and the indicator bio-parameter analytical results for each well are plotted on the Y-axis to create the plots on the attached charts. The plots are than evaluated by observation for apparent trends in the data.

The dissolved oxygen vs. BTEX plot shows that with high BTEX concentrations, dissolved concentrations are lower, going from well MW4 to MW- 3, but there appears to be no biological activity is occurring from well MW-3 to MW-6. This indicates that partial intrinsic bioremediation is occurring at this site.

The ORP vs. BTEX plot indicates that ORP is decreasing with increasing BTEX values. Therefore, this trend would be a good indicator of the presence of intrinsic bioremediation at this site.

The nitrate vs. BTEX plot indicates that nitrate is present where BTEX concentrations are low and reduced when BTEX concentrations are elevated. This is an expected trend for nitrate in the presence of BTEX and intrinsic bioremediation. The observed nitrate trend through the BTEX plume suggests the intrinsic bioremediation is occurring in the groundwater at this site. Nitrate is a good indicator of this process.

The sulfate vs. BTEX plot indicates that sulfate is present where BTEX concentrations are low and reduced when BTEX concentrations are elevated. This is an expected trend for sulfate in the presence of BTEX and intrinsic bioremediation. The observed sulfate trend through the BTEX plume suggests that intrinsic bioremediation is occurring in the groundwater at this site. Sulfate is a good indicator of this process.

The alkalinity vs. BTEX plot indicates that alkalinity is increasing with decreasing BTEX values. An increase in alkalinity across a contaminant plume is a potential indicator of biologic activity. Therefore, the observed trend for alkalinity is not consistent with the occurrence of intrinsic bioremediation in the groundwater at this site.

The dissolved iron (ferrous) vs. BTEX plot indicates that dissolved iron increases with increasing BTEX values. This is an expected trend for dissolved iron in the presence of BTEX and intrinsic bioremediation. This trend would be a good indicator of the presence of intrinsic bioremediation at this site.

The plots of the indicator parameters for DO (partial), ORP, nitrate, sulfate and dissolved iron vs. total BTEX for site wells upgradient, within and downgradient of the plume indicates the presence of intrinsic bioremediation occurring in the groundwater plume associated with this site. A trend in four of the six indicator parameters is acceptable to indicate that intrinsic bioremediation is occurring at a site.

The effect of the intrinsic bioremediation process will be to stabilize the contaminant plume and reduce the size of the plume as the source area concentrations are reduced.

If you have any questions or comments, call me at (925) 842-9136 or Brett Hunter at (925) 842-8695.

Sincerely,
**CHEVRON PRODUCTS COMPANY**

Philip R. Briggs
Site Assessment and Remediation Project Manager

Enclosure

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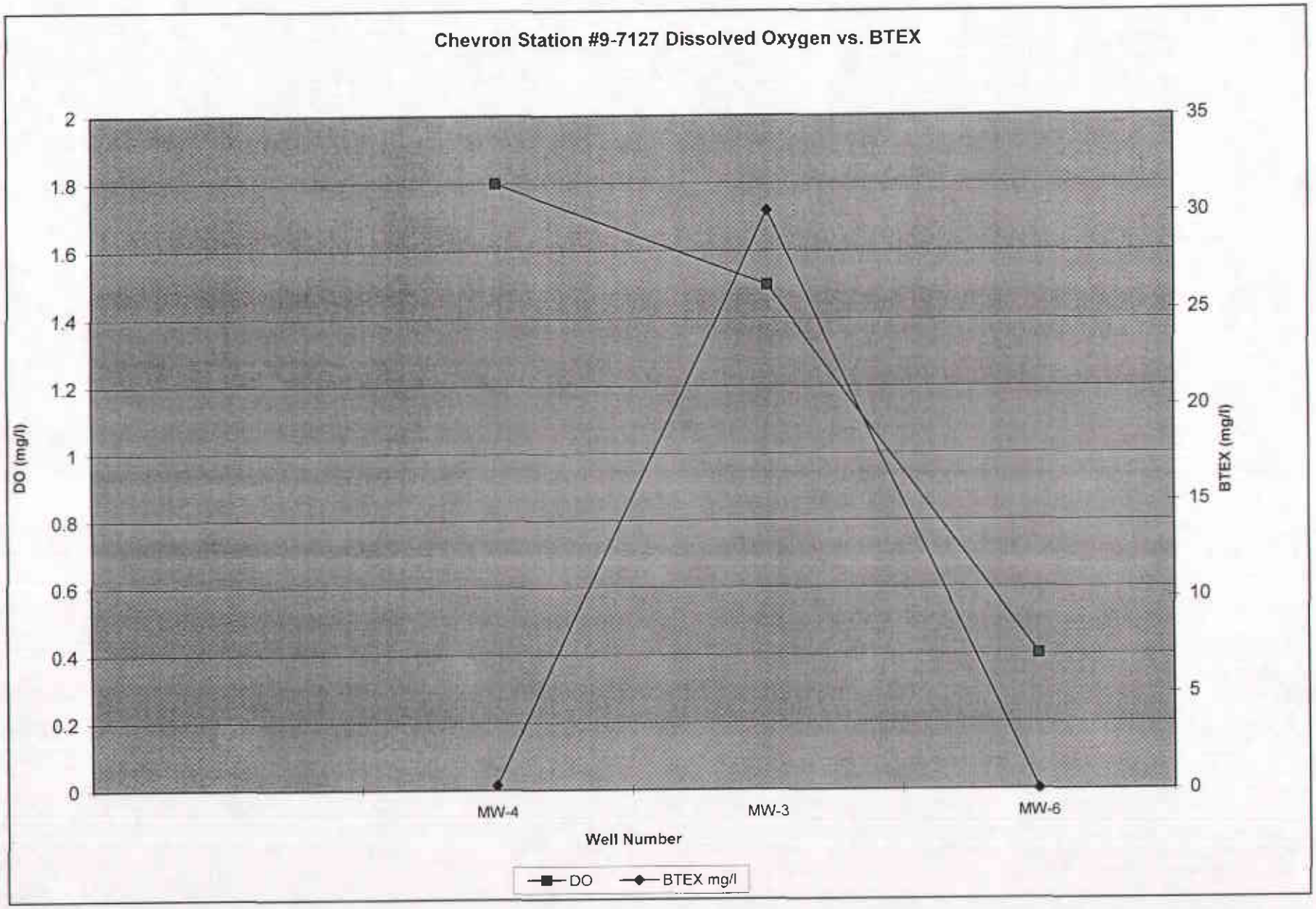
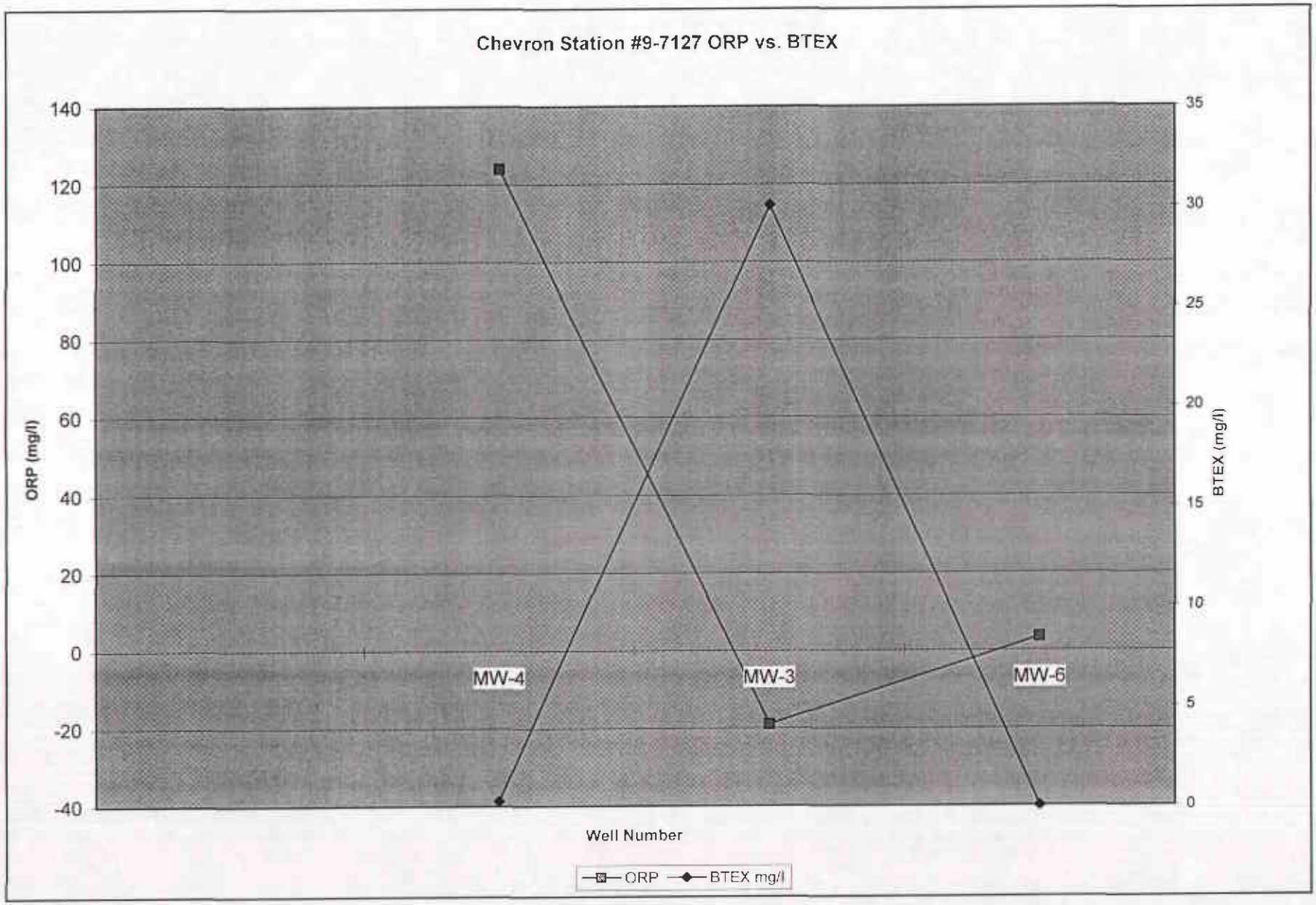
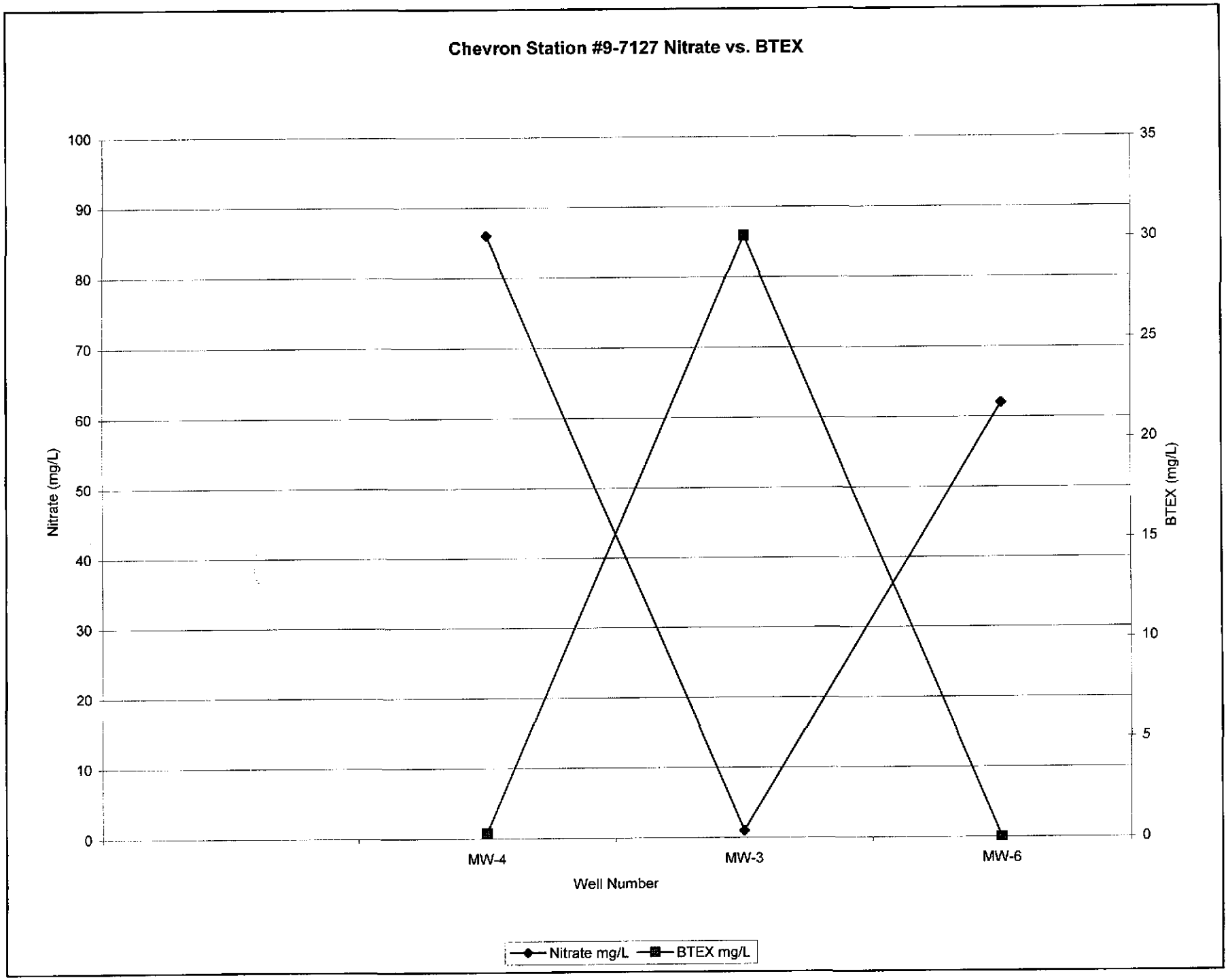
Ms. Bette Owen, Chevron

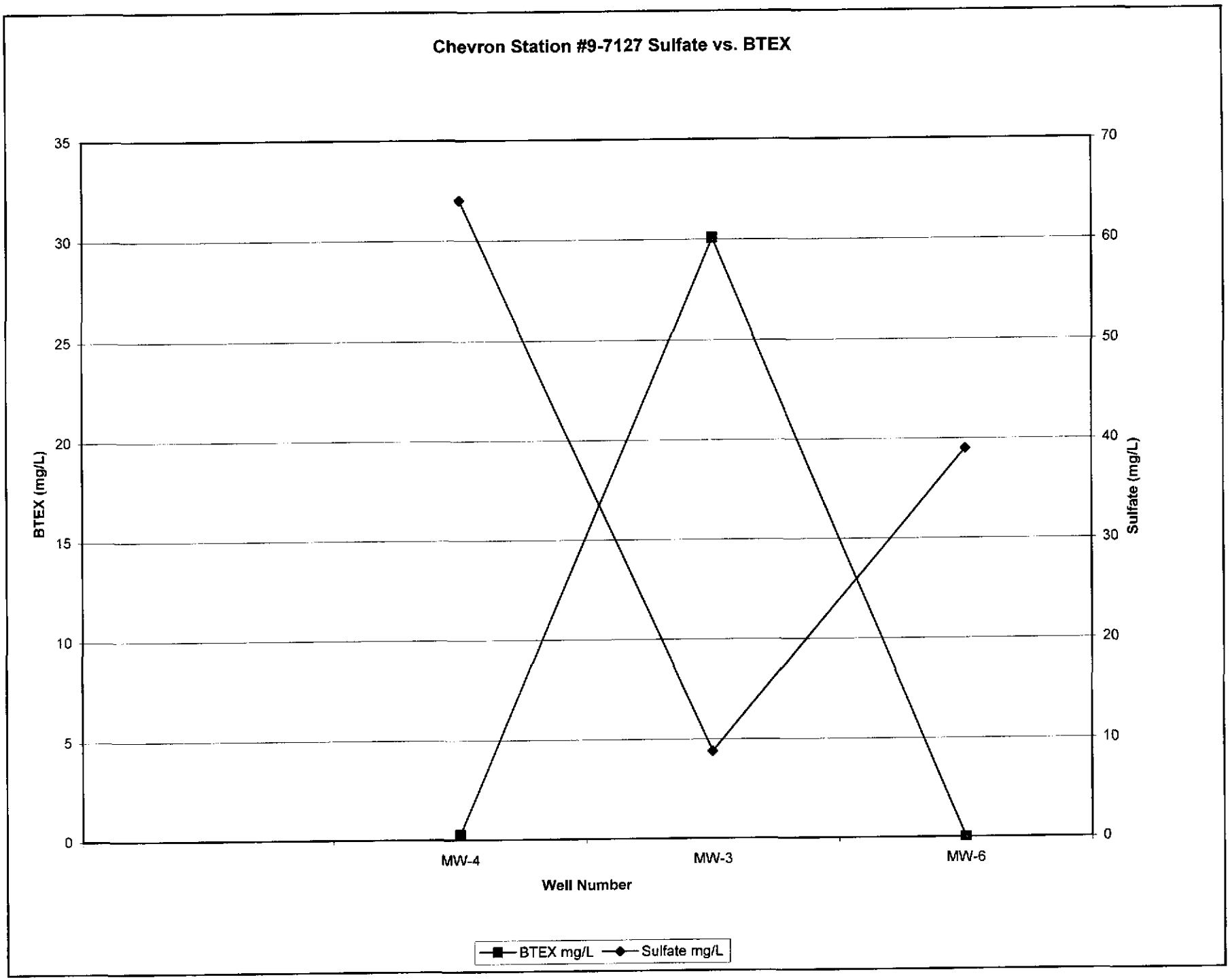
#9-7127 - 5/11/99 IB Parameter Plots

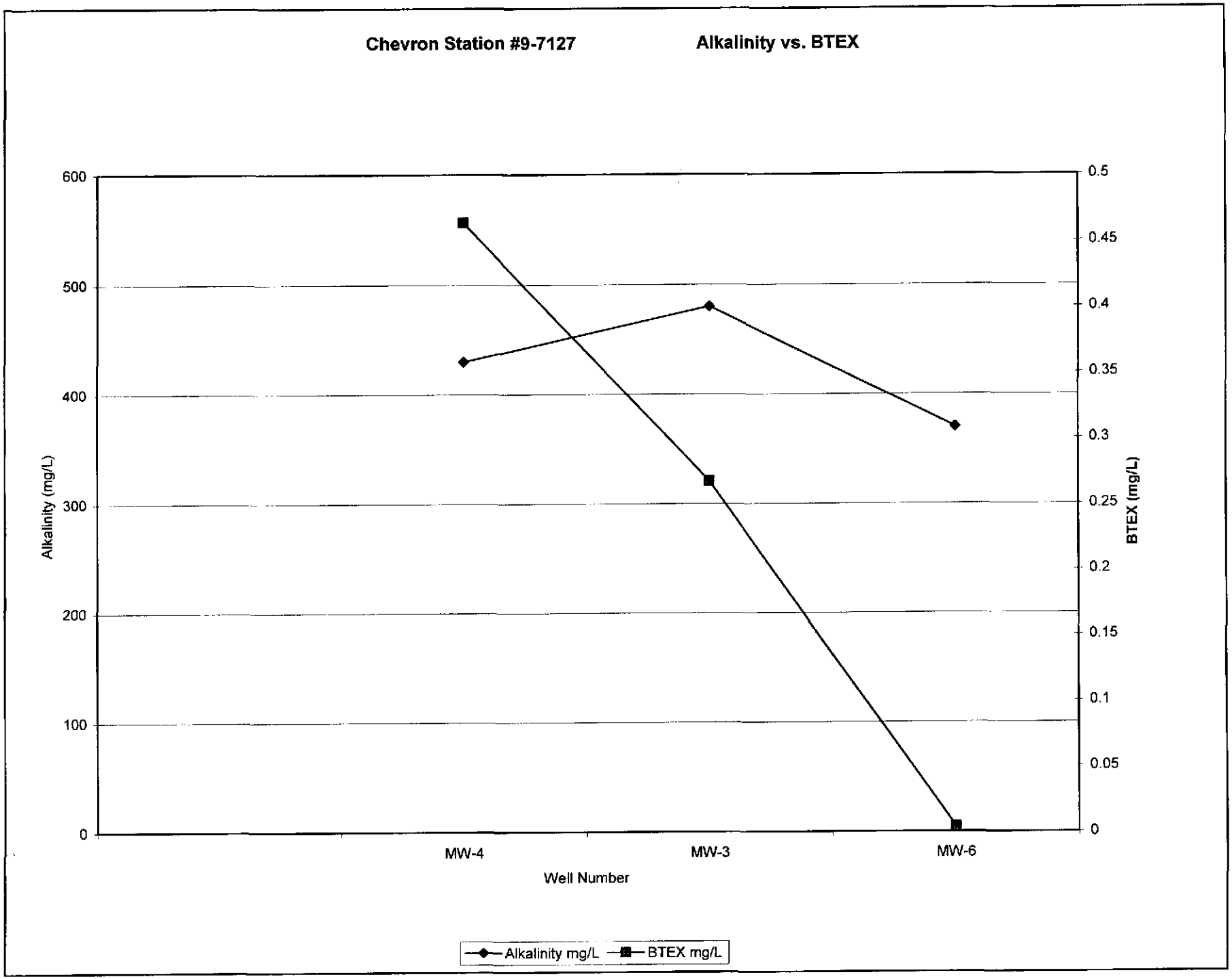
| Well | Alkalinity mg/L | Ferrous Iron mg/L | Nitrate mg/L | Sulfate mg/L | B mg/L | T mg/L | E mg/L | X mg/L | BTEX mg/L | DO | ORP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | | 1.5 | 1.7 | | | | | | | 1.5 | 26 |
| MW-2 | 290 | 0.043 | 62 | 59 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.002 | 2.3 | 91 |
| MW-3 | 480 | 1.5 | 1 | 8.8 | 18 | 7.8 | 0.67 | 3.6 | 30.07 | 1.5 | -19 |
| MW-4 | 430 | 0.027 | 86 | 64 | 0.26 | 0.0026 | 0.0005 | 0.0043 | 0.2674 | 1.8 | 124 |
| MW-5 | 330 | 0.01 | 62 | 100 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.002 | 4.6 | 140 |
| MW-6 | 370 | 0.064 | 52 | 39 | 0.0019 | 0.0005 | 0.0005 | 0.0005 | 0.0034 | 0.4 | 214 |
| MW-7 | 300 | 0.14 | 75 | 86 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.002 | 5.2 | 96 |
| MW-8 | 110 | 0.028 | 42 | 19 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.002 | 5.44 | 92 |


Chevron Station #9-7127 Dissolved Oxygen vs. BTEX
DO (mg/l)
BTEX (mg/l)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
35
30
25
20
15
10
5
0
MW-4
MW-3
MW-6
Well Number
DO
BTEX mg/l


Chevron Station #9-7127 ORP vs. BTEX
140
120
100
80
60
40
20
0
-20
-40
ORP (mg/l)
35
30
25
20
15
10
5
0
BTEX (mg/l)
MW-4
MW-3
MW-6
Well Number
ORP
BTEX mg/l


Chevron Station #9-7127 Nitrate vs. BTEX
Nitrate (mg/L)
BTEX (mg/L)
100
90
80
70
60
50
40
30
20
10
0
35
30
25
20
15
10
5
0
MW-4
MW-3
MW-6
Well Number
Nitrate mg/L
BTEX mg/L


Chevron Station #9-7127 Sulfate vs. BTEX
BTEX (mg/L)
Sulfate (mg/L)
0
5
10
15
20
25
30
35
0
10
20
30
40
50
60
70
MW-4
MW-3
MW-6
Well Number
BTEX mg/L
Sulfate mg/L


Chevron Station #9-7127
Alkalinity vs. BTEX
600
500
400
300
200
100
0
Alkalinity (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
BTEX (mg/L)
MW-4
MW-3
MW-6
Well Number
Alkalinity mg/L
BTEX mg/L

**Chevron Station #97127** **Ferrous Iron vs. BTEX**