APPENDIX 2.9(A)

# PRIVATE WELLS

**Sampling Periods and Number of Samples used in the Statistical Evaluation of Water Quality Data from Wells in the Crow Butte Commercial Study Area**

**Private Wells**

| Well ID# | Formation | Sampling Period | No. of Samples |
|---|---|---|---|
| 13 | Brule | 01/82 - 07/85 | 8 |
| 17 | Brule | 10/81 - 04/87 | 23 |
| 19 | Brule | 07/85 - 04/87 | 4 |
| 25 | Brule | 10/81 - 04/87 | 25 |
| 26 | Brule | 10/81 - 04/87 | 25 |
| 27 | Brule | 03/83 - 04/87 | 18 |
| 30 | Brule | 01/82 - 07/85 | 8 |
| 40 | Brule | 01/82 - 07/85 | 8 |
| 56 | Brule | 10/81 - 07/85 | 9 |
| 57 | Brule | 10/81 - 04/87 | 18 |
| 61 | Chadron | 10/81 - 07/85 | 12 |
| 62 | Chadron | 10/81 - 07/85 | 12 |
| 63 | Brule | 10/81 - 07/85 | 9 |
| 65 | Chadron | 10/81 - 07/85 | 11 |
| 66 | Brule | 10/81 - 07/85 | 14 |
| 74 | Brule | 10/81 - 07/85 | 11 |
| 88 | Brule | 01/82 - 07/85 | 8 |
| 95 | Brule | 01/81 - 07/85 | 8 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #13
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 4019.9 ft. MSL
Well Depth: N/A ft.
Distance from Wellfield: 8500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 67.4 | 76.8 | 72.275 | 2.715 |
| Magnesium | 9.1 | 10 | 9.525 | .287 |
| Sodium | 21 | 21 | 21 | 0 |
| Potassium | 4.7 | 5 | 4.843 | .127 |
| Carbonate | <2 | <2 | 2 | 0 |
| Bicarbonate | 300 | 318 | 309.614 | 5.866 |
| Sulfate | <5 | 13 | 9.513 | 2.59 |
| Chloride | 2 | 5.7 | 3.629 | 1.237 |
| Ammonia-N | <0.05 | 0.18 | .086 | .057 |
| Nitrite-N | 0.001 | <0.01 | 7E-03 | 4E-03 |
| Nitrate-N | 1.1 | 1.4 | 1.253 | .096 |
| Fluoride | 0.6 | 0.7 | .636 | .046 |
| Silica(as SiO2) | 41 | 63 | 57 | 8.155 |
| TDS-180°C | 308 | 370 | 342.625 | 21.639 |
| Conductivity (µmhos) | 463 | 520 | 484.875 | 18.427 |
| Alkalinity(as CaCO3) | 228.2 | 270 | 249.529 | 16 |
| pH (standard units) | 7.2 | 7.6 | 7.394 | .149 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 300 | 300 | 300 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 2 | 2 | 2 | 0 |
| Iron | 400 | 400 | 400 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | 2 | 2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 10 | 10 | 10 | 0 |
| Zinc | 440 | 440 | 440 | 0 |
| Uranium (as U) | 1 | 12 | 7.375 | 3.249 |
| Radium-226(pCi/l) | 0.1 | 0.2 | .133 | .052 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL •17
ample Type: PRIVATE WELL
ormation: BRULE

Surface Elevation: 3910 ft. MSL
Well Depth: 80.1 ft.
Distance from Wellfield: 3000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 57 | 63.2 | 59.182 | 1.622 |
| Magnesium | 7.1 | 9.1 | 7.948 | .477 |
| Sodium | 15.8 | 19 | 17.259 | .764 |
| Potassium | 3.6 | 5 | 4.427 | .403 |
| Carbonate | <1 | <2 | 1.5 | .527 |
| Bicarbonate | 224 | 257 | 240.741 | 7.672 |
| Sulfate | 8.6 | 13 | 11.024 | 1.016 |
| Chloride | 2 | 6 | 3.74 | .926 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 7E-03 | 4E-03 |
| itrate-N | 0.74 | 1.70 | 1.248 | .27 |
| luoride | 0.6 | 0.8 | .677 | .057 |
| Silica(as SiO2) | 54 | 62 | 58.874 | 2.446 |
| TDS-180•C | 246 | 330 | 287 | 21.711 |
| Conductivity (µmhos) | 387 | 445 | 408.455 | 14.651 |
| Alkalinity(as CaCO3) | 184 | 220 | 200.648 | 9.594 |
| H (standard units) | 7.22 | 8.22 | 7.675 | .32 |
| .on Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 6 | 4.071 | 1.141 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | 30 | 100 | 63.077 | 33.263 |
| admium | <1 | <1 | 1 | 0 |
| hromium | <5 | <5 | 5 | 0 |
| Cobalt | <1 | <50 | 18.667 | 27.209 |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <10 | <50 | 29.231 | 10.377 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 30 | 21.167 | 7.975 |
| Uranium (as U) | <1 | 11 | 3.696 | 3.037 |
| adium-226(pCi/l) | 0.1 | 0.7 | .269 | .195 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #19
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3890 ft. MSL
Well Depth: 80 ft.
Distance from Wellfield: 1000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 75.3 | 80.5 | 78 | 2.14 |
| Magnesium | 9.9 | 11.3 | 10.55 | .597 |
| Sodium | 9.3 | 12.3 | 11.2 | 1.332 |
| Potassium | 4.1 | 5.2 | 4.675 | .556 |
| Carbonate | | | | |
| Bicarbonate | 248 | 258.3 | 253.35 | 4.397 |
| Sulfate | 7.9 | 13.3 | 11.05 | 2.381 |
| Chloride | 6.5 | 6.5 | 6.5 | 0 |
| Ammonia-N | <0.05 | 0.07 | .057 | .012 |
| Nitrite-N | 0.003 | 0.012 | 7E-03 | 4E-03 |
| Nitrate-N | 9.73 | 10.7 | 10.233 | .415 |
| Fluoride | 0.60 | 0.64 | .62 | .016 |
| Silica(as SiO2) | 47.2 | 52.3 | 49.65 | 2.575 |
| TDS-180°C | 364 | 364 | 364 | 0 |
| Conductivity (µmhos) | 527 | 527 | 527 | 0 |
| Alkalinity(as CaCO3) | 204 | 211.7 | 207.7 | 3.393 |
| pH (standard units) | 7.38 | 8.14 | 7.725 | .349 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 3 | 4 | 3.5 | .577 |
| Barium | 260 | 300 | 275 | 19.149 |
| Boron | 30 | 30 | 30 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | 10 | 20 | 15 | 5.774 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | 8 | 6 | 1.414 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 180 | 530 | 347.5 | 154.137 |
| Uranium (as U) | 2 | 5 | 3.75 | 1.258 |
| Radium-226(pCi/l) | 0.2 | 1.7 | .875 | .624 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #25
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3904.7 ft. MSL
Well Depth: 75.1 ft.
Distance from Wellfield: 3000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 70 | 86.8 | 78.833 | 4.262 |
| Magnesium | 9.6 | 12.2 | 10.754 | .757 |
| Sodium | 11.4 | 16 | 13.321 | 1.076 |
| Potassium | 4.0 | 5.2 | 4.621 | .308 |
| Carbonate | <1 | <2 | 1.5 | .527 |
| Bicarbonate | 256 | 301 | 282.464 | 11.215 |
| Sulfate | 5 | <10 | 7.644 | 1.507 |
| Chloride | 3 | 12 | 7.416 | 2.42 |
| Ammonia-N | 0.05 | 0.05 | .05 | 0 |
| Nitrite-N | 0.001 | <0.01 | 6E-03 | 4E-03 |
| Nitrate-N | 2.3 | 11.3 | 7.26 | 2.759 |
| Fluoride | 0.6 | 0.72 | .663 | .041 |
| Silica(as SiO2) | 49.2 | 55.2 | 52.757 | 1.82 |
| TDS-180°C | 257 | 404 | 344.16 | 37.877 |
| Conductivity (µmhos) | 458 | 552 | 517.8 | 27.347 |
| Alkalinity(as CaCO3) | 210 | 255 | 232.265 | 10.465 |
| pH (standard units) | 7.03 | 8.24 | 7.596 | .331 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 8 | 5.563 | 1.672 |
| Barium | 30 | 340 | 259.375 | 101.158 |
| Boron | <10 | 140 | 58.571 | 40.923 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 5 | 5 | 5 | 0 |
| Cobalt | <1 | <10 | 5.25 | 3.686 |
| Copper | 10 | 10 | 10 | 0 |
| Iron | <10 | <50 | 27.857 | 9.75 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 5 | 5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | 10 | 10 | 10 | 0 |
| Zinc | 26 | 350 | 195.067 | 80.139 |
| Uranium (as U) | <1 | 10 | 4.292 | 2.662 |
| Radium-226(pCi/l) | 0.1 | 0.6 | .282 | .17 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: WELL #26
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3820.1 ft. MSL
Well Depth: 80.1 ft.
Distance from Wellfield: 3700 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 93 | 156.7 | 122.464 | 15.271 |
| Magnesium | 10 | 20 | 15.116 | 2.19 |
| Sodium | 12 | 17.5 | 15.25 | 1.45 |
| Potassium | 5.3 | 7.6 | 6.522 | .513 |
| Carbonate | <1 | <2 | 1.5 | .527 |
| Bicarbonate | 289.0 | 374 | 339.4 | 20.051 |
| Sulfate | 12 | 44 | 28.232 | 8.757 |
| Chloride | 13.2 | 45 | 30.605 | 7.694 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 6E-03 | 4E-03 |
| Nitrate-N | 9.3 | 35 | 16.658 | 6.945 |
| Fluoride | 0.4 | 0.8 | .622 | .087 |
| Silica(as SiO2) | 45.8 | 55 | 49.205 | 2.329 |
| TDS-180°C | 372 | 648 | 500.44 | 65.571 |
| Conductivity (µmhos) | 630 | 966 | 774.48 | 91.467 |
| Alkalinity(as CaCO3) | 256.3 | 316 | 282.178 | 16.795 |
| pH (standard units) | 6.8 | 8.14 | 7.587 | .355 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | 7 | 4.313 | 1.887 |
| Barium | <100 | 420 | 290 | 101.39 |
| Boron | 10 | 110 | 60.714 | 37.716 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | <1 | <50 | 18.667 | 27.209 |
| Copper | 7 | 30 | 14.188 | 8.28 |
| Iron | 10 | <50 | 30.667 | 10.998 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 20 | 54 | 37.267 | 11.087 |
| Uranium (as U) | <1 | 12 | 5.84 | 3.387 |
| Radium-226(pCi/l) | 0.02 | 1.5 | .48 | .427 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: WELL °27
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3850 ft. MSL
Well Depth: 80 ft.
Distance from Wellfield: 2500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 68.9 | 72.3 | 70.319 | 1.117 |
| Magnesium | 8.3 | 10 | 9.159 | .421 |
| Sodium | 14.4 | 19.5 | 16.582 | 1.377 |
| Potassium | 4.4 | 5.5 | 5.088 | .33 |
| Carbonate | <1 | <1 | 1 | 0 |
| icarbonate | 250 | 284 | 269.044 | 7.909 |
| ulfate | 15.0 | 18 | 16.494 | 1.184 |
| Chloride | 2.1 | 8 | 4.329 | 1.715 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 5E-03 | 4E-03 |
| Nitrate-N | 0.8 | 3.38 | 2.576 | .738 |
| luoride | 0.6 | 0.9 | .781 | .078 |
| ilica(as SiO2) | 47.9 | 59 | 54.159 | 2.635 |
| TDS-180°C | 276 | 364 | 319.667 | 20.954 |
| Conductivity (µmhos) | 445 | 502 | 471 | 16.62 |
| Alkalinity(as CaCO3) | 205 | 241 | 223.789 | 8.848 |
| pH (standard units) | 7.28 | 8.29 | 7.754 | .332 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| luminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | 6 | 4.308 | 1.494 |
| Barium | 170 | 200 | 182.727 | 11.909 |
| Boron | 40 | 150 | 84.615 | 30.718 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | <5 | <5 | 5 | 0 |
| Copper | <10 | <10 | 10 | 0 |
| Iron | 20 | 60 | 35.8 | 11.679 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | 10 | 10 | 10 | 0 |
| Zinc | 10 | 60 | 30.077 | 15.866 |
| Uranium (as U) | <1 | 14 | 4.667 | 3.929 |
| Radium-226(pCi/l) | 0.1 | 1.9 | .52 | .555 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #30
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3770 ft. MSL
Well Depth: 55 ft.
Distance from Wellfield: 13500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 55.6 | 62.0 | 58.229 | 2.137 |
| Magnesium | 4.6 | 6 | 5.275 | .465 |
| Sodium | 37.9 | 44 | 40.7 | 2.159 |
| Potassium | 14 | 16 | 14.625 | .713 |
| Carbonate | <1 | <2 | 1.667 | .516 |
| Bicarbonate | 243.5 | 291 | 261.986 | 15.507 |
| Sulfate | 25 | 34 | 29.271 | 2.901 |
| Chloride | 13 | 17.9 | 14.971 | 1.533 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | 0.01 | 8E-03 | 4E-03 |
| Nitrate-N | 3.4 | 3.7 | 3.568 | .119 |
| Fluoride | 0.5 | 0.61 | .541 | .052 |
| Silica(as SiO2) | 55 | 60.5 | 58.35 | 2.004 |
| TDS-180°C | 336 | 404 | 369.429 | 27.802 |
| Conductivity (µmhos) | 486 | 545 | 516.333 | 24.279 |
| Alkalinity(as CaCO3) | 199.6 | 250 | 219.65 | 17.949 |
| pH (standard units) | 7.3 | 8.22 | 7.605 | .334 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 300 | 300 | 300 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 4 | 4 | 4 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | 4 | 4 | 4 | 0 |
| Vanadium | 5 | 5 | 5 | 0 |
| Zinc | 82 | 82 | 82 | 0 |
| Uranium (as U) | 11 | 23 | 15.625 | 4.658 |
| Radium-226(pCi/l) | 0.2 | 0.9 | .538 | .226 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #40
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3750 ft. MSL
Well Depth: 60 ft.
Distance from Wellfield: 12500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 61 | 67.2 | 63.813 | 2.016 |
| Magnesium | 6.5 | 9 | 7.613 | .786 |
| Sodium | 17 | 17 | 17 | 0 |
| Potassium | 6.6 | 6.8 | 6.7 | .1 |
| Carbonate | <1 | <2 | 1.667 | .516 |
| Bicarbonate | 250 | 267 | 255.1 | 6.364 |
| Sulfate | 5 | 19 | 10.663 | 4.435 |
| Chloride | 3 | 6.7 | 4.3 | 1.365 |
| Ammonia-N | <0.05 | 0.06 | .053 | 5E-03 |
| Nitrite-N | 0.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | 2.1 | 3.51 | 2.578 | .594 |
| Fluoride | 0.4 | 0.5 | .475 | .046 |
| Silica(as SiO2) | 53 | 58.6 | 55.6 | 2.149 |
| TDS-180°C | 272 | 340 | 309.375 | 26.581 |
| Conductivity (µmhos) | 424 | 460 | 442.143 | 12.993 |
| Alkalinity(as CaCO3) | 200 | 231 | 213.1 | 10.347 |
| pH (standard units) | 7.3 | 8.15 | 7.67 | .319 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 4 | 4 | 4 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 9 | 9 | 9 | 0 |
| Zinc | 50 | 50 | 50 | 0 |
| Uranium (as U) | <1 | 7 | 4.625 | 2.2 |
| Radium-226(pCi/l) | <0.1 | 0.8 | .363 | .233 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: WELL #56
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3730 ft. MSL
Well Depth: 200 ft.
Distance from Wellfield: 22200 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 37 | 45.5 | 40.244 | 2.828 |
| Magnesium | 4.1 | 5.2 | 4.611 | .322 |
| Sodium | 210 | 240 | 224 | 10.863 |
| Potassium | 14 | 18 | 16.189 | 1.179 |
| Carbonate | <1 | <2 | 1.714 | .488 |
| Bicarbonate | 249.9 | 270 | 259.356 | 7.379 |
| Sulfate | 179 | 217 | 196.5 | 11.006 |
| Chloride | 120 | 150 | 135.378 | 8.376 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | 5.3 | 7.0 | 6.003 | .577 |
| Fluoride | 0.3 | 0.4 | .353 | .047 |
| Silica(as SiO2) | 68 | 81.1 | 74.111 | 3.679 |
| TDS-180°C | 790 | 886 | 838.333 | 30.274 |
| Conductivity (µmhos) | 1218 | 1340 | 1280.444 | 43.356 |
| Alkalinity(as CaCO3) | 200 | 224 | 213.4 | 8.823 |
| pH (standard units) | 7.5 | 8.16 | 7.787 | .219 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 8 | 8 | 8 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 700 | 700 | 700 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 5 | 5 | 5 | 0 |
| Iron | 150 | 150 | 150 | 0 |
| Lead | 5 | 5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 1.5 | 1.5 | 1.5 | 0 |
| Molybdenum | 6 | 6 | 6 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | 71 | 71 | 71 | 0 |
| Vanadium | 6 | 6 | 6 | 0 |
| Zinc | 560 | 560 | 560 | 0 |
| Uranium (as U) | 17 | 21 | 19.75 | 1.389 |
| Radium-226(pCi/l) | 0.1 | 0.4 | .225 | .116 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL °57
'ample Type: PRIVATE WELL
ormation: BRULE

Surface Elevation: 3800.1 ft. MSL
Well Depth: 24.9 ft.
Distance from Wellfield: 5700 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 61.6 | 68 | 64.535 | 1.86 |
| Magnesium | 6.7 | 9 | 7.656 | .573 |
| Sodium | 15.3 | 20.4 | 17.611 | 1.226 |
| Potassium | 5.4 | 6.6 | 6.087 | .305 |
| Carbonate | <1 | <2 | 1.444 | .527 |
| Bicarbonate | 249 | 268 | 257.671 | 5.547 |
| Sulfate | 5 | 12 | 9.235 | 1.928 |
| Chloride | <2 | 5.6 | 3.641 | 1.177 |
| Ammonia-N | 0.05 | 0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 6E-03 | 5E-03 |
| 'itrate-N | 1.71 | 6.09 | 3.003 | 1.327 |
| luoride | 0.5 | 0.63 | .567 | .044 |
| Silica(as SiO2) | 49.2 | 62 | 56.417 | 2.954 |
| TDS-180°C | 280 | 350 | 304.824 | 20.388 |
| Conductivitv (µmhos) | 404 | 490 | 439.5 | 25.661 |
| Alkalinity(as CaCO3) | 204 | 236 | 215.36 | 10.066 |
| H (standard units) | 7.2 | 8.28 | 7.646 | .366 |
| on Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <50 | 190 | 110 | 58.31 |
| Arsenic | 2 | 7 | 4.1 | 1.449 |
| Barium | 200 | 240 | 220 | 11.18 |
| Boron | 20 | <100 | 52.222 | 27.739 |
| admium | <1 | <1 | 1 | 0 |
| hromium | <5 | <5 | 5 | 0 |
| Cobalt | <1 | <50 | 18.667 | 27.209 |
| Copper | <10 | <10 | 10 | 0 |
| Iron | 10 | <50 | 31.2 | 13.863 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | 0.2 | 0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <2 | 1.2 | .422 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 30 | 140 | 68.556 | 34.479 |
| Uranium (as U) | <1 | 14 | 6.5 | 4.076 |
| adium-226(pCi/l) | 0.1 | 0.9 | .436 | .248 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #61
Sample Type: PRIVATE WELL
Formation: CHADRON

Surface Elevation: 3710 ft. MSL
Well Depth: 280 ft.
Distance from Wellfield: 20000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 12.6 | 16 | 14.4 | 1.03 |
| Magnesium | 2.7 | 3.6 | 3.091 | .247 |
| Sodium | 380 | 420 | 402.167 | 10.495 |
| Potassium | 8.9 | 9.5 | 9.25 | .193 |
| Carbonate | <1 | <2 | 1.625 | .518 |
| Bicarbonate | 365 | 410 | 388 | 11.066 |
| Sulfate | 340 | 409 | 381.083 | 19.538 |
| Chloride | 150 | 170 | 160.655 | 7.231 |
| Ammonia-N | 0.14 | 0.44 | .311 | .096 |
| Nitrite-N | <0.01 | <0.01 | .01 | 0 |
| Nitrate-N | <0.01 | <0.1 | .051 | .041 |
| Fluoride | 0.5 | 0.8 | .666 | .089 |
| Silica(as SiO2) | 7.9 | 13 | 10.142 | 1.264 |
| TDS-180°C | 1078 | 1240 | 1169.333 | 45.761 |
| Conductivity (µmhos) | 1740 | 2000 | 1863.818 | 84.053 |
| Alkalinity(as CaCO3) | 310 | 349 | 323.71 | 12.37 |
| pH (standard units) | 7.78 | 8.42 | 8.059 | .173 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <2 | <2 | 2 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 800 | 800 | 800 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 13 | 13 | 13 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 8 | 8 | 8 | 0 |
| Zinc | 8 | 8 | 8 | 0 |
| Uranium (as U) | <1 | <2 | 1.417 | .515 |
| Radium-226(pCi/l) | 1.9 | 4.8 | 3.283 | .849 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number:WELL °62
ample Type: PRIVATE WELL
ormation: CHADRON

Surface Elevation: 3780 ft. MSL
Well Depth: 469.8 ft.
Distance from Wellfield: 9700 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 12 | 18 | 15.1 | 1.553 |
| Magnesium | 2.5 | 4.3 | 3.408 | .446 |
| Sodium | 380 | 410 | 392.417 | 9.02 |
| Potassium | 6.0 | 14 | 9.975 | 1.907 |
| Carbonate | <1 | <2 | 1.667 | .5 |
| Bicarbonate | 380 | 445.5 | 400.017 | 20.189 |
| Sulfate | 328 | 370 | 348.727 | 12.586 |
| Chloride | 169.2 | 186 | 178.23 | 5.123 |
| Ammonia-N | 0.20 | 0.44 | .314 | .117 |
| Nitrite-N | <.001 | <0.01 | 9E-03 | 4E-03 |
| itrate-N | <0.01 | <0.1 | .049 | .036 |
| luoride | 0.4 | 0.9 | .635 | .122 |
| Silica(as SiO2) | 10 | 12 | 11.082 | .564 |
| TDS-180°C | 1050 | 1200 | 1143.333 | 51.22 |
| Conductivity (µmhos) | 1790 | 1950 | 1864.833 | 48.123 |
| Alkalinity(as CaCO3) | 313 | 365.2 | 333.73 | 16.418 |
| H (standard units) | 7.8 | 8.34 | 8.085 | .173 |
| ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 70 | 70 | 70 | 0 |
| Arsenic | <1 | <1 | 1 | 0 |
| Barium | 40 | 40 | 40 | 0 |
| Boron | 730 | 730 | 730 | 0 |
| admium | <0.1 | <0.1 | .1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | 30 | 30 | 30 | 0 |
| Lead | <1 | <1 | 1 | 0 |
| Manganese | 13 | 13 | 13 | 0 |
| Mercury | 0.3 | 0.3 | .3 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | 6 | 6 | 6 | 0 |
| Zinc | 110 | 110 | 110 | 0 |
| Uranium (as U) | 16 | 36 | 24.25 | 6.608 |
| adium-226(pCi/l) | 5.9 | 18 | 13.975 | 3.919 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #63
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3780 ft. MSL
Well Depth: N/A ft.
Distance from Wellfield: 10000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 60 | 69 | 65.1 | 3.118 |
| Magnesium | 6.2 | 8.7 | 7.411 | .777 |
| Sodium | 21.3 | 24 | 22.663 | .843 |
| Potassium | 7.6 | 8.7 | 8.4 | .384 |
| Carbonate | <1 | <2 | 1.714 | .488 |
| Bicarbonate | 262.8 | 281 | 275.244 | 6.535 |
| Sulfate | 7 | 15 | 10.656 | 2.446 |
| Chloride | 3.4 | 5.5 | 4.5 | .739 |
| Ammonia-N | 0.05 | 0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | 0.96 | 3.1 | 2.022 | .551 |
| Fluoride | 0.5 | 0.6 | .552 | .05 |
| Silica(as SiO2) | 54 | 60 | 57.267 | 2.306 |
| TDS-180°C | 295 | 390 | 333.667 | 30.116 |
| Conductivity (µmhos) | 439 | 499 | 469.667 | 18.682 |
| Alkalinity(as CaCO3) | 210.2 | 244 | 227.371 | 12.889 |
| pH (standard units) | 7.2 | 8.08 | 7.624 | .303 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 3 | 3 | 3 | 0 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 2 | 2 | 2 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 0.1 | 0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | 2 | 2 | 2 | 0 |
| Vanadium | 6 | 6 | 6 | 0 |
| Zinc | 54 | 54 | 54 | 0 |
| Uranium (as U) | 2 | 22 | 10.889 | 5.555 |
| Radium-226(pCi/l) | 0.2 | 0.8 | .444 | .219 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #65
Sample Type: PRIVATE WELL
Formation: CHADRON

Surface Elevation: 3710 ft. MSL
Well Depth: 260 ft.
Distance from Wellfield: 19100 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 11.7 | 14 | 12.85 | .81 |
| Magnesium | 1.6 | 2.2 | 1.827 | .167 |
| Sodium | 340 | 380 | 360.909 | 12.413 |
| Potassium | 5.4 | 6.7 | 6.06 | .386 |
| Carbonate | <1 | <2 | 1.556 | .527 |
| Bicarbonate | 391.3 | 420 | 405.673 | 9.13 |
| Sulfate | 255 | 290 | 270.091 | 10.251 |
| Chloride | 160 | 170.4 | 165.95 | 4.351 |
| Ammonia-N | 0.14 | 0.63 | .412 | .159 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | <0.01 | <0.1 | .049 | .042 |
| Fluoride | 0.5 | 0.9 | .688 | .11 |
| Silica(as SiO2) | 8 | 10 | 9.24 | .585 |
| TDS-180°C | 910 | 1100 | 1013.364 | 48.283 |
| Conductivity (µmhos) | 1550 | 1760 | 1666.909 | 72.322 |
| Alkalinity(as CaCO3) | 320.8 | 354 | 338.333 | 9.913 |
| pH (standard units) | 7.6 | 8.29 | 7.937 | .18 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | <2 | <2 | 2 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 600 | 600 | 600 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 0.4 | 0.4 | .4 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 5 | 5 | 5 | 0 |
| Zinc | 10 | 10 | 10 | 0 |
| Uranium (as U) | <1 | <2 | 1.5 | .527 |
| Radium-226(pCi/l) | 12.0 | 26.3 | 19.291 | 3.68 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #66
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3710 ft. MSL
Well Depth: 60 ft.
Distance from Wellfield: 15400 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 87 | 169.6 | 115.271 | 26.29 |
| Magnesium | 10 | 20 | 13.536 | 3.148 |
| Sodium | 52 | 74 | 59.271 | 8.131 |
| Potassium | 7.6 | 18 | 14.107 | 2.749 |
| Carbonate | <1 | <2 | 1.556 | .527 |
| Bicarbonate | 410 | 487 | 444.077 | 27.573 |
| Sulfate | 26 | 56 | 36.429 | 10.054 |
| Chloride | 2 | 52.4 | 26 | 13.553 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 7E-03 | 4E-03 |
| Nitrate-N | 4.1 | 49.3 | 16.683 | 15.382 |
| Fluoride | 0.5 | 0.7 | .595 | .056 |
| Silica(as SiO2) | 47.9 | 62 | 57.252 | 4.168 |
| TDS-180°C | 480 | 720 | 579.429 | 77.258 |
| Conductivity (µmhos) | 728 | 1220 | 881.929 | 173.228 |
| Alkalinity(as CaCO3) | 340 | 410 | 369.508 | 23.307 |
| pH (standard units) | 7.10 | 8.51 | 7.655 | .368 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 5 | 5 | 5 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 500 | 500 | 500 | 0 |
| Cadmium | 2 | 2 | 2 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 6 | 6 | 6 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | 20 | 20 | 20 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 0.9 | 0.9 | .9 | 0 |
| Molybdenum | 4 | 4 | 4 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 16 | 16 | 16 | 0 |
| Zinc | 5200 | 5200 | 5200 | 0 |
| Uranium (as U) | 23 | 33 | 29.2 | 3.225 |
| Radium-226(pCi/l) | 0.1 | 0.6 | .35 | .135 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL #74
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3630 ft. MSL
Well Depth: 60 ft.
Distance from Wellfield: 25000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 85 | 128.8 | 108.073 | 12.11 |
| Magnesium | 10.5 | 15 | 12.982 | 1.258 |
| Sodium | 110 | 130 | 121.545 | 5.355 |
| Potassium | 19 | 22 | 20.7 | .781 |
| Carbonate | <1 | <2 | 1.625 | .518 |
| Bicarbonate | 493 | 548 | 519.34 | 19.401 |
| Sulfate | 76 | 113 | 91.491 | 10.944 |
| Chloride | 32 | 110 | 75.936 | 21.424 |
| Ammonia-N | <0.05 | 0.25 | .121 | .082 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.14 | .069 | .055 |
| Fluoride | 0.48 | 0.7 | .554 | .077 |
| Silica(as SiO2) | 51 | 59.9 | 55.282 | 3.118 |
| TDS-180°C | 702 | 820 | 766.1 | 35.209 |
| Conductivity (µmhos) | 1050 | 1268 | 1139 | 78.961 |
| Alkalinity(as CaCO3) | 415 | 463 | 434.325 | 18.521 |
| pH (standard units) | 7.00 | 7.82 | 7.407 | .272 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 18 | 18 | 18 | 0 |
| Barium | 600 | 600 | 600 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 3 | 3 | 3 | 0 |
| Iron | 200 | 200 | 200 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 300 | 300 | 300 | 0 |
| Mercury | 0.1 | 0.1 | .1 | 0 |
| Molybdenum | 10 | 10 | 10 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | <1 | <1 | 1 | 0 |
| Zinc | 38 | 38 | 38 | 0 |
| Uranium (as U) | 7 | 14 | 10.333 | 2.872 |
| Radium-226(pCi/l) | 0.2 | 0.7 | .422 | .186 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELL •88
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3610 ft. MSL
Well Depth: 60 ft.
Distance from Wellfield: 28000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 61 | 89 | 74.9 | 9.659 |
| Magnesium | 8.6 | 12 | 9.957 | 1.134 |
| Sodium | 75 | 129 | 100.15 | 17.18 |
| Potassium | 11 | 21 | 16.237 | 3.116 |
| Carbonate | <1 | <2 | 1.667 | .516 |
| Bicarbonate | 330 | 435.7 | 389.1 | 32.42 |
| Sulfate | 22 | 190 | 112.875 | 47.634 |
| Chloride | 13 | 45.7 | 32.438 | 10.969 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | <0.01 | 3.25 | 1.964 | 1.042 |
| Fluoride | 0.6 | 0.8 | .693 | .058 |
| Silica(as SiO2) | 57 | 61 | 58.371 | 1.36 |
| TDS-180•C | 490 | 790 | 627.25 | 88.878 |
| Conductivity (µmhos) | 647 | 1101 | 895.125 | 147.563 |
| Alkalinity(as CaCO3) | 270 | 357.1 | 322.3 | 30.355 |
| pH (standard units) | 6.95 | 8.0 | 7.531 | .395 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 7 | 7 | 7 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 5 | 5 | 5 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 47 | 47 | 47 | 0 |
| Molybdenum | 2 | 2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | 5 | 5 | 5 | 0 |
| Vanadium | 4 | 4 | 4 | 0 |
| Zinc | 490 | 490 | 490 | 0 |
| Uranium (as U) | 9 | 26 | 17.125 | 5.915 |
| Radium-226(pCi/l) | 0.2 | 0.9 | .463 | .262 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: WELL •95
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3650 ft. MSL
Well Depth: 100 ft.
Distance from Wellfield: 30000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 78 | 110 | 89.237 | 11.003 |
| Magnesium | 5.5 | 8.3 | 6.612 | 1.092 |
| Sodium | 72 | 80 | 75.75 | 2.659 |
| Potassium | 22 | 27 | 24.313 | 1.434 |
| Carbonate | <1 | <2 | 1.667 | .516 |
| Bicarbonate | 290 | 335 | 311.438 | 13.978 |
| Sulfate | 79 | 200 | 123.325 | 39.328 |
| Chloride | 27.3 | 39.2 | 34.825 | 3.89 |
| Ammonia-N | <0.05 | 0.06 | .054 | 5E-03 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | 2.5 | 5.9 | 3.833 | 1.098 |
| Fluoride | 0.3 | 0.5 | .408 | .055 |
| Silica(as SiO2) | 55 | 60 | 57.925 | 1.469 |
| TDS-180•C | 540 | 680 | 591.25 | 53.033 |
| Conductivity (µmhos) | 775 | 933 | 843.938 | 51.236 |
| Alkalinity(as CaCO3) | 240 | 287 | 260.071 | 14.642 |
| pH (standard units) | 7.17 | 8.10 | 7.574 | .356 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 8 | 8 | 8 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 10 | 10 | 10 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | 35 | 35 | 35 | 0 |
| Molybdenum | 7 | 7 | 7 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | 4 | 4 | 4 | 0 |
| Vanadium | 7 | 7 | 7 | 0 |
| Zinc | 74 | 74 | 74 | 0 |
| Uranium (as U) | 18 | 31 | 23.125 | 4.121 |
| Radium-226(pCi/l) | 0.2 | 1.1 | .525 | .349 |

BASELINE WELLS
DRILLED BY FEN

## Sampling Periods and Number of Samples used in the Statistical Evaluation of Water Quality Data from Wells in the Crow Butte Commercial Study Area

### Baseline Wells Drilled by FEN

| Well No. | Formation | Sampling Period | No. of Samples |
|---|---|---|---|
| RA-1 | Brule | 07/82 - 10/85 | 12 |
| RA-2 | Brule | 07/82 - 10/85 | 13 |
| RB-1 | Brule | 07/82 - 10/85 | 13 |
| RB-3 | Brule | 07/82 - 10/85 | 11 |
| RC-1 | Chadron | 07/82 - 10/85 | 11 |
| RC-2 | Chadron | 07/82 - 10/85 | 13 |
| RC-3 | Chadron | 07/82 - 10/85 | 15 |
| RC-4 | Chadron | 07/82 - 10/85 | 12 |
| RC-5 | Chadron | 07/82 - 10/85 | 11 |
| RC-6 | Chadron | 07/82 - 10/85 | 7 |
| RC-7 | Chadron | 07/82 - 10/85 | 13 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: RA-1
Sample Type: REGIONAL BASELINE WELL
Formation: BRULE

Surface Elevation: 3667.3 ft. MSL
Well Depth: 40 ft.
Distance from Wellfield: 21700 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 61.5 | 98 | 77.358 | 12.138 |
| Magnesium | 9.1 | 16 | 12.267 | 1.966 |
| Sodium | 32.0 | 45 | 37.478 | 3.698 |
| Potassium | 8.3 | 11.4 | 9.7 | .819 |
| Carbonate | <1 | <2 | 1.5 | .548 |
| Bicarbonate | 314 | 449 | 364.091 | 48.72 |
| Sulfate | 9 | 23 | 14.9 | 4.169 |
| Chloride | 6 | 9.6 | 8.012 | 1.281 |
| Ammonia-N | <0.05 | 0.06 | .052 | 4E-03 |
| Nitrite-N | <.001 | <0.02 | .01 | 6E-03 |
| Nitrate-N | <0.01 | 0.12 | .058 | .048 |
| Fluoride | 0.8 | 1.33 | 1.022 | .179 |
| Silica(as SiO2) | 51.4 | 58 | 54.922 | 1.895 |
| TDS-180°C | 348 | 562 | 415.917 | 66.003 |
| Conductivity (µmhos) | 501 | 720 | 598 | 75.989 |
| Alkalinity(as CaCO3) | 259.6 | 379 | 309.15 | 41.705 |
| pH (standard units) | 6.8 | 8.5 | 7.528 | .446 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <25 | <100 | 85.302 | 30.994 |
| Arsenic | 7 | 16.33 | 10.859 | 2.81 |
| Barium | 100 | 400 | 252.361 | 95.171 |
| Boron | <1 | 700 | 291 | 248.417 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | 5 | 3.3 | 2.003 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | <10 | 6.5 | 3.722 |
| Iron | 20 | <50 | 39.2 | 11.821 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 325 | 840 | 510.727 | 162.372 |
| Mercury | <0.05 | <0.3 | .155 | .076 |
| Molybdenum | 0.38 | <10 | 5.738 | 3.914 |
| Nickel | <1 | 10.5 | 5.95 | 4.387 |
| Selenium | <1 | 11.3 | 3.936 | 4.21 |
| Vanadium | 1 | <10 | 5.75 | 4.559 |
| Zinc | 20 | 160 | 101.636 | 42.403 |
| Uranium (as U) | <1 | 9 | 4.889 | 3.18 |
| Radium-226(pCi/l) | 0.1 | 0.5 | .244 | .159 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: RA-2
Sample Type: REGIONAL BASELINE WELL
Formation: BRULE

Surface Elevation: 3744.9 ft. MSL
Well Depth: 40 ft.
Distance from Wellfield: 12200 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 64 | 75.5 | 70.415 | 3.384 |
| Magnesium | 6.4 | 11.5 | 9.062 | 1.182 |
| Sodium | 34 | 41 | 36.814 | 2.245 |
| Potassium | 10.3 | 11.8 | 11 | .413 |
| Carbonate | <1 | 14 | 4.429 | 5.318 |
| carbonate | 278 | 364 | 319.883 | 23.735 |
| ulfate | 11 | 20 | 15.992 | 3.059 |
| Chloride | 5 | 11 | 6.936 | 1.845 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 6E-03 | 5E-03 |
| Nitrate-N | 0.01 | 5.2 | 2.418 | 1.324 |
| uoride | 0.7 | 1.12 | .886 | .132 |
| ilica(as SiO2) | 49.43 | 60 | 55.103 | 2.703 |
| TDS-180°C | 335 | 394 | 373.455 | 17.478 |
| Conductivity (µmhos) | 480 | 614 | 544.769 | 33.028 |
| Alkalinity(as CaCO3) | 245.0 | 303 | 265.7 | 17.681 |
| pH (standard units) | 6.89 | 8.4 | 7.643 | .414 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| luminum | <100 | <100 | 100 | 0 |
| Arsenic | 5 | <10 | 7.749 | 1.854 |
| Barium | <100 | 300 | 198.525 | 84.303 |
| Boron | 10 | <1000 | 330 | 330.234 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 5.5 | 3.682 | 1.953 |
| Cobalt | <1 | <5 | 2.333 | 2.066 |
| Copper | <1 | <10 | 7.475 | 3.376 |
| Iron | 6 | 80 | 38 | 20.919 |
| Lead | <5 | <10 | 6 | 1.844 |
| Manganese | 1 | 160 | 41.5 | 56.539 |
| Mercury | <0.1 | 0.34 | .195 | .077 |
| Molybdenum | <2 | 14 | 8.5 | 3.629 |
| ickel | <1 | <10 | 6.545 | 4.083 |
| lenium | <1 | 3 | 1.6 | .699 |
| Vanadium | 10 | 12 | 10.444 | .882 |
| Zinc | 13 | 197 | 96.583 | 70.725 |
| Uranium (as U) | 5 | 21 | 14.455 | 4.824 |
| Radium-226(pCi/l) | 0.2 | 0.8 | .48 | .162 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number:RB-1
Sample Type: REGIONAL BASELINE WELL
Formation: BRULE

Surface Elevation: 3663.9 ft. MSL
Well Depth: 133 ft.
Distance from Wellfield: 20800 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 7.1 | 13 | 9.254 | 1.704 |
| Magnesium | 0.3 | 2 | .848 | .533 |
| Sodium | 310 | 340 | 325 | 10.04 |
| Potassium | 10.3 | 15.9 | 12.262 | 1.698 |
| Carbonate | <1 | <2 | 1.4 | .548 |
| Bicarbonate | 586.3 | 627 | 608.809 | 14.396 |
| Sulfate | 3 | <5 | 4.35 | .891 |
| Chloride | 160 | 192.0 | 172.6 | 9.424 |
| Ammonia-N | <0.05 | 0.26 | .179 | .077 |
| Nitrite-N | <.001 | <0.02 | .01 | 7E-03 |
| Nitrate-N | <0.01 | <0.1 | .042 | .038 |
| Fluoride | 0.51 | 0.68 | .606 | .05 |
| Silica(as SiO2) | 38.3 | 47 | 42.692 | 2.987 |
| TDS-180°C | 802 | 921 | 870.167 | 38.551 |
| Conductivity (µmhos) | 1318 | 1481 | 1440.5 | 54.093 |
| Alkalinity(as CaCO3) | 486.6 | 527 | 507.46 | 13.569 |
| pH (standard units) | 7.82 | 8.5 | 8.18 | .198 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 20.51 | <100 | 84.551 | 32.587 |
| Arsenic | 1 | 6 | 2.305 | 1.831 |
| Barium | <100 | 400 | 249.567 | 126.713 |
| Boron | 600 | 1600 | 890.833 | 360.012 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 10 | 4.409 | 2.518 |
| Cobalt | 0.59 | <5 | 1.949 | 1.889 |
| Copper | <1 | 18 | 8.018 | 5.068 |
| Iron | 20 | 73.5 | 42.125 | 16.215 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <2 | <100 | 36.833 | 46.684 |
| Mercury | <0.1 | <0.3 | .17 | .067 |
| Molybdenum | <2 | <10 | 6.4 | 3.893 |
| Nickel | <1 | 10 | 5.9 | 4.332 |
| Selenium | <1 | 14.3 | 4.323 | 4.482 |
| Vanadium | 1 | <10 | 7 | 3.775 |
| Zinc | 4 | 100 | 30.5 | 30.691 |
| Uranium (as U) | 1 | 2 | 1.222 | .441 |
| Radium-226(pCi/l) | 0.4 | 3.0 | 1.59 | .872 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: RB-3
Sample Type: REGIONAL BASELINE WELL
Formation: BRULE

Surface Elevation: 4040.2 ft. MSL
Well Depth: 142 ft.
Distance from Wellfield: 7500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 28.55 | 38 | 33.923 | 3.6 |
| Magnesium | 3.4 | 5.5 | 4.341 | .682 |
| Sodium | 12.0 | 24 | 16.841 | 4.164 |
| Potassium | 4.1 | 8.6 | 6.7 | 1.722 |
| Carbonate | <1 | <2 | 1.5 | .548 |
| Bicarbonate | 137 | 180 | 163.97 | 12.514 |
| Sulfate | 1 | 7 | 4.77 | 2.131 |
| Chloride | 1.6 | 6.2 | 3.31 | 1.597 |
| Ammonia-N | 0.04 | 0.06 | .05 | 5E-03 |
| Nitrite-N | <.001 | 0.48 | .093 | .191 |
| Nitrate-N | 0.4 | 0.55 | .483 | .042 |
| Fluoride | 0.3 | 0.42 | .357 | .049 |
| Silica(as SiO2) | 58.6 | 62 | 60.786 | 1.187 |
| TDS-180°C | 190 | 230 | 211.889 | 14.979 |
| Conductivity (µmhos) | 246 | 291 | 273.889 | 16.244 |
| Alkalinity(as CaCO3) | 130 | 150 | 139.175 | 7.45 |
| pH (standard units) | 7.6 | 8.3 | 7.918 | .262 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <25 | 200 | 113.716 | 55.161 |
| Arsenic | <1 | <5 | 2.583 | 1.331 |
| Barium | <100 | 230 | 185.322 | 47.885 |
| Boron | 20 | <1000 | 333 | 320.036 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | <5 | 3.278 | 1.889 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 11 | 7 | 4.346 |
| Iron | 5 | 70 | 38.25 | 19.15 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 2 | <100 | 33.9 | 45.657 |
| Mercury | <0.1 | <0.3 | .175 | .071 |
| Molybdenum | 0.04 | <10 | 6.227 | 4.078 |
| Nickel | <1 | <10 | 6.278 | 4.309 |
| Selenium | <1 | <2 | 1.429 | .535 |
| Vanadium | 6 | <10 | 8.833 | 1.835 |
| Zinc | 5 | 20 | 11 | 4.796 |
| Uranium (as U) | <1 | 11 | 5 | 3.162 |
| Radium-226(pCi/l) | 0.1 | 1.1 | .533 | .383 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number:RC-1
Sample Type: REGIONAL BASELINE WELL
Formation: CHADRON

Surface Elevation: 3646.7 ft. MSL
Well Depth: 374 ft.
Distance from Wellfield: 25200 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 20 | 22.3 | 21.5 | .718 |
| Magnesium | 2.1 | 3.1 | 2.669 | .307 |
| Sodium | 445 | 540 | 494.136 | 24.222 |
| Potassium | 15 | 19.8 | 16.955 | 1.681 |
| Carbonate | <1 | <2 | 1.4 | .548 |
| Bicarbonate | 350 | 396 | 374.689 | 12.354 |
| Sulfate | 450 | 620 | 574.636 | 61.282 |
| Chloride | 159 | 183.7 | 170.92 | 6.924 |
| Ammonia-N | 0.13 | 0.64 | .43 | .138 |
| Nitrite-N | <.001 | <0.02 | .01 | 6E-03 |
| Nitrate-N | <0.01 | <0.1 | .042 | .039 |
| Fluoride | 0.7 | 1.07 | .849 | .109 |
| Silica(as SiO2) | 9.8 | 12 | 10.85 | .852 |
| TDS-180°C | 1436 | 1534 | 1491 | 26.393 |
| Conductivity (µmhos) | 2180 | 2500 | 2316.909 | 99.723 |
| Alkalinity(as CaCO3) | 300 | 336 | 315.163 | 11.149 |
| pH (standard units) | 7.9 | 8.5 | 8.125 | .176 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <10 | 4.404 | 3.144 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 930 | 1300 | 1111 | 108.674 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 6.5 | 3.833 | 1.936 |
| Cobalt | <1 | 9.04 | 4.202 | 3.756 |
| Copper | <1 | <10 | 7.13 | 3.583 |
| Iron | 15 | <50 | 40.889 | 12.879 |
| Lead | <5 | 13 | 8.2 | 3.521 |
| Manganese | 7 | <100 | 37.3 | 43.328 |
| Mercury | <0.1 | <0.3 | .175 | .071 |
| Molybdenum | <2 | <10 | 6.429 | 3.645 |
| Nickel | <2 | <10 | 6.611 | 3.723 |
| Selenium | <1 | 47.8 | 11.176 | 17.778 |
| Vanadium | 1 | <10 | 6.857 | 4.1 |
| Zinc | <5 | 32 | 15.95 | 9.179 |
| Uranium (as U) | <1 | 4 | 2.222 | 1.302 |
| Radium-226(pCi/l) | 0.2 | 1.3 | .65 | .366 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: RC-2
Sample Type: REGIONAL BASELINE WELL
Formation: CHADRON

Surface Elevation: 3656.9 ft. MSL
Well Depth: 629 ft.
Distance from Wellfield: 26300 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 11 | 16.8 | 13.315 | 1.666 |
| Magnesium | 0.83 | 1.6 | 1.259 | .289 |
| Sodium | 473 | 495 | 485.091 | 6.564 |
| Potassium | 12 | 16.4 | 13.946 | 1.376 |
| Carbonate | <1 | 8 | 3.85 | 2.991 |
| icarbonate | 350 | 385 | 369.882 | 11.086 |
| ulfate | 515 | 610 | 574.909 | 30.247 |
| Chloride | 134 | 180 | 154.869 | 12.849 |
| Ammonia-N | 0.22 | 0.65 | .487 | .121 |
| Nitrite-N | <.001 | 0.03 | .01 | 9E-03 |
| Nitrate-N | <0.01 | 0.12 | .056 | .044 |
| luoride | 1.1 | 1.54 | 1.219 | .149 |
| ilica(as SiO2) | 10.7 | 14 | 12.211 | 1.104 |
| TDS-180°C | 1370 | 1498 | 1433.333 | 43.389 |
| Conductivity (µmhos) | 2039 | 2370 | 2194.417 | 98.678 |
| Alkalinity(as CaCO3) | 300 | 337 | 314.62 | 10.727 |
| pH (standard units) | 8.2 | 8.7 | 8.369 | .147 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <25 | <100 | 84.138 | 30.013 |
| Arsenic | <1 | 3 | 1.924 | .728 |
| Barium | 0.71 | 100 | 78.374 | 42.923 |
| Boron | 920 | 1670 | 1320.6 | 295.784 |
| Cadmium | <1 | <10 | 2.71 | 3.386 |
| Chromium | <1 | 6 | 3.889 | 1.965 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 4 | <10 | 7.29 | 2.913 |
| Iron | 10 | 70 | 42.1 | 16.789 |
| Lead | 5 | 5 | 5 | 0 |
| Manganese | 6 | <100 | 41.55 | 44.709 |
| Mercury | <0.05 | <0.3 | .161 | .078 |
| Molybdenum | <2 | <10 | 6.429 | 3.645 |
| Nickel | <1 | 20 | 7.833 | 6.548 |
| elenium | <1 | 62.5 | 13.301 | 22.87 |
| Vanadium | 2 | <10 | 7.571 | 3.552 |
| Zinc | <10 | <10 | 10 | 0 |
| Uranium (as U) | <1 | 5 | 2.667 | 1.658 |
| Radium-226(pCi/l) | 0.4 | 1.7 | .925 | .509 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: RC-3
Sample Type: REGIONAL BASELINE WELL
Formation: CHADRON

Surface Elevation: 3708.0 ft. MSL
Well Depth: 293 ft.
Distance from Wellfield: 15600 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 14.5 | 17.4 | 15.746 | .736 |
| Magnesium | 2.3 | 3 | 2.528 | .242 |
| Sodium | 350 | 390 | 374.357 | 11.077 |
| Potassium | 7.8 | 9.9 | 8.553 | .606 |
| Carbonate | <1 | 2.8 | 1.686 | .701 |
| Bicarbonate | 370 | 408 | 389.329 | 10.717 |
| Sulfate | 267 | 340 | 310.067 | 23.107 |
| Chloride | 160 | 182.3 | 171.554 | 6.41 |
| Ammonia-N | 0.23 | 0.56 | .351 | .094 |
| Nitrite-N | <.001 | <0.02 | 8E-03 | 7E-03 |
| Nitrate-N | <0.01 | <0.1 | .039 | .034 |
| Fluoride | 0.6 | 0.72 | .634 | .039 |
| Silica(as SiO2) | 6.8 | 13.89 | 10.048 | 1.735 |
| TDS-180°C | 1000 | 1121 | 1074.071 | 41.594 |
| Conductivity (µmhos) | 1660 | 1860 | 1768.214 | 68.27 |
| Alkalinity(as CaCO3) | 315.2 | 327 | 321 | 3.522 |
| pH (standard units) | 7.66 | 8.5 | 8.095 | .215 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 10.08 | <100 | 82.09 | 33.523 |
| Arsenic | <1 | 10 | 3.002 | 3.114 |
| Barium | 0.80 | 200 | 93.808 | 45.538 |
| Boron | 670 | 1100 | 905 | 103.385 |
| Cadmium | <1 | <2 | 1.182 | .405 |
| Chromium | 1 | 8.5 | 3.885 | 2.417 |
| Cobalt | 0.23 | <50 | 12.491 | 21.316 |
| Copper | <1 | <10 | 6.936 | 3.745 |
| Iron | 10 | 70 | 43.836 | 14.978 |
| Lead | <5 | 10.5 | 6.014 | 1.944 |
| Manganese | 2.3 | <100 | 32.607 | 44.279 |
| Mercury | <0.1 | <0.3 | .175 | .062 |
| Molybdenum | <2 | 20 | 8.583 | 6.445 |
| Nickel | <1 | 20 | 8.138 | 6.469 |
| Selenium | <1 | <2 | 1.364 | .505 |
| Vanadium | 1 | <100 | 22.417 | 36.388 |
| Zinc | <2 | 14 | 8.167 | 3.326 |
| Uranium (as U) | <1 | 6 | 2.583 | 1.881 |
| Radium-226(pCi/l) | 0.1 | 2.6 | 1.208 | .776 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number:RC-4
Sample Type: REGIONAL BASELINE WELL
ormation: CHADRON

Surface Elevation: 3746.2 ft. MSL
Well Depth: 400 ft.
Distance from Wellfield: 12000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 13.5 | 18 | 15.85 | 1.345 |
| Magnesium | 2.4 | 4.3 | 3.485 | .599 |
| Sodium | 368 | 400 | 381.909 | 9.137 |
| Potassium | 7.0 | 11.7 | 9.542 | 1.135 |
| Carbonate | <1 | 14 | 4.463 | 5.516 |
| Bicarbonate | 386 | 411 | 399.156 | 8.262 |
| Sulfate | 270 | 350 | 315.833 | 25.587 |
| Chloride | 152 | 192 | 169.767 | 10.544 |
| Ammonia-N | 0.09 | 0.46 | .309 | .101 |
| Nitrite-N | <.001 | 0.03 | .011 | 9E-03 |
| Nitrate-N | <0.01 | <0.1 | .058 | .038 |
| luoride | 0.5 | 0.92 | .679 | .135 |
| Silica(as SiO2) | 9.3 | 12 | 10.344 | .977 |
| TDS-180°C | 1036 | 1150 | 1099.333 | 35.377 |
| Conductivity (µmhos) | 1550 | 1920 | 1773.75 | 105.116 |
| Alkalinity(as CaCO3) | 316 | 332 | 326.422 | 5.473 |
| H (standard units) | 7.8 | 8.52 | 8.148 | .207 |
| on Balance | | | | |
| DS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <10 | 3.484 | 3.146 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 900 | 1020 | 953 | 45.473 |
| admium | <1 | 12 | 3.182 | 3.995 |
| hromium | 1 | 5 | 3.5 | 1.958 |
| Cobalt | <1 | 2.46 | 1.406 | .639 |
| Copper | <1 | <10 | 7.045 | 3.798 |
| Iron | 17 | 80 | 47.364 | 17.856 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 4.5 | <100 | 34.318 | 42.351 |
| Mercury | <0.1 | 0.3 | .178 | .067 |
| Molybdenum | 4.09 | 33 | 18.209 | 8.557 |
| Nickel | <2 | <10 | 6.75 | 4.091 |
| Selenium | <1 | 34.1 | 7.814 | 12.257 |
| Vanadium | 5 | <10 | 8.857 | 2.035 |
| Zinc | <10 | 110 | 37 | 38.938 |
| Uranium (as U) | 65 | 2400 | 627.8 | 873.641 |
| adium-226(pCi/l) | 193 | 619 | 366.04 | 119.684 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: RC-5
Sample Type: REGIONAL BASELINE WELL
Formation: CHADRON

Surface Elevation: 3903.4 ft. MSL
Well Depth: 646 ft.
Distance from Wellfield: 4000 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 15.8 | 20.9 | 18.3 | 1.446 |
| Magnesium | 2.1 | 3.2 | 2.845 | .406 |
| Sodium | 360 | 393 | 378.8 | 10.369 |
| Potassium | 10 | 11 | 10.456 | .448 |
| Carbonate | <1 | <2 | 1.4 | .548 |
| Bicarbonate | 350 | 380 | 366.222 | 10.923 |
| Sulfate | 289 | 370 | 340.182 | 25.187 |
| Chloride | 168.6 | 190 | 178.77 | 6.527 |
| Ammonia-N | 0.19 | 0.38 | .302 | .053 |
| Nitrite-N | <.001 | 0.03 | .013 | .011 |
| Nitrate-N | <0.01 | <0.1 | .047 | .042 |
| Fluoride | 0.5 | 0.72 | .62 | .068 |
| Silica(as SiO2) | 9.8 | 13 | 11.933 | 1.507 |
| TDS-180°C | 1063 | 1158 | 1115.5 | 27.375 |
| Conductivity (µmhos) | 1711 | 1950 | 1823.909 | 67.811 |
| Alkalinity(as CaCO3) | 290 | 321 | 306.122 | 8.317 |
| pH (standard units) | 7.98 | 8.4 | 8.143 | .158 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <25 | 200 | 111.768 | 51.143 |
| Arsenic | <1 | <10 | 3.983 | 3.364 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 800 | <1000 | 902.222 | 82.882 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 5 | 3.667 | 2 |
| Cobalt | <1 | <5 | 2.06 | 1.722 |
| Copper | <1 | <10 | 6.65 | 3.697 |
| Iron | 26 | 80 | 47.944 | 17.601 |
| Lead | <5 | 11 | 7.65 | 2.495 |
| Manganese | 5 | <100 | 34.45 | 45.261 |
| Mercury | <0.1 | <0.3 | .175 | .071 |
| Molybdenum | 0.83 | 10 | 7.104 | 3.443 |
| Nickel | <1 | 20 | 7.333 | 6.225 |
| Selenium | <1 | <2 | 1.429 | .535 |
| Vanadium | 1 | <10 | 7.143 | 4.018 |
| Zinc | 10 | 16 | 11.556 | 2.603 |
| Uranium (as U) | <1 | 3 | 1.625 | .916 |
| Radium-226(pCi/l) | 2.8 | 3.8 | 3.271 | .325 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: RC-6
Sample Type: REGIONAL BASELINE WELL
Formation: CHADRON

Surface Elevation: 3945.2 ft. MSL
Well Depth: 738 ft.
Distance from Wellfield: 3500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 30 | 41 | 36.414 | 3.643 |
| Magnesium | 5.1 | 7.2 | 6.329 | .697 |
| Sodium | 380 | 444 | 409.143 | 24.327 |
| Potassium | 13 | 18 | 15.643 | 1.978 |
| Carbonate | <1 | <2 | 1.5 | .577 |
| Bicarbonate | 310 | 340 | 326.667 | 11.361 |
| Sulfate | 418 | 470 | 442.333 | 19.325 |
| Chloride | 190 | 250 | 211.914 | 22.818 |
| Ammonia-N | 0.30 | 0.58 | .387 | .105 |
| Nitrite-N | <0.01 | <0.01 | .01 | 0 |
| Nitrate-N | 0.01 | <0.1 | .057 | .038 |
| Fluoride | 0.7 | 0.71 | .703 | 5E-03 |
| Silica(as SiO2) | 16 | 16 | 16 | 0 |
| TDS-180°C | 1174 | 1310 | 1251.571 | 58.172 |
| Conductivity (µmhos) | 1970 | 2032 | 1994.5 | 27.083 |
| Alkalinity(as CaCO3) | 250 | 285 | 272.6 | 13.74 |
| pH (standard units) | 7.6 | 8.4 | 8.036 | .265 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <25 | <100 | 81.453 | 31.233 |
| Arsenic | 5 | 13.44 | 8.288 | 3.577 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 700 | 1160 | 973.333 | 162.317 |
| Cadmium | 1 | 16.0 | 5.833 | 6.178 |
| Chromium | 1 | 6 | 3.4 | 2.302 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 2 | <10 | 4.917 | 3.584 |
| Iron | <50 | <50 | 50 | 1E-03 |
| Lead | <5 | 14.5 | 9.75 | 4.144 |
| Manganese | 8 | <100 | 57.167 | 47.288 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | 3.08 | 32 | 16.616 | 12.032 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | 53 | 17.613 | 21.932 |
| Vanadium | 2 | 8 | 5.333 | 3.055 |
| Zinc | 9 | 157 | 55 | 59.296 |
| Uranium (as U) | <1 | 6 | 2.6 | 2.074 |
| Radium-226(pCi/l) | 0.2 | 0.6 | .35 | .191 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: RC-7
Sample Type: REGIONAL BASELINE WELL
Formation: CHADRON

Surface Elevation: 4038.8 ft. MSL
Well Depth: 774 ft.
Distance from Wellfield: 7500 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 13 | 25 | 18.669 | 2.845 |
| Magnesium | 1.8 | 4 | 2.907 | .683 |
| Sodium | 340 | 363 | 350.917 | 6.037 |
| Potassium | 10.1 | 14 | 11.485 | 1.167 |
| Carbonate | <1 | 9 | 3.575 | 3.165 |
| Bicarbonate | 308 | 375 | 348.967 | 21.071 |
| Sulfate | 254 | 330 | 294.231 | 19.93 |
| Chloride | 160 | 180 | 170.692 | 5.774 |
| Ammonia-N | 0.03 | 0.46 | .265 | .164 |
| Nitrite-N | <.001 | <0.02 | 8E-03 | 6E-03 |
| Nitrate-N | 0.01 | 0.2 | .058 | .067 |
| Fluoride | 0.66 | 0.92 | .783 | .074 |
| Silica(as SiO2) | 11.7 | 16 | 14.028 | 1.323 |
| TDS-180°C | 958 | 1136 | 1042.231 | 48.999 |
| Conductivity (µmhos) | 1500 | 1800 | 1655.231 | 84.698 |
| Alkalinity(as CaCO3) | 267 | 315 | 295.255 | 12.725 |
| pH (standard units) | 7.77 | 8.5 | 8.155 | .215 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <10 | 3.612 | 3.189 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 800 | 1040 | 948 | 75.836 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 6 | 4.045 | 1.981 |
| Cobalt | <1 | <5 | 2.677 | 1.8 |
| Copper | <1 | <10 | 7.2 | 3.594 |
| Iron | <50 | 60 | 52.813 | 4.519 |
| Lead | <5 | 13 | 6.958 | 2.988 |
| Manganese | 4.5 | <100 | 30.375 | 42.022 |
| Mercury | <0.1 | 0.34 | .195 | .077 |
| Molybdenum | 3.98 | 22 | 15.089 | 6.583 |
| Nickel | <2 | 20 | 8.2 | 5.534 |
| Selenium | <1 | <2 | 1.444 | .527 |
| Vanadium | 2 | <10 | 7.444 | 3.321 |
| Zinc | 4 | 10 | 8.125 | 2.642 |
| Uranium (as U) | 1 | 6 | 2.4 | 1.713 |
| Radium-226(pCi/l) | 0.3 | 2.3 | 1.1 | .786 |

# PREOPERATIONAL AND OPERATIONAL WELL DATA

## Sampling Periods and Number of Samples used in the Statistical Evaluation of Water Quality Data from Wells in the Crow Butte Commercial Study Area

### Water Quality Wells Used for Preoperational and Operational Data Collection

| Well No. | Formation | Sampling Period | No. of Samples |
|---|---|---|---|
| OB-1(PT-4) | Chadron | 11/85 - 12/85 | 4 |
| OB-2(PT-6) | Chadron | 11/85 - 12/85 | 4 |
| W.F.Domestic | Brule | 07/86 - 04/87 | 7 |
| PT-2 | Chadron | 12/82 - 12/85 | 11 |
| 3 | Chadron | 11/85 - 12/85 | 4 |
| 5 | Chadron | 11/85 - 12/85 | 4 |
| 7 | Chadron | 12/82 - 12/85 | 11 |
| 8 | Chadron | 12/82 - 12/85 | 8 |
| 9 | Chadron | 12/82 - 04/84 | 7 |
| 21 | Chadron | 11/85 - 12/85 | 4 |
| 22 | Chadron | 11/85 - 12/85 | 4 |
| 23 | Chadron | 11/85 - 12/85 | 4 |
| 24 | Chadron | 11/85 - 12/85 | 4 |
| 25 | Chadron | 11/85 - 12/85 | 4 |
| PM-1 | Chadron | 12/82 - 04/87 | 12 |
| 2 | Chadron | 11/85 - 04/87 | 8 |
| 3 | Chadron | 11/85 - 04/87 | 8 |
| 4 | Chadron | 12/82 - 04/87 | 12 |
| 5 | Chadron | 11/85 - 04/87 | 8 |
| 6 | Brule | 12/82 - 04/87 | 15 |
| 7 | Brule | 01/83 - 04/87 | 16 |
| 8 | Chadron | 11/85 - 04/87 | 9 |
| 9 | Chadron | 11/85 - 04/87 | 9 |
| 10 | Chadron | 11/85 - 04/87 | 8 |
| 11 | Brule | 11/85 - 04/87 | 8 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: OB-1
Sample Type: OBSERVATION WELL
Formation: CHADRON

Surface Elevation: 3859.6 ft. MSL
Well Depth: 676 ft.
Distance from Wellfield: 45 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 10.5 | 14 | 12.425 | 1.464 |
| Magnesium | 2.9 | 3.2 | 3.033 | .153 |
| Sodium | 392 | 408 | 400.75 | 7.182 |
| Potassium | 12 | 12.7 | 12.25 | .311 |
| Carbonate | 8.9 | 8.9 | 8.9 | 0 |
| Bicarbonate | 315.2 | 359.2 | 337.75 | 18.005 |
| Sulfate | 338 | 348 | 342 | 5.292 |
| Chloride | 191 | 208 | 199.75 | 6.946 |
| Ammonia-N | 0.15 | 0.45 | .32 | .129 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | 0.02 | 0.08 | .05 | .024 |
| Fluoride | 0.65 | 0.76 | .703 | .048 |
| Silica(as SiO2) | 10.9 | 15.4 | 12.325 | 2.109 |
| TDS-180°C | 1086 | 1165 | 1121.25 | 33.12 |
| Conductivity (µmhos) | 1790 | 1837 | 1813.75 | 20.023 |
| Alkalinity(as CaCO3) | 273.6 | 310.0 | 294.2 | 15.369 |
| pH (standard units) | 8.52 | 8.52 | 8.52 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | <1 | 3 | 1.75 | .957 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 800 | 980 | 870 | 80.829 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 11 | 11 | 11 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 10 | 20 | 15 | 5.774 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | <10 | 10 | 0 |
| Uranium (as U) | 66 | 101 | 81 | 14.855 |
| Radium-226(pCi/l) | 17.8 | 33.1 | 27.7 | 6.786 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: OB-2
Sample Type: OBSERVATION WELL
Formation: CHADRON

Surface Elevation: 3863.3 ft. MSL
Well Depth: 677 ft.
Distance from Wellfield: 95 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 14.8 | 16 | 15.233 | .666 |
| Magnesium | 3.0 | 6 | 3.998 | 1.378 |
| Sodium | 385 | 412 | 396.25 | 11.442 |
| Potassium | 11 | 11.5 | 11.25 | .208 |
| Carbonate | 4.7 | 4.7 | 4.7 | 0 |
| Bicarbonate | 364 | 376.4 | 371.25 | 5.788 |
| Sulfate | 345 | 347 | 346 | 1 |
| Chloride | 185 | 185 | 185 | 0 |
| Ammonia-N | 0.17 | 0.45 | .305 | .115 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | <0.01 | <0.05 | .03 | .016 |
| Fluoride | 0.51 | 0.72 | .643 | .092 |
| Silica(as SiO2) | 10.0 | 13.5 | 12 | 1.472 |
| TDS-180°C | 1148 | 1182 | 1162 | 14.514 |
| Conductivity (µmhos) | 1780 | 1855 | 1827.25 | 35.141 |
| Alkalinity(as CaCO3) | 307.7 | 315 | 310.425 | 3.269 |
| pH (standard units) | 8.22 | 8.42 | 8.298 | .088 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | <1 | <1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 870 | 980 | 917.5 | 48.563 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | 50 | 37.5 | 9.574 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | 25 | 16.5 | 8.963 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 10 | 20 | 15 | 5.774 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 10 | 10 | 10 | 0 |
| Uranium (as U) | 54 | 93 | 69.5 | 16.823 |
| Radium-226(pCi/l) | 53 | 70.3 | 64.6 | 7.97 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WELLFIELD DOMESTIC
Sample Type: PRIVATE WELL
Formation: BRULE

Surface Elevation: 3865 ft. MSL
Well Depth: 60 ft.
Distance from Wellfield: 300 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 54.7 | 59.4 | 56.8 | 2.045 |
| Magnesium | 6.4 | 11 | 8.329 | 2.002 |
| Sodium | 9.4 | 14.7 | 12.286 | 1.786 |
| Potassium | 3.8 | 4.8 | 4.3 | .396 |
| Carbonate | | | | |
| Bicarbonate | 203 | 222 | 214.167 | 7.885 |
| Sulfate | 4.1 | 12.9 | 9.243 | 3.089 |
| Chloride | 0.81 | 14 | 5.387 | 5.259 |
| Ammonia-N | <0.05 | 0.57 | .184 | .213 |
| Nitrite-N | 0.001 | <0.01 | 5E-03 | 4E-03 |
| Nitrate-N | 3.83 | 4.80 | 4.383 | .409 |
| Fluoride | 0.33 | 0.51 | .44 | .071 |
| Silica(as SiO2) | 54.0 | 61.3 | 57.333 | 2.839 |
| TDS-180°C | 231 | 292 | 269.5 | 26.681 |
| Conductivity (µmhos) | 381 | 396 | 390 | 5.404 |
| Alkalinity(as CaCO3) | 166 | 185 | 176.167 | 7.36 |
| pH (standard units) | 7.70 | 8.18 | 7.901 | .189 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | 6 | 3.143 | 1.574 |
| Barium | <30 | 210 | 151.429 | 73.808 |
| Boron | 30 | 280 | 136.429 | 82.296 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | 20 | <30 | 27.143 | 4.88 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <10 | 6.429 | 2.44 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 29 | 134 | 71.143 | 46.535 |
| Uranium (as U) | 1 | 11 | 5.571 | 3.645 |
| Radium-226(pCi/l) | <0.1 | 2.3 | .943 | .757 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number:PT-2
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3864.9 ft. MSL
Well Depth: 665 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 7.6 | 15 | 10.155 | 2.305 |
| Magnesium | 2 | 3.6 | 2.61 | .549 |
| Sodium | 390 | 439 | 411.364 | 13.002 |
| Potassium | 13.1 | 18 | 16.21 | 1.598 |
| Carbonate | <1 | 14 | 5.37 | 4.456 |
| Bicarbonate | 337 | 386 | 360.2 | 16.285 |
| Sulfate | 329 | 370 | 350 | 11.216 |
| Chloride | 188 | 222 | 203.918 | 11.119 |
| Ammonia-N | 0.15 | 0.64 | .357 | .141 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.11 | .079 | .033 |
| Fluoride | 0.48 | 0.7 | .596 | .065 |
| Silica(as SiO2) | 10.1 | 16 | 13.441 | 1.9 |
| TDS-180°C | 1100 | 1220 | 1172.091 | 39.351 |
| Conductivity (µmhos) | 1675 | 2050 | 1857.818 | 128.236 |
| Alkalinity(as CaCO3) | 287 | 326 | 308.036 | 13.694 |
| pH (standard units) | 8.06 | 8.6 | 8.293 | .154 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <10 | 4.7 | 2.541 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 770 | 1130 | 927 | 103.607 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <5 | 4.111 | 1.764 |
| Cobalt | <1 | 9 | 5 | 2.309 |
| Copper | 3 | <10 | 8.556 | 2.877 |
| Iron | 20 | <50 | 35.5 | 11.045 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.1 | <0.3 | .2 | .067 |
| Molybdenum | <10 | 24 | 16.111 | 5.925 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | 10 | 10 | 10 | 0 |
| Zinc | <5 | 10 | 9 | 2 |
| Uranium (as U) | 230 | 933 | 479.182 | 206.083 |
| Radium-226(pCi/l) | 20.0 | 68.1 | 43.85 | 14.08 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PT-3
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3864 EST. ft. MS
Well Depth: 670 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 10.4 | 14 | 12.675 | 1.569 |
| Magnesium | 2.70 | 3.1 | 2.837 | .228 |
| Sodium | 361 | 385 | 376.25 | 10.874 |
| Potassium | 10.8 | 11.6 | 11.225 | .386 |
| Carbonate | 7.1 | 10.8 | 8.6 | 1.947 |
| icarbonate | 326.6 | 334.7 | 330.6 | 4.051 |
| Sulfate | 284 | 324 | 308 | 16.971 |
| Chloride | 189 | 191 | 190 | 1 |
| Ammonia-N | 0.14 | 0.51 | .32 | .154 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| 'itrate-N | 0.01 | <0.05 | .025 | .019 |
| luoride | 0.70 | 0.72 | .713 | .012 |
| Silica(as SiO2) | 12.5 | 13.87 | 12.968 | .625 |
| TDS-180°C | 1062 | 1110 | 1086 | 24.495 |
| Conductivity (µmhos) | 1660 | 1699 | 1681.5 | 16.135 |
| Alkalinity(as CaCO3) | 284.2 | 286.1 | 285.275 | .854 |
| pH (standard units) | 8.38 | 8.60 | 8.475 | .093 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| 'll values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | 1 | <10 | 5 | 3.742 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 820 | 910 | 877.5 | 40.311 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <10 | 6.75 | 2.363 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | 30 | 17.5 | 9.574 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | <10 | 10 | 0 |
| Uranium (as U) | 130 | 173 | 145.75 | 19.619 |
| Radium-226(pCi/l) | 46 | 67.2 | 56.925 | 9.458 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PT-5
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3862 EST. ft. MS
Well Depth: 670 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 5.7 | 10.8 | 8.225 | 2.301 |
| Magnesium | 1.4 | 3 | 2.345 | .68 |
| Sodium | 423 | 499 | 464.75 | 36.737 |
| Potassium | 14.1 | 17 | 15.425 | 1.261 |
| Carbonate | 9.4 | 24 | 17.4 | 7.048 |
| Bicarbonate | 268 | 334.8 | 305.025 | 30.203 |
| Sulfate | 341 | 348 | 344 | 3.606 |
| Chloride | 234 | 395 | 316.5 | 78.505 |
| Ammonia-N | 0.22 | 0.57 | .388 | .143 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | <0.01 | 0.07 | .04 | .026 |
| Fluoride | 0.64 | 0.70 | .667 | .031 |
| Silica(as SiO2) | 10.1 | 12.5 | 11.413 | 1.077 |
| TDS-180°C | 1172 | 1420 | 1301.5 | 121.099 |
| Conductivity (µmhos) | 1903 | 2400 | 2136 | 229.122 |
| Alkalinity(as CaCO3) | 260 | 303.0 | 279.125 | 20.845 |
| pH (standard units) | 8.36 | 8.72 | 8.535 | .147 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | <1 | <1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 720 | 1020 | 885 | 126.095 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <10 | 7 | 2.449 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 10 | 10 | 10 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 20 | 20 | 20 | 0 |
| Uranium (as U) | 79 | 100 | 87 | 9.487 |
| Radium-226(pCi/l) | 260 | 612 | 467.8 | 166.037 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PT-7
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3868.3 ft. MSL
Well Depth: 672 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 11.1 | 20 | 15.636 | 2.235 |
| Magnesium | 2.6 | 4.1 | 3.64 | .476 |
| Sodium | 390 | 419 | 403.4 | 9.18 |
| Potassium | 9.0 | 15 | 11.836 | 1.722 |
| Carbonate | <1 | 10 | 4.044 | 3.494 |
| icarbonate | 345 | 390 | 373 | 14.553 |
| Sulfate | 337 | 380 | 354 | 12.174 |
| Chloride | 166 | 194 | 182.145 | 8.822 |
| Ammonia-N | 0.08 | 0.52 | .323 | .135 |
| Nitrite-N | <0.01 | <0.01 | .01 | 0 |
| Nitrate-N | <0.01 | <0.1 | .068 | .041 |
| luoride | 0.5 | 0.7 | .626 | .058 |
| Silica(as SiO2) | 12.0 | 16 | 14.464 | 1.236 |
| TDS-180°C | 1078 | 1220 | 1144 | 41.96 |
| Conductivity (µmhos) | 1510 | 1960 | 1783 | 125.869 |
| Alkalinity(as CaCO3) | 291.0 | 337 | 315.891 | 12.936 |
| pH (standard units) | 8.1 | 8.4 | 8.275 | .117 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | <10 | 4.4 | 3.406 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 790 | 1100 | 938.889 | 104.217 |
| Cadmium | 0.4 | <10 | 2.74 | 3.831 |
| Chromium | <1 | <10 | 4.444 | 2.698 |
| Cobalt | <1 | 10 | 4.5 | 3.332 |
| Copper | 3 | <10 | 8 | 3.041 |
| Iron | 10 | <50 | 36 | 13.565 |
| Lead | <1 | <10 | 5.6 | 2.633 |
| Manganese | <5 | <100 | 25.9 | 39.094 |
| Mercury | <0.1 | <0.3 | .19 | .074 |
| Molybdenum | 10 | <100 | 33.5 | 35.419 |
| ickel | <2 | <50 | 16.4 | 18.007 |
| elenium | <1 | <10 | 3 | 3.712 |
| Vanadium | 4 | 20 | 10.625 | 4.984 |
| Zinc | <10 | 17 | 11.875 | 2.8 |
| Uranium (as U) | 64 | 314 | 150.3 | 85.791 |
| Radium-226(pCi/l) | 66 | 379 | 160.355 | 106.27 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: PT-8
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3870.0 ft. MSL
Well Depth: 674 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 8.4 | 20 | 14.8 | 3.257 |
| Magnesium | 1.24 | 3.6 | 2.765 | .767 |
| Sodium | 380 | 402 | 392.75 | 9.301 |
| Potassium | 11 | 13 | 12.243 | .716 |
| Carbonate | <1 | 15 | 7.775 | 6.365 |
| Bicarbonate | 332.8 | 379 | 358.1 | 14.167 |
| Sulfate | 334 | 360 | 347.25 | 7.978 |
| Chloride | 175.9 | 180 | 178 | 1.686 |
| Ammonia-N | 0.22 | 0.55 | .399 | .114 |
| Nitrite-N | 0.01 | 0.01 | .01 | 0 |
| Nitrate-N | <0.01 | 0.2 | .085 | .06 |
| Fluoride | 0.5 | 0.7 | .599 | .054 |
| Silica(as SiO2) | 14.4 | 19 | 16.525 | 1.585 |
| TDS-180°C | 1100 | 1190 | 1143.25 | 32.159 |
| Conductivity (µmhos) | 1510 | 1960 | 1787.25 | 143.394 |
| Alkalinity(as CaCO3) | 287.3 | 324 | 310.288 | 11.806 |
| pH (standard units) | 8.14 | 8.62 | 8.368 | .183 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | <10 | 4.571 | 2.878 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 800 | 1140 | 947.143 | 105.469 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <5 | 3.667 | 2.066 |
| Cobalt | <5 | <5 | 5 | 0 |
| Copper | 5 | <10 | 8.667 | 2.16 |
| Iron | 10 | <50 | 33 | 14.629 |
| Lead | <1 | <10 | 5.143 | 2.61 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.1 | <0.3 | .186 | .069 |
| Molybdenum | <10 | 30 | 18.5 | 7.583 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | 13 | 10.833 | 1.329 |
| Zinc | 5 | 27 | 13.143 | 7.581 |
| Uranium (as U) | 113 | 322 | 201.875 | 74.311 |
| Radium-226(pCi/l) | 73 | 151 | 104.6 | 27.02 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: PT-9
Sample Type: R&D BASELINE WELL
Formation: CHADRON

Surface Elevation: 3868.6 ft. MSL
Well Depth: 680.2 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 10 | 17 | 13 | 2.449 |
| Magnesium | 1.57 | 2.8 | 2.126 | .405 |
| Sodium | 390 | 420 | 407.714 | 11.572 |
| Potassium | 12 | 15 | 13.429 | 1.134 |
| Carbonate | <1 | 24 | 13.857 | 9.424 |
| icarbonate | 341 | 379 | 358 | 12.097 |
| Sulfate | 333 | 367 | 351.714 | 13.225 |
| Chloride | 180 | 196 | 186.6 | 5.693 |
| Ammonia-N | 0.18 | 0.82 | .443 | .211 |
| Nitrite-N | <0.01 | <0.01 | .01 | 0 |
| itrate-N | <0.01 | <0.1 | .074 | .044 |
| uoride | 0.6 | 0.7 | .656 | .052 |
| Silica(as SiO2) | 13 | 21 | 16.143 | 2.61 |
| TDS-180°C | 1134 | 1240 | 1176.286 | 35.293 |
| Conductivity (µmhos) | 1820 | 1990 | 1911.667 | 77.309 |
| Alkalinity(as CaCO3) | 310 | 336 | 323.857 | 8.474 |
| pH (standard units) | 8.29 | 8.82 | 8.604 | .198 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | <1 | 14 | 7 | 4.517 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | 700 | 1150 | 943.333 | 151.349 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <5 | 3.4 | 2.191 |
| Cobalt | <5 | <5 | 5 | 0 |
| Copper | 4 | 17 | 9.333 | 4.633 |
| Iron | 20 | 90 | 46.167 | 24.417 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <10 | 6.8 | 2.168 |
| Mercury | <0.1 | <0.3 | .2 | .089 |
| Molybdenum | <10 | <100 | 47.667 | 35.702 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | 30 | 30 | 30 | 0 |
| Zinc | <5 | <10 | 8.25 | 2.363 |
| Uranium (as U) | 229 | 441 | 304 | 82.15 |
| Radium-226(pCi/l) | 207 | 602 | 420.429 | 145.263 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: PT-21
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3885 EST. ft. MS
Well Depth: 685 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 15.6 | 16.4 | 16.025 | .33 |
| Magnesium | 3.49 | 5 | 3.993 | .694 |
| Sodium | 381 | 403 | 393 | 9.201 |
| Potassium | 10 | 13.5 | 11.2 | 1.606 |
| Carbonate | 2.4 | 10 | 5.7 | 3.897 |
| Bicarbonate | 351 | 369.7 | 363.325 | 8.598 |
| Sulfate | 343 | 352 | 348.333 | 4.726 |
| Chloride | 184 | 195 | 188.25 | 4.992 |
| Ammonia-N | 0.19 | 0.40 | .285 | .087 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | 0.02 | <0.05 | .03 | .014 |
| Fluoride | 0.62 | 0.85 | .703 | .104 |
| Silica(as SiO2) | 12.0 | 14.0 | 12.85 | .85 |
| TDS-180°C | 1148 | 1178 | 1164.5 | 13.304 |
| Conductivity (µmhos) | 1767 | 1786 | 1777.25 | 10.178 |
| Alkalinity(as CaCO3) | 303.0 | 306.2 | 305.1 | 1.51 |
| pH (standard units) | 8.29 | 8.36 | 8.323 | .033 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | <1 | <5 | 2.25 | 1.893 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 900 | 1100 | 972.5 | 87.702 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | 7 | 6 | .816 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 20 | 20 | 20 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | <10 | 10 | 0 |
| Uranium (as U) | 129 | 134 | 131.25 | 2.217 |
| Radium-226(pCi/l) | 1315 | 1541 | 1436.75 | 109.217 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PT-22
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3885 EST. ft. MS
Well Depth: 681 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 15.6 | 16 | 15.833 | .208 |
| Magnesium | 3.36 | 3.5 | 3.423 | .071 |
| Sodium | 381 | 396 | 389.5 | 6.856 |
| Potassium | 10 | 11.1 | 10.433 | .586 |
| Carbonate | 0.9 | 14 | 6.067 | 6.974 |
| icarbonate | 367.8 | 374.5 | 371.767 | 3.516 |
| Sulfate | 304 | 356 | 336.5 | 23.685 |
| Chloride | 176 | 186 | 181.25 | 4.272 |
| Ammonia-N | 0.20 | 0.45 | .338 | .103 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| itrate-N | <0.01 | 0.06 | .033 | .026 |
| uoride | 0.65 | 0.74 | .688 | .045 |
| Silica(as SiO2) | 10.9 | 13.7 | 12.525 | 1.179 |
| TDS-180°C | 1120 | 1120 | 1120 | 0 |
| Conductivity (µmhos) | 1710 | 1786 | 1750.75 | 33.079 |
| Alkalinity(as CaCO3) | 296 | 306.9 | 302.875 | 4.943 |
| pH (standard units) | 8.22 | 8.40 | 8.315 | .075 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | <1 | <5 | 2.5 | 1.915 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 900 | 950 | 930 | 26.458 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | 13 | 7.75 | 3.594 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 20 | 20 | 20 | 0 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 20 | 15 | 5.774 |
| Uranium (as U) | 61 | 88 | 72.25 | 11.442 |
| Radium-226(pCi/l) | 674 | 1124 | 955.5 | 204.344 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PT-23
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3886 EST. ft. MS
Well Depth: 685 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 14.4 | 15.7 | 15.175 | .602 |
| Magnesium | 3.22 | 5 | 3.945 | .826 |
| Sodium | 383 | 410 | 392.75 | 11.843 |
| Potassium | 10 | 10.8 | 10.5 | .383 |
| Carbonate | 0.9 | 0.9 | .9 | 0 |
| Bicarbonate | 371.6 | 371.6 | 371.6 | 0 |
| Sulfate | 328 | 346 | 339.25 | 7.89 |
| Chloride | 181 | 187 | 184.75 | 2.63 |
| Ammonia-N | 0.35 | 0.38 | .363 | .015 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | <0.01 | 0.21 | .085 | .087 |
| Fluoride | 0.57 | 0.72 | .648 | .062 |
| Silica(as SiO2) | 10.9 | 14.2 | 12.65 | 1.358 |
| TDS-180°C | 1106 | 1144 | 1122 | 15.916 |
| Conductivity (µmhos) | 1730 | 1807 | 1766.25 | 32.796 |
| Alkalinity(as CaCO3) | 304.6 | 304.6 | 304.6 | 0 |
| pH (standard units) | 8.21 | 8.34 | 8.288 | .055 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | 1 | 1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 900 | 1090 | 967.5 | 83.815 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | 30 | 30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 6 | 6 | 6 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 20 | 20 | 20 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 10 | 10 | 10 | 0 |
| Uranium (as U) | 71 | 99 | 82.75 | 11.899 |
| Radium-226(pCi/l) | 23 | 45.7 | 35.825 | 10.113 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number:PT-24
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3881 EST. ft. MS
Well Depth: 670 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 10.4 | 13.9 | 12.45 | 1.484 |
| Magnesium | 3.12 | 5 | 3.81 | .866 |
| Sodium | 416 | 426 | 421 | 5 |
| Potassium | 11.9 | 13.4 | 12.925 | .709 |
| Carbonate | 3.3 | 16.7 | 8.45 | 6.288 |
| Bicarbonate | 342 | 358.2 | 349.85 | 6.904 |
| Sulfate | 300 | 350 | 327.25 | 23.343 |
| Chloride | 231 | 245 | 239 | 7.211 |
| Ammonia-N | 0.17 | 0.40 | .328 | .109 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | <0.01 | 0.13 | .06 | .05 |
| Fluoride | 0.66 | 0.74 | .695 | .041 |
| Silica(as SiO2) | 11.4 | 14.2 | 12.75 | 1.156 |
| TDS-180°C | 1206 | 1270 | 1232.5 | 27.875 |
| Conductivity (µmhos) | 1879 | 1951 | 1912.75 | 29.511 |
| Alkalinity(as CaCO3) | 294.0 | 312.4 | 300.8 | 8.088 |
| pH (standard units) | 8.26 | 8.42 | 8.36 | .069 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | 1 | <5 | 2.25 | 1.893 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 890 | 1070 | 955 | 79.373 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 20 | 20 | 20 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 10 | 10 | 10 | 0 |
| Uranium (as U) | 51 | 64 | 56.75 | 5.909 |
| Radium-226(pCi/l) | 1298 | 1426 | 1346.5 | 55.961 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: PT-25
Sample Type: INJECTION/RECOVERY WELL
Formation: CHADRON

Surface Elevation: 3886 EST. ft. MS
Well Depth: 678 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 10.9 | 14 | 12.8 | 1.334 |
| Magnesium | 2.45 | 2.78 | 2.643 | .172 |
| Sodium | 389 | 392 | 390.333 | 1.528 |
| Potassium | 11 | 15.4 | 12.425 | 2.04 |
| Carbonate | 6.6 | 24 | 13.175 | 7.635 |
| Bicarbonate | 317 | 348.6 | 334.275 | 14.615 |
| Sulfate | 300 | 350 | 330.25 | 22.157 |
| Chloride | 191 | 211 | 199.5 | 8.505 |
| Ammonia-N | 0.21 | 0.36 | .298 | .065 |
| Nitrite-N | <.001 | <.001 | 1E-03 | 0 |
| Nitrate-N | 0.03 | 0.08 | .048 | .024 |
| Fluoride | 0.68 | 0.85 | .743 | .076 |
| Silica(as SiO2) | 12.5 | 14.8 | 13.375 | 1.005 |
| TDS-180°C | 1124 | 1164 | 1142 | 16.573 |
| Conductivity (µmhos) | 1770 | 1821 | 1794.75 | 21.407 |
| Alkalinity(as CaCO3) | 289.7 | 300 | 295.975 | 4.413 |
| pH (standard units) | 8.38 | 8.64 | 8.52 | .11 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | | | | |
| Arsenic | <1 | <5 | 2.25 | 1.893 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 940 | 940 | 940 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 20 | 20 | 20 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | <10 | 10 | 0 |
| Uranium (as U) | 183 | 245 | 208 | 27.043 |
| Radium-226(pCi/l) | 338 | 380 | 357.65 | 18.329 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-1
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3877.1 ft. MSL
Well Depth: 674 ft.
Distance from Wellfield: 220 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD:DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 11 | 17 | 14.117 | 2.081 |
| Magnesium | 1.9 | 4.1 | 2.998 | .734 |
| Sodium | 387 | 440 | 408.25 | 15.978 |
| Potassium | 9.6 | 18 | 13.858 | 3.171 |
| Carbonate | <1 | 13 | 7.056 | 5.105 |
| .carbonate | 357 | 387 | 370.836 | 9.209 |
| Sulfate | 330 | 380 | 357.333 | 14.259 |
| Chloride | 173 | 215.1 | 192.15 | 13.722 |
| Ammonia-N | 0.10 | 0.71 | .353 | .165 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 3E-03 |
| Nitrate-N | <0.01 | <0.1 | .049 | .045 |
| uoride | 0.48 | 0.8 | .611 | .093 |
| Silica(as SiO2) | 12.1 | 16.5 | 14.175 | 1.284 |
| TDS-180°C | 1134 | 1260 | 1189.5 | 36.401 |
| Conductivity (µmhos) | 1825 | 2040 | 1906.667 | 69.58 |
| Alkalinity(as CaCO3) | 285 | 342 | 315.192 | 19.187 |
| pH (standard units) | 8.15 | 8.7 | 8.358 | .173 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | <5 | 2.2 | 1.751 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 800 | 1060 | 947.273 | 81.128 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <5 | 4.2 | 1.687 |
| Cobalt | <5 | <5 | 5 | 0 |
| Copper | 5 | <10 | 9.091 | 2.023 |
| Iron | 20 | <50 | 33 | 9.487 |
| Lead | <1 | <10 | 5.455 | 2.339 |
| Manganese | 4 | <10 | 6.6 | 1.838 |
| Mercury | <0.1 | <0.3 | .2 | .063 |
| Molybdenum | <10 | 24 | 17.4 | 5.254 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <5 | 200 | 66.091 | 79.386 |
| Uranium (as U) | 20 | 106 | 54 | 25.042 |
| Radium-226(pCi/l) | 40 | 163.5 | 95.15 | 51.637 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-2
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3883.1 ft. MSL
Well Depth: 685 ft.
Distance from Wellfield: 190 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 17.1 | 19 | 17.829 | .65 |
| Magnesium | 3.6 | 6 | 4.529 | .736 |
| Sodium | 382 | 408 | 394.25 | 7.888 |
| Potassium | 9.7 | 13.4 | 11.513 | 1.164 |
| Carbonate | 3.7 | 3.7 | 3.7 | 0 |
| Bicarbonate | 338 | 372 | 361.413 | 12.213 |
| Sulfate | 335 | 374 | 352.143 | 15.378 |
| Chloride | 177 | 212 | 193.125 | 11.618 |
| Ammonia-N | 0.13 | 0.42 | .325 | .101 |
| Nitrite-N | <.001 | 0.01 | 4E-03 | 4E-03 |
| Nitrate-N | 0.01 | <0.05 | .021 | .016 |
| Fluoride | 0.57 | 0.72 | .673 | .051 |
| Silica(as SiO2) | 8.9 | 13.5 | 11.738 | 1.434 |
| TDS-180°C | 1136 | 1201 | 1162.875 | 21.788 |
| Conductivity (µmhos) | 1835 | 1894 | 1864.143 | 21.698 |
| Alkalinity(as CaCO3) | 283 | 305 | 298.45 | 8.186 |
| pH (standard units) | 8.06 | 8.37 | 8.196 | .102 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 880 | 980 | 910 | 35.051 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | 10 | 7.75 | 1.389 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | 20 | 16 | 5.014 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | 1 | 1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 10 | 240 | 111.25 | 109.21 |
| Uranium (as U) | 6 | 44 | 27.625 | 13.783 |
| Radium-226(pCi/l) | 3.5 | 5.3 | 4.114 | .679 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-3
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3863.7 ft. MSL
Well Depth: 664 ft.
Distance from Wellfield: 165 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 8.1 | 18.0 | 13.15 | 3.31 |
| Magnesium | 2.6 | 4.5 | 3.526 | .68 |
| Sodium | 387 | 481 | 428.125 | 35.555 |
| Potassium | 10.4 | 17.3 | 13.85 | 2.78 |
| Carbonate | 4.0 | 29 | 13.08 | 9.829 |
| Bicarbonate | 293 | 359 | 337.563 | 21.932 |
| Sulfate | 338 | 359 | 348.286 | 8.015 |
| Chloride | 180 | 335 | 246.125 | 57.432 |
| Ammonia-N | 0.14 | 0.45 | .343 | .1 |
| Nitrite-N | <.001 | <0.01 | 4E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.06 | .021 | .021 |
| Fluoride | 0.66 | 0.74 | .692 | .03 |
| Silica(as SiO2) | 10.9 | 12.8 | 11.778 | .69 |
| TDS-180°C | 1126 | 1322 | 1233.125 | 75.38 |
| Conductivity (µmhos) | 1866 | 2100 | 1960.75 | 96.368 |
| Alkalinity(as CaCO3) | 285 | 294 | 290.438 | 2.809 |
| pH (standard units) | 8.18 | 8.76 | 8.4 | .202 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | 4 | 1.857 | 1.215 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 880 | 960 | 912.857 | 24.976 |
| Cadmium | 1 | 1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | 20 | 15.875 | 4.97 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 70 | 39.5 | 25.45 |
| Uranium (as U) | 13 | 58 | 36.5 | 13.416 |
| Radium-226(pCi/l) | 5.0 | 23.0 | 14.913 | 6.809 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-4
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3862.5 ft. MSL
Well Depth: 674 ft.
Distance from Wellfield: 300 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 12.1 | 16.6 | 14.75 | 1.291 |
| Magnesium | 2.85 | 4.0 | 3.288 | .326 |
| Sodium | 390 | 410 | 399.917 | 7.879 |
| Potassium | 9.2 | 14 | 11.233 | 1.354 |
| Carbonate | <1 | <1 | 1 | 0 |
| Bicarbonate | 338 | 399 | 371.825 | 16.893 |
| Sulfate | 333 | 370 | 354.417 | 11.188 |
| Chloride | 170 | 196 | 182.35 | 7.945 |
| Ammonia-N | 0.06 | 0.49 | .367 | .137 |
| Nitrite-N | <.001 | <0.01 | 8E-03 | 3E-03 |
| Nitrate-N | <0.01 | <0.1 | .048 | .046 |
| Fluoride | 0.5 | 0.72 | .645 | .07 |
| Silica(as SiO2) | 11.0 | 18 | 14.508 | 2.162 |
| TDS-180°C | 1100 | 1250 | 1153.5 | 46.643 |
| Conductivity (µmhos) | 1790 | 1980 | 1866.909 | 60.688 |
| Alkalinity(as CaCO3) | 284 | 337 | 311.533 | 15.739 |
| pH (standard units) | 8.05 | 8.6 | 8.227 | .164 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | <5 | 2.2 | 1.751 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 870 | 1050 | 971 | 61.364 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <5 | 4.2 | 1.687 |
| Cobalt | <5 | <5 | 5 | 0 |
| Copper | 4 | <10 | 8.909 | 2.427 |
| Iron | 30 | <50 | 34.909 | 8.549 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 5 | 14 | 10 | 2.494 |
| Mercury | <0.1 | <0.3 | .209 | .07 |
| Molybdenum | <10 | 23 | 18 | 4.546 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <2 | 1.222 | .441 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 5 | 230 | 88.727 | 101.436 |
| Uranium (as U) | 8 | 36 | 19.583 | 8.207 |
| Radium-226(pCi/l) | 35 | 95.9 | 61.508 | 18.436 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number:PM-5
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3868.6 ft. MSL
Well Depth: 695 ft.
Distance from Weilfield: 280 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 9.8 | 17.0 | 14.288 | 2.281 |
| Magnesium | 3.2 | 4.1 | 3.649 | .348 |
| Sodium | 393 | 416 | 402.429 | 8.658 |
| Potassium | 9.5 | 13 | 11.425 | 1.234 |
| Carbonate | 2.4 | 19 | 8.4 | 9.207 |
| carbonate | 340 | 374.0 | 358.286 | 11.313 |
| Sulfate | 348 | 371 | 359 | 7.979 |
| Chloride | 175 | 235 | 198.375 | 20.17 |
| Ammonia-N | <0.05 | 0.64 | .388 | .204 |
| Nitrite-N | <.001 | <0.01 | 4E-03 | 4E-03 |
| trate-N | <0.01 | 0.07 | .029 | .026 |
| uoride | 0.62 | 0.74 | .678 | .045 |
| Silica(as SiO2) | 10.9 | 12.8 | 11.774 | .804 |
| TDS-180°C | 1104 | 1236 | 1165.25 | 49.477 |
| Conductivity (µmhos) | 1820 | 1907 | 1874.375 | 26.896 |
| Alkalinity(as CaCO3) | 285 | 306.5 | 294.2 | 7.325 |
| pH (standard units) | 8.05 | 8.38 | 8.226 | .122 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| l values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 880 | 1020 | 936.25 | 48.088 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | 10 | 6.125 | 2.1 |
| Manganese | 5 | 6 | 5.286 | .488 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | 20 | 17 | 4.536 |
| ckel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 190 | 104.375 | 81.128 |
| Uranium (as U) | 12 | 53 | 35.429 | 14.199 |
| Radium-226(pCi/l) | 285 | 329.7 | 305.829 | 16.358 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-6
Sample Type: MONITOR WELL
Formation: BRULE

Surface Elevation: 3869.5 ft. MSL
Well Depth: 217 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 2.3 | 4.9 | 3.599 | .916 |
| Magnesium | 0.13 | 0.26 | .192 | .036 |
| Sodium | 90.7 | 100 | 96.273 | 3.184 |
| Potassium | 6.7 | 10 | 8.527 | .792 |
| Carbonate | <1 | 24 | 9.179 | 6.811 |
| Bicarbonate | 190 | 210 | 200.923 | 4.931 |
| Sulfate | 33.9 | 44 | 37.64 | 2.706 |
| Chloride | 1.9 | 12.3 | 7.24 | 3.57 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | 0.02 | .01 | 6E-03 |
| Nitrate-N | 0.46 | 1.76 | 1.28 | .374 |
| Fluoride | 0.39 | 0.5 | .458 | .042 |
| Silica(as SiO2) | 59 | 69 | 64.286 | 2.698 |
| TDS-180°C | 276 | 363 | 321.533 | 19.799 |
| Conductivity (µmhos) | 425 | 480 | 445.267 | 16.228 |
| Alkalinity(as CaCO3) | 166 | 195 | 178.947 | 8.485 |
| pH (standard units) | 8.20 | 8.9 | 8.543 | .181 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 4 | 13 | 8.571 | 2.344 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 90 | 140 | 114 | 17.764 |
| Cadmium | <0.1 | <10 | 2.507 | 3.293 |
| Chromium | 2 | 14 | 6.231 | 3.516 |
| Cobalt | <1 | <5 | 3.667 | 2.066 |
| Copper | 4 | <10 | 8.667 | 2.462 |
| Iron | <10 | 110 | 55.714 | 31.062 |
| Lead | <1 | <10 | 5.5 | 2.21 |
| Manganese | <1 | <100 | 19.071 | 34.357 |
| Mercury | <0.02 | <0.3 | .194 | .079 |
| Molybdenum | 2 | <100 | 21.429 | 33.408 |
| Nickel | <2 | <50 | 14.571 | 15.281 |
| Selenium | 1 | <10 | 2.5 | 3.205 |
| Vanadium | 7 | <10 | 9.333 | 1.231 |
| Zinc | 60 | 290 | 175 | 64.031 |
| Uranium (as U) | <1 | 13 | 7.133 | 3.681 |
| Radium-226(pCi/l) | <0.1 | 1.7 | .926 | .455 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-7
Sample Type: MONITOR WELL
Formation: BRULE

Surface Elevation: 3868.9 ft. MSL
Well Depth: 129 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 13 | 33 | 23.419 | 6.049 |
| Magnesium | 0.13 | 1 | .575 | .226 |
| Sodium | 61.6 | 72 | 66.588 | 2.487 |
| Potassium | 15.0 | 21 | 18.806 | 1.736 |
| Carbonate | <1 | 18 | 8.436 | 5.848 |
| icarbonate | 166 | 266 | 228.744 | 26.588 |
| Sulfate | 5 | 9.6 | 7.244 | 1.497 |
| Chloride | 2.1 | 12 | 6.7 | 3.111 |
| Ammonia-N | <0.05 | 0.07 | .053 | 7E-03 |
| Nitrite-N | 0.001 | 0.03 | .011 | .01 |
| itrate-N | 1.6 | 2.9 | 2.329 | .422 |
| luoride | 0.2 | 0.4 | .274 | .059 |
| Silica(as SiO2) | 53.7 | 59 | 56.82 | 1.603 |
| TDS-180°C | 248 | 354 | 305.375 | 27.41 |
| Conductivity (µmhos) | 365 | 540 | 432.125 | 44.779 |
| Alkalinity(as CaCO3) | 177 | 231 | 204.306 | 17.24 |
| pH (standard units) | 7.99 | 8.88 | 8.423 | .232 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| ll values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | <1 | <5 | 2.083 | 1.621 |
| Barium | 70 | 210 | 132.308 | 44.563 |
| Boron | <10 | 200 | 99.667 | 55.739 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | 11 | 6.333 | 2.188 |
| Cobalt | <5 | <5 | 5 | 0 |
| Copper | <10 | <10 | 10 | 0 |
| Iron | 20 | <50 | 32.727 | 9.045 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | 0.1 | <0.3 | .192 | .049 |
| Molybdenum | <10 | <10 | 10 | 0 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <5 | 270 | 124.923 | 113.098 |
| Uranium (as U) | 8 | 40 | 24.5 | 10.316 |
| Radium-226(pCi/l) | 0.1 | 1.9 | .8 | .594 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-8
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3884.9 ft. MSL
Well Depth: 670 ft.
Distance from Wellfield: 175 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 8.7 | 17.4 | 14.144 | 2.732 |
| Magnesium | 3.1 | 7 | 4.253 | 1.351 |
| Sodium | 393 | 407 | 398.625 | 5.999 |
| Potassium | 11.3 | 13.4 | 12.45 | .725 |
| Carbonate | 0.9 | 19 | 8.3 | 7.782 |
| Bicarbonate | 317 | 368 | 349.733 | 15.691 |
| Sulfate | 302 | 368 | 341.556 | 20.057 |
| Chloride | 179 | 216 | 198.222 | 10.378 |
| Ammonia-N | 0.16 | 0.65 | .386 | .136 |
| Nitrite-N | <.001 | <0.01 | 4E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.05 | .026 | .02 |
| Fluoride | 0.51 | 0.72 | .66 | .074 |
| Silica(as SiO2) | 9.3 | 13.3 | 11.7 | 1.353 |
| TDS-180°C | 1080 | 1207 | 1148.778 | 36.352 |
| Conductivity (µmhos) | 1800 | 1894 | 1854.875 | 31.809 |
| Alkalinity(as CaCO3) | 283 | 306 | 294.556 | 7.668 |
| pH (standard units) | 8.16 | 8.39 | 8.27 | .093 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | <1 | <1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 870 | 940 | 905 | 26.726 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <10 | 6.889 | 1.965 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | 20 | 17.333 | 4.359 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 160 | 79.556 | 63.85 |
| Uranium (as U) | 12 | 55 | 36.333 | 13.91 |
| Radium-226(pCi/l) | 20 | 115.3 | 68.067 | 25.254 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: PM-9
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3888.1 ft. MSL
Well Depth: 678 ft.
Distance from Wellfield: 220 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 9.3 | 16 | 12.478 | 2.397 |
| Magnesium | 2.4 | 5 | 3.476 | .806 |
| Sodium | 385 | 475 | 416.667 | 29.875 |
| Potassium | 9.6 | 17.2 | 12.956 | 3.045 |
| Carbonate | 4.2 | 15.5 | 9.64 | 4.86 |
| Bicarbonate | 321.4 | 370 | 347.189 | 14.531 |
| Sulfate | 302 | 350 | 331.333 | 15.199 |
| Chloride | 174 | 307 | 225.444 | 45.758 |
| Ammonia-N | 0.15 | 0.65 | .386 | .137 |
| Nitrite-N | <.001 | <0.01 | 4E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.02 | .013 | 5E-03 |
| Fluoride | 0.65 | 0.76 | .718 | .037 |
| Silica(as SiO2) | 10.9 | 13.8 | 12.367 | 1.057 |
| TDS-180°C | 1074 | 1302 | 1201.222 | 79.655 |
| Conductivity (µmhos) | 1856 | 1995 | 1915.375 | 48.047 |
| Alkalinity(as CaCO3) | 280.7 | 307 | 293.533 | 8.043 |
| pH (standard units) | 7.94 | 8.60 | 8.299 | .205 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | 1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 880 | 960 | 916.444 | 28.263 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | 9 | 6.222 | 1.394 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 10 | 20 | 15.111 | 5.011 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 150 | 65.444 | 64.879 |
| Uranium (as U) | 20 | 95 | 61.111 | 23.23 |
| Radium-226(pCi/l) | 18.9 | 72.7 | 46.078 | 18.93 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: FM-10
Sample Type: MONITOR WELL
Formation: CHADRON

Surface Elevation: 3882.7 ft. MSL
Well Depth: 671 ft.
Distance from Wellfield: 205 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 15.4 | 18.2 | 16.529 | .898 |
| Magnesium | 3.3 | 5 | 3.954 | .534 |
| Sodium | 381 | 408 | 389.375 | 9.62 |
| Potassium | 9.7 | 12.8 | 10.988 | 1.036 |
| Carbonate | 4.7 | 5.4 | 5.1 | .361 |
| Bicarbonate | 340 | 372 | 360.457 | 10.799 |
| Sulfate | 329 | 356 | 339.571 | 9.199 |
| Chloride | 173 | 200 | 185.375 | 8.601 |
| Ammonia-N | 0.32 | 0.51 | .413 | .056 |
| Nitrite-N | <.001 | <0.01 | 5E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.08 | .029 | .027 |
| Fluoride | 0.66 | 0.78 | .709 | .037 |
| Silica(as SiO2) | 10.9 | 12.9 | 12.195 | .803 |
| TDS-180°C | 1094 | 1184 | 1140.125 | 27.142 |
| Conductivity (µmhos) | 1701 | 1868 | 1793.125 | 65.002 |
| Alkalinity(as CaCO3) | 288 | 308.1 | 300.2 | 7.831 |
| pH (standard units) | 8.03 | 8.36 | 8.254 | .123 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 1 | 1 | 1 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 890 | 970 | 930 | 28.284 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 9 | 11 | 9.75 | .886 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | 20 | 20 | 20 | 0 |
| Nickel | <10 | <10 | 10 | 0 |
| Selenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <10 | 240 | 124.75 | 93.765 |
| Uranium (as U) | 18 | 47 | 28.375 | 11.612 |
| Radium-226(pCi/l) | 12.5 | 37.5 | 22.375 | 8.316 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: PM-11
Sample Type: MONITOR WELL
Formation: BRULE

Surface Elevation: 3886.2 ft. MSL
Well Depth: 274 ft.
Distance from Wellfield: 0 ft.

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 4.1 | 7.2 | 5.575 | 1.007 |
| Magnesium | 0.16 | 0.60 | .373 | .142 |
| Sodium | 126 | 136 | 130.5 | 4.276 |
| Potassium | 8.8 | 11.9 | 10.188 | 1.087 |
| Carbonate | 2.9 | 24 | 10.663 | 8.226 |
| icarbonate | 210 | 232 | 222.688 | 7.137 |
| Sulfate | 50.1 | 53.0 | 51.7 | 1.094 |
| Chloride | 30.9 | 39 | 35.238 | 2.948 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 5E-03 | 4E-03 |
| 'itrate-N | 0.76 | 0.85 | .804 | .032 |
| luoride | 0.60 | 0.66 | .631 | .025 |
| Silica(as SiO2) | 67.6 | 74.9 | 70.913 | 2.771 |
| TDS-180°C | 390 | 448 | 419.75 | 25.15 |
| Conductivity (µmhos) | 563 | 636 | 600.25 | 25.064 |
| Alkalinity(as CaCO3) | 183 | 212 | 199.588 | 12.27 |
| pH (standard units) | 8.31 | 8.86 | 8.584 | .195 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| ^ll values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 22 | 30 | 26.857 | 3.579 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 110 | 130 | 122.857 | 7.559 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <5 | <5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | 160 | 230 | 186.667 | 25.82 |
| Uranium (as U) | 3 | 14 | 9.429 | 4.117 |
| Radium-226(pCi/l) | 0.9 | 1.2 | 1.1 | .141 |

# SURFACE WATER DATA

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: I-1
Distance from wellfield: 6300 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: SQUAW CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 24 | 24 | 24 | 0 |
| Magnesium | 1.9 | 1.9 | 1.9 | 0 |
| Sodium | 0.5 | 0.5 | .5 | 0 |
| Potassium | 4.7 | 4.7 | 4.7 | 0 |
| Carbonate | <2 | <2 | 2 | 0 |
| icarbonate | 86 | 86 | 86 | 0 |
| Sulfate | <5 | <5 | 5 | 0 |
| Chloride | <2 | <2 | 2 | 0 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| Nitrate-N | <0.02 | <0.02 | .02 | 0 |
| luoride | 0.1 | 0.1 | .1 | 0 |
| Silica(as SiO2) | 9.4 | 9.4 | 9.4 | 0 |
| TDS-180°C | 87 | 87 | 87 | 0 |
| Conductivity (µmhos) | 147 | 147 | 147 | 0 |
| Alkalinity(as CaCO3) | 71 | 71 | 71 | 0 |
| pH (standard units) | 7.5 | 7.5 | 7.5 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | 500 | 500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| ickel | <2 | <2 | 2 | 0 |
| elenium | <2 | <2 | 2 | 0 |
| Vanadium | 1 | 1 | 1 | 0 |
| Zinc | 2 | 2 | 2 | 0 |
| Uranium (as U) | 4 | 4 | 4 | 0 |
| Radium-226(pCi/l) | 0.6 | 0.6 | .6 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: I-2
Distance from Wellfield: 13500 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: WHITE CLAY CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 57 | 57 | 57 | 0 |
| Magnesium | 9.1 | 9.1 | 9.1 | 0 |
| Sodium | 26 | 26 | 26 | 0 |
| Potassium | 8.5 | 8.5 | 8.5 | 0 |
| Carbonate | <2 | <2 | 2 | 0 |
| Bicarbonate | 260 | 260 | 260 | 0 |
| Sulfate | 10 | 10 | 10 | 0 |
| Chloride | 5 | 5 | 5 | 0 |
| Ammonia-N | 0.07 | 0.07 | .07 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| Nitrate-N | 0.03 | 0.03 | .03 | 0 |
| Fluoride | 0.7 | 0.7 | .7 | 0 |
| Silica(as SiO2) | 49 | 49 | 49 | 0 |
| TDS-180°C | 330 | 330 | 330 | 0 |
| Conductivity (µmhos) | 483 | 483 | 483 | 0 |
| Alkalinity(as CaCO3) | 220 | 220 | 220 | 0 |
| pH (standard units) | 7.9 | 7.9 | 7.9 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 3 | 3 | 3 | 0 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | 700 | 700 | 700 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 6 | 6 | 6 | 0 |
| Zinc | 10 | 10 | 10 | 0 |
| Uranium (as U) | 8 | 8 | 8 | 0 |
| Radium-226(pCi/l) | 0.3 | 0.3 | .3 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: I-3
Distance from Wellfield: 9900 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: ENGLISH CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 74 | 74 | 74 | 0 |
| Magnesium | 12 | 12 | 12 | 0 |
| Sodium | 25 | 25 | 25 | 0 |
| Potassium | 7.2 | 7.2 | 7.2 | 0 |
| Carbonate | <2 | <2 | 2 | 0 |
| Bicarbonate | 350 | 350 | 350 | 0 |
| Sulfate | <5 | <5 | 5 | 0 |
| Chloride | <2 | <2 | 2 | 0 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| Nitrate-N | <0.02 | <0.02 | .02 | 0 |
| Fluoride | 0.7 | 0.7 | .7 | 0 |
| Silica(as SiO2) | 31 | 31 | 31 | 0 |
| TDS-180°C | 350 | 350 | 350 | 0 |
| Conductivity (µmhos) | 558 | 558 | 558 | 0 |
| Alkalinity(as CaCO3) | 280 | 280 | 280 | 0 |
| pH (standard units) | 7.9 | 7.9 | 7.9 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 3 | 3 | 3 | 0 |
| Barium | 400 | 400 | 400 | 0 |
| Boron | 500 | 500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 200 | 200 | 200 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | <1 | <1 | 1 | 0 |
| Zinc | 12 | 12 | 12 | 0 |
| Uranium (as U) | 3 | 3 | 3 | 0 |
| Radium-226(pCi/l) | 0.6 | 0.6 | .6 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: I-4
Distance from Wellfield: 11600 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: ENGLISH CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 30 | 30 | 30 | 0 |
| Magnesium | 11 | 11 | 11 | 0 |
| Sodium | 38 | 38 | 38 | 0 |
| Potassium | 12 | 12 | 12 | 0 |
| Carbonate | <2 | <2 | 2 | 0 |
| Bicarbonate | 250 | 250 | 250 | 0 |
| Sulfate | <5 | <5 | 5 | 0 |
| Chloride | <2 | <2 | 2 | 0 |
| Ammonia-N | 0.13 | 0.13 | .13 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| Nitrate-N | <0.02 | <0.02 | .02 | 0 |
| Fluoride | 0.7 | 0.7 | .7 | 0 |
| Silica(as SiO2) | 9.7 | 9.7 | 9.7 | 0 |
| TDS-180°C | 230 | 230 | 230 | 0 |
| Conductivity (µmhos) | 432 | 432 | 432 | 0 |
| Alkalinity(as CaCO3) | 200 | 200 | 200 | 0 |
| pH (standard units) | 7.9 | 7.9 | 7.9 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 3 | 3 | 3 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 2 | 2 | 2 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | 2 | 2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 2 | 2 | 2 | 0 |
| Zinc | 4 | 4 | 4 | 0 |
| Uranium (as U) | 8 | 8 | 8 | 0 |
| Radium-226(pCi/l) | 0.3 | 0.3 | .3 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: I-5 | Sample Type: IMPOUNDMENT SAMPLE
Distance from Wellfield: 13500 ft. | Water System: ENGLISH CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 40 | 40 | 40 | 0 |
| Magnesium | 9.7 | 9.7 | 9.7 | 0 |
| Sodium | 40 | 40 | 40 | 0 |
| Potassium | 14 | 14 | 14 | 0 |
| 'arbonate | <2 | <2 | 2 | 0 |
| .icarbonate | 270 | 270 | 270 | 0 |
| Sulfate | 5 | 5 | 5 | 0 |
| Chloride | 4 | 4 | 4 | 0 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| :trate-N | 0.06 | 0.06 | .06 | 0 |
| luoride | 0.7 | 0.7 | .7 | 0 |
| Silica(as SiO2) | 28 | 28 | 28 | 0 |
| TDS-180°C | 320 | 320 | 320 | 0 |
| Conductivity (µmhos) | 478 | 478 | 478 | 0 |
| Alkalinity(as CaCO3) | 220 | 220 | 220 | 0 |
| pH (standard units) | 7.9 | 7.9 | 7.9 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| ll values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 5 | 5 | 5 | 0 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | 500 | 500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| ickel | <2 | <2 | 2 | 0 |
| elenium | <2 | <2 | 2 | 0 |
| Vanadium | 4 | 4 | 4 | 0 |
| Zinc | 2 | 2 | 2 | 0 |
| Uranium (as U) | 6 | 6 | 6 | 0 |
| Radium-226(pCi/l) | 0.5 | 0.5 | .5 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: I-6
Distance from Wellfield: 13000 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: SQUAW CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 53 | 53 | 53 | 0 |
| Magnesium | 7.6 | 7.6 | 7.6 | 0 |
| Sodium | 9.8 | 9.8 | 9.8 | 0 |
| Potassium | 6.5 | 6.5 | 6.5 | 0 |
| Carbonate | <1 | <1 | 1 | 0 |
| Bicarbonate | 240 | 240 | 240 | 0 |
| Sulfate | <5 | <5 | 5 | 0 |
| Chloride | <2 | <2 | 2 | 0 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <0.01 | <0.01 | .01 | 0 |
| Nitrate-N | 0.02 | 0.02 | .02 | 0 |
| Fluoride | 0.4 | 0.4 | .4 | 0 |
| Silica(as SiO2) | 22 | 22 | 22 | 0 |
| TDS-180°C | 240 | 240 | 240 | 0 |
| Conductivity (µmhos) | 378 | 378 | 378 | 0 |
| Alkalinity(as CaCO3) | 200 | 200 | 200 | 0 |
| pH (standard units) | 7.38 | 7.38 | 7.38 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 300 | 300 | 300 | 0 |
| Boron | 600 | 600 | 600 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 3 | 3 | 3 | 0 |
| Zinc | 2 | 2 | 2 | 0 |
| Uranium (as U) | 4 | 8 | 6 | 2 |
| Radium-226(pCi/l) | 0.4 | 0.4 | .4 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: I-7
Distance from Wellfield: 20500 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: ENGLISH CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 55 | 55 | 55 | 0 |
| Magnesium | 11 | 11 | 11 | 0 |
| Sodium | 50 | 50 | 50 | 0 |
| Potassium | 18 | 18 | 18 | 0 |
| Carbonate | <2 | <2 | 2 | 0 |
| Bicarbonate | 350 | 350 | 350 | 0 |
| Sulfate | 6 | 6 | 6 | 0 |
| Chloride | 5 | 5 | 5 | 0 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| Nitrate-N | <0.02 | <0.02 | .02 | 0 |
| Fluoride | 0.7 | 0.7 | .7 | 0 |
| Silica(as SiO2) | 27 | 27 | 27 | 0 |
| TDS-180°C | 390 | 390 | 390 | 0 |
| Conductivity (µmhos) | 606 | 606 | 606 | 0 |
| Alkalinity(as CaCO3) | 280 | 280 | 280 | 0 |
| pH (standard units) | 8.0 | 8.0 | 8 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 5 | 5 | 5 | 0 |
| Barium | 300 | 300 | 300 | 0 |
| Boron | 700 | 700 | 700 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 2 | 2 | 2 | 0 |
| Zinc | 18 | 18 | 18 | 0 |
| Uranium (as U) | 8 | 8 | 8 | 0 |
| Radium-226(pCi/l) | 0.6 | 0.6 | .6 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: I-8
Distance from Wellfield: 22000 ft.

Sample Type: IMPOUNDMENT SAMPLE
Water System: WHITE CLAY CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 53 | 53 | 53 | 0 |
| Magnesium | 9.1 | 9.1 | 9.1 | 0 |
| Sodium | 30 | 30 | 30 | 0 |
| Potassium | 9.8 | 9.8 | 9.8 | 0 |
| Carbonate | <2 | <2 | 2 | 0 |
| Bicarbonate | 260 | 260 | 260 | 0 |
| Sulfate | 5 | 5 | 5 | 0 |
| Chloride | 6 | 6 | 6 | 0 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <0.02 | <0.02 | .02 | 0 |
| Nitrate-N | <0.02 | <0.02 | .02 | 0 |
| Fluoride | 0.7 | 0.7 | .7 | 0 |
| Silica(as SiO2) | 38 | 38 | 38 | 0 |
| TDS-180°C | 310 | 310 | 310 | 0 |
| Conductivity (µmhos) | 481 | 481 | 481 | 0 |
| Alkalinity(as CaCO3) | 210 | 210 | 210 | 0 |
| pH (standard units) | 7.8 | 7.8 | 7.8 | 0 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | 100 | 100 | 100 | 0 |
| Arsenic | 4 | 4 | 4 | 0 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | 700 | 700 | 700 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | 1 | 1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | 1 | 1 | 1 | 0 |
| Iron | <50 | <50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 5 | 5 | 5 | 0 |
| Zinc | 14 | 14 | 14 | 0 |
| Uranium (as U) | 9 | 9 | 9 | 0 |
| Radium-226(pCi/l) | 0.5 | 0.5 | .5 | 0 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: W-1
Distance from Wellfield: 24000 ft.

Sample Type: STREAM SAMPLE
Water System: WHITE RIVER

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 46 | 57 | 53.045 | 3.698 |
| Magnesium | 6.8 | 8 | 7.54 | .427 |
| Sodium | 12.7 | 15.9 | 14.21 | .889 |
| Potassium | 6.1 | 7.8 | 7.13 | .542 |
| Carbonate | <1 | <2 | 1.5 | .535 |
| icarbonate | 214.7 | 235 | 225.66 | 6.053 |
| Sulfate | <5 | 20 | 10.47 | 4.397 |
| Chloride | <2 | 4.7 | 3.35 | .789 |
| Ammonia-N | 0.05 | 0.05 | .05 | 0 |
| Nitrite-N | 0.001 | 0.02 | 9E-03 | 7E-03 |
| Nitrate-N | 0.24 | 0.78 | .49 | .176 |
| luoride | 0.3 | 0.6 | .499 | .096 |
| Silica(as SiO2) | 50.6 | 59 | 54.218 | 2.436 |
| TDS-180°C | 230 | 302 | 266.455 | 23.183 |
| Conductivity (µmhos) | 329 | 400 | 365.636 | 22.028 |
| Alkalinity(as CaCO3) | 173.1 | 201 | 187.855 | 9.166 |
| pH (standard units) | 7.74 | 8.05 | 7.914 | .116 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 8 | 8 | 8 | 0 |
| Zinc | <2 | <2 | 2 | 0 |
| Uranium (as U) | 1 | 6 | 3.636 | 2.063 |
| Radium-226(pCi/l) | 0.1 | 0.8 | .4 | .232 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: W-2
Distance from Wellfield: 27500 ft.

Sample Type: STREAM SAMPLE
Water System: WHITE RIVER

SAMPLE RESULTS

| Sample date | 02-82 | 04-82 | 07-82 | 10-82 |
|---|---|---|---|---|
| Laboratory | NRL | NRL | NRL | NRL |
| All values in mg/l unless noted | | | | |
| Calcium | 55 | 56 | 57 | 52 |
| Magnesium | 8 | 7.7 | 7.8 | 7.8 |
| Sodium | 17 | 16 | 20 | 18 |
| Potassium | 6.5 | 6.8 | 7.7 | 7.9 |
| Carbonate | <2 | <2 | <2 | <2 |
| Bicarbonate | 230 | 230 | 240* | 230 |
| Sulfate | 12 | <5 | 13 | 16 |
| Chloride | 4 | 4 | 6 | 6 |
| Ammonia-N | <0.05 | 0.05 | <0.05 | N/A |
| Nitrite-N | 0.01 | <0.01 | 0.01 | 0.40* |
| Nitrate-N | 2.1* | 0.62 | 0.46 | 0.4 |
| Fluoride | 0.5 | 0.6 | 0.4 | 0.4 |
| Silica(as SiO2) | 56 | 54 | 54 | 52 |
| TDS-180°C | 280 | 230 | 300 | 270 |
| Conductivity (µmhos) | 394 | 413 | 420 | 377 |
| Alkalinity(as CaCO3) | 190 | 200 | 200 | 190 |
| pH (standard units) | 7.5 | 7.7 | 7.9 | 8.2 |
| Ion Balance | N/A | N/A | N/A | N/A |
| TDS Balance | N/A | N/A | N/A | N/A |
| Cond. Balance | N/A | N/A | N/A | N/A |
| All values in µg/l unless noted | | | | |
| Aluminum | | <100 | 100 | |
| Arsenic | | 2 | 4* | |
| Barium | | 200* | <100 | |
| Boron | | <500 | 500 | |
| Cadmium | | <1 | <1 | |
| Chromium | | <1 | <1 | |
| Cobalt | | N/A | <1 | |
| Copper | | <1 | 2* | |
| Iron | | 50 | <50 | |
| Lead | | <5 | <5 | |
| Manganese | | <100 | <100 | |
| Mercury | | <0.1 | <0.1 | |
| Molybdenum | | <2 | <2 | |
| Nickel | | <2 | <2 | |
| Selenium | | <2 | <2 | |
| Vanadium | | 7 | 10* | |
| Zinc | | <2 | 16* | |
| Uranium (as U) | 1 | 6 | 5 | 7 |
| Radium-226(pCi/l) | 3*±0.8 | 0.4±0.1 | 0.5±0.2 | 0.3±0.2 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: W-3
Distance from Wellfield: 37800 ft.

Sample Type: STREAM SAMPLE
Water System: WHITE RIVER

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 32.2 | 63 | 48.713 | 10.725 |
| Magnesium | 6.7 | 9.3 | 8.15 | .93 |
| Sodium | 24 | 109 | 63.888 | 35.907 |
| Potassium | 4 | 18.0 | 11.663 | 4.378 |
| Carbonate | <1 | 24.0 | 6.667 | 9.564 |
| icarbonate | 257 | 383.1 | 308.913 | 48.19 |
| ulfate | 16 | 53.2 | 28.75 | 12.53 |
| Chloride | 5.6 | 18 | 12.638 | 4.837 |
| Ammonia-N | <0.05 | 0.26 | .113 | .077 |
| Nitrite-N | <.001 | 0.01 | 6E-03 | 4E-03 |
| Nitrate-N | 0.08 | 0.8 | .424 | .249 |
| uoride | 0.4 | 0.89 | .686 | .165 |
| ilica(as SiO2) | 45.8 | 55 | 51.025 | 3.552 |
| TDS-180°C | 306 | 460 | 376.375 | 59.838 |
| Conductivity (µmhos) | 470 | 709 | 565.25 | 96.916 |
| Alkalinity(as CaCO3) | 222 | 314.0 | 263.375 | 35.763 |
| pH (standard units) | 7.6 | 8.84 | 8.133 | .363 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| luminum | <100 | <100 | 100 | 0 |
| Arsenic | 11 | 11 | 11 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | 10 | 10 | 10 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <5 | <5 | 5 | 0 |
| Cobalt | | | | |
| Copper | <10 | <10 | 10 | 0 |
| Iron | <30 | <30 | 30 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 5 | 5 | 5 | 0 |
| Mercury | <0.2 | <0.2 | .2 | 0 |
| Molybdenum | <10 | <10 | 10 | 0 |
| ickel | <10 | <10 | 10 | 0 |
| elenium | <1 | <1 | 1 | 0 |
| Vanadium | <10 | <10 | 10 | 0 |
| Zinc | <5 | <5 | 5 | 0 |
| Uranium (as U) | <1 | 20 | 11.5 | 7.764 |
| Radium-226(pCi/l) | <0.1 | 0.6 | .314 | .212 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number:S-1
Distance from Wellfield: 6100 ft.

Sample Type: STREAM SAMPLE
Water System: SQUAW CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 53.7 | 69 | 61.818 | 4.567 |
| Magnesium | 8.2 | 10 | 9.29 | .615 |
| Sodium | 10 | 13 | 11.927 | .932 |
| Potassium | 3.1 | 4.3 | 3.709 | .342 |
| Carbonate | <1 | 7.5 | 3.063 | 2.625 |
| Bicarbonate | 206.4 | 270 | 254.382 | 24.074 |
| Sulfate | 1 | 11 | 6.382 | 2.583 |
| Chloride | 1.0 | 6 | 2.755 | 1.513 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | <0.01 | 6E-03 | 5E-03 |
| Nitrate-N | 0.10 | 0.57 | .303 | .161 |
| Fluoride | 0.5 | 0.7 | .575 | .06 |
| Silica(as SiO2) | 49.6 | 56 | 52.189 | 2.282 |
| TDS-180•C | 253 | 320 | 282.1 | 21.074 |
| Conductivity (µmhos) | 330 | 425 | 395.273 | 32.419 |
| Alkalinity(as CaCO3) | 181 | 231 | 212.109 | 16.974 |
| pH (standard units) | 7.6 | 8.54 | 8.093 | .276 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 5 | 5 | 5 | 0 |
| Zinc | <2 | <2 | 2 | 0 |
| Uranium (as U) | 1 | 6 | 2.8 | 1.932 |
| Radium-226(pCi/l) | 0.1 | 0.4 | .211 | .127 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: S-2
Distance from Wellfield: 1900 ft.

Sample Type: STREAM SAMPLE
Water System: SQUAW CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 53 | 66 | 60.318 | 4.119 |
| Magnesium | 7.9 | 10 | 9.195 | .546 |
| Sodium | 10.5 | 14 | 12.256 | 1.031 |
| Potassium | 2.2 | 5.9 | 3.926 | .814 |
| Carbonate | <1 | 3.0 | 1.808 | .798 |
| carbonate | 215.3 | 282 | 249.216 | 19.975 |
| ulfate | 4.7 | 11 | 7.283 | 1.9 |
| Chloride | 1.0 | 2.6 | 1.787 | .434 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | 0.02 | 8E-03 | 5E-03 |
| Nitrate-N | <0.01 | 1 | .302 | .291 |
| uoride | 0.5 | 0.69 | .596 | .042 |
| ilica(as SiO2) | 42.5 | 54.4 | 48.484 | 3.626 |
| TDS-180°C | 222 | 312 | 270.105 | 26.032 |
| Conductivity (µmhos) | 339 | 450 | 400.421 | 31.339 |
| Alkalinity(as CaCO3) | 180 | 243 | 209.111 | 16.66 |
| pH (standard units) | 7.8 | 8.50 | 8.143 | .22 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| uminum | <100 | <100 | 100 | 0 |
| Arsenic | 4 | 6 | 4.667 | .707 |
| Barium | 100 | 320 | 216 | 58.348 |
| Boron | 20 | 600 | 164 | 207.803 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | 9 | 4.6 | 2.271 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | 12 | 8.4 | 3.95 |
| Iron | <30 | 50 | 34 | 8.433 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 5 | <100 | 29.6 | 37.869 |
| Mercury | <0.1 | <0.2 | .18 | .042 |
| Molybdenum | <2 | <10 | 7.9 | 3.479 |
| ickel | <2 | <10 | 8.4 | 3.373 |
| lenium | <1 | <2 | 1.2 | .422 |
| vanadium | <10 | <10 | 10 | 0 |
| Zinc | <2 | <10 | 8.222 | 3.528 |
| Uranium (as U) | 1 | 8 | 3.278 | 2.164 |
| Radium-226(pCi/l) | 0.1 | 0.4 | .236 | .108 |

# FERRET EXPLORATION CO OF NEBRASKA
## CROW BUTTE PROJECT
## WATER QUALITY REPORT



Sample Number: S-3
Distance from Wellfield: 3400 ft.

Sample Type: STREAM SAMPLE
Water System: SQUAW CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 49 | 73 | 60.839 | 6.664 |
| Magnesium | 7.6 | 11.0 | 9.363 | .832 |
| Sodium | 10.0 | 15.7 | 12.517 | 1.422 |
| Potassium | 2.3 | 6.7 | 4.347 | .976 |
| Carbonate | <1 | 3.5 | 1.909 | .877 |
| Bicarbonate | 208.6 | 292 | 251.4 | 23.925 |
| Sulfate | 5 | 11.4 | 7.211 | 1.756 |
| Chloride | 0.6 | 3.2 | 2.094 | .646 |
| Ammonia-N | <0.05 | 0.07 | .055 | 8E-03 |
| Nitrite-N | <.001 | 0.02 | 8E-03 | 6E-03 |
| Nitrate-N | <0.01 | 0.35 | .171 | .106 |
| Fluoride | 0.5 | 0.69 | .605 | .049 |
| Silica(as SiO2) | 39.7 | 51.6 | 47.195 | 3.07 |
| TDS-180°C | 230 | 322 | 276.421 | 22.414 |
| Conductivity (µmhos) | 340 | 470 | 404.421 | 36.019 |
| Alkalinity(as CaCO3) | 180 | 249 | 209.674 | 19.341 |
| pH (standard units) | 7.6 | 8.55 | 8.063 | .299 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 6 | 3.909 | 1.221 |
| Barium | 200 | 250 | 216.667 | 20.616 |
| Boron | 20 | <500 | 145.455 | 178.514 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | 9 | 4.636 | 2.157 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <10 | 8.364 | 3.641 |
| Iron | 30 | 50 | 35.3 | 8.354 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 6 | <100 | 35.182 | 33.406 |
| Mercury | <0.1 | <0.2 | .182 | .04 |
| Molybdenum | 2 | <10 | 8.091 | 3.36 |
| Nickel | <2 | <10 | 8.545 | 3.236 |
| Selenium | <1 | <2 | 1.182 | .405 |
| Vanadium | 5 | <10 | 9 | 2.108 |
| Zinc | <2 | 20 | 12.273 | 6.872 |
| Uranium (as U) | <1 | 7 | 2.875 | 1.962 |
| Radium-226(pCi/l) | 0.1 | 0.9 | .322 | .258 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: S-4 | Sample Type: STREAM SAMPLE
Distance from Wellfield: 21000 ft. | Water System: SQUAW CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 66.6 | 78 | 72.767 | 4.891 |
| Magnesium | 9.1 | 12 | 10.517 | 1.021 |
| Sodium | 25 | 48 | 35 | 7.403 |
| Potassium | 8.5 | 16 | 11.367 | 2.574 |
| Carbonate | <1 | <2 | 1.6 | .548 |
| Bicarbonate | 362 | 392 | 376.8 | 13.387 |
| Sulfate | <5 | 13 | 7.75 | 2.962 |
| Chloride | 3 | 10.4 | 6.01700001 | 2.878 |
| Ammonia-N | 0.05 | 0.24 | .106 | .084 |
| Nitrite-N | <0.01 | <0.01 | .01 | 0 |
| Nitrate-N | <0.01 | 0.11 | .066 | .051 |
| Fluoride | 0.6 | 0.8 | .727 | .086 |
| Silica(as SiO2) | 34 | 64.3 | 46.55 | 11.68 |
| TDS-180°C | 364 | 430 | 390.667 | 25.851 |
| Conductivity (µmhos) | 555 | 603 | 586.8 | 19.097 |
| Alkalinity(as CaCO3) | 300 | 332 | 315 | 11.916 |
| pH (standard units) | 7.4 | 8.20 | 7.878 | .277 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 200 | 200 | 200 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | 3 | 3 | 3 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 2 | 2 | 2 | 0 |
| Zinc | <2 | <2 | 2 | 0 |
| Uranium (as U) | <1 | 8 | 4.5 | 2.429 |
| Radium-226(pCi/l) | 0.1 | 0.8 | .367 | .273 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WC-1
Distance from Wellfield: 8400 ft.

Sample Type: STREAM SAMPLE
Water System: WHITE CLAY CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 31.9 | 52 | 41.371 | 8.491 |
| Magnesium | 8.8 | 9.9 | 9.357 | .447 |
| Sodium | 21 | 25 | 22.6 | 1.479 |
| Potassium | 4.2 | 5.3 | 4.757 | .5 |
| Carbonate | <1 | <2 | 1.6 | .548 |
| Bicarbonate | 195.0 | 242 | 216.286 | 18.625 |
| Sulfate | <5 | 14 | 10.1 | 2.922 |
| Chloride | 2 | 5.6 | 3.114 | 1.398 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | <.001 | 0.01 | 8E-03 | 4E-03 |
| Nitrate-N | <0.01 | 0.20 | .091 | .068 |
| Fluoride | 0.7 | 0.9 | .789 | .076 |
| Silica(as SiO2) | 43.3 | 58 | 52.143 | 4.855 |
| TDS-180°C | 214 | 298 | 261.857 | 26.823 |
| Conductivity (µmhos) | 319 | 390 | 354.857 | 29.14 |
| Alkalinity(as CaCO3) | 159.9 | 217 | 183.357 | 22.003 |
| pH (standard units) | 7.6 | 8.56 | 8.049 | .308 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 2 | 2 | 0 |
| Barium | 100 | 100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | 2 | 2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 7 | 7 | 7 | 0 |
| Zinc | <2 | <2 | 2 | 0 |
| Uranium (as U) | 2 | 10 | 5.857 | 2.911 |
| Radium-226(pCi/l) | 0.1 | 0.5 | .367 | .151 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: WC-2 | Sample Type: STREAM SAMPLE
Distance from Wellfield: 22200 ft. | Water System: WHITE CLAY CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 62 | 66.6 | 64.643 | 1.726 |
| Magnesium | 10 | 10.4 | 10.157 | .162 |
| Sodium | 30.4 | 41.4 | 36.263 | 3.365 |
| Potassium | 8.5 | 12.1 | 10.7 | 1.296 |
| Carbonate | <1 | <2 | 1.6 | .548 |
| Bicarbonate | 288 | 340 | 314.013 | 18.221 |
| Sulfate | 14 | 22 | 19.514 | 2.968 |
| Chloride | 8.5 | 10.8 | 9.633 | .931 |
| Ammonia-N | 0.05 | 0.14 | .08 | .034 |
| Nitrite-N | <.001 | 0.02 | 8E-03 | 7E-03 |
| Nitrate-N | 0.3 | 0.84 | .563 | .173 |
| Fluoride | 0.8 | 0.9 | .863 | .045 |
| Silica(as SiO2) | 51 | 57.1 | 53.286 | 2.028 |
| TDS-180°C | 350 | 411 | 385.625 | 23.201 |
| Conductivity (µmhos) | 500 | 578 | 538.875 | 27.915 |
| Alkalinity(as CaCO3) | 242.4 | 283 | 260.65 | 15.223 |
| pH (standard units) | 7.6 | 8.11 | 7.836 | .16 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 3 | 3 | 3 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | 100 | 100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 6 | 6 | 6 | 0 |
| Zinc | <2 | <2 | 2 | 0 |
| Uranium (as U) | 1 | 13 | 6.125 | 4.224 |
| Radium-226(pCi/l) | <0.1 | 0.4 | .271 | .125 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: E-1 & E-2
Distance from Wellfield: 8400 ft.

Sample Type: STREAM SAMPLE
Water System: ENGLISH CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 65 | 77 | 69.043 | 4.801 |
| Magnesium | 6.5 | 9.9 | 7.814 | 1.125 |
| Sodium | 17 | 20.9 | 18.533 | 1.562 |
| Potassium | 6.3 | 7.2 | 6.717 | .319 |
| Carbonate | <1 | <2 | 1.6 | .548 |
| Bicarbonate | 260 | 290 | 272.067 | 10.959 |
| Sulfate | 7 | 31 | 14.543 | 10.345 |
| Chloride | 3.8 | 4.9 | 4.2 | .415 |
| Ammonia-N | <0.05 | <0.05 | .05 | 0 |
| Nitrite-N | 0.001 | 0.02 | 9E-03 | 7E-03 |
| Nitrate-N | 0.66 | 3.38 | 1.849 | .967 |
| Fluoride | 0.5 | 0.7 | .601 | .082 |
| Silica(as SiO2) | 53 | 58 | 55.15 | 1.953 |
| TDS-180°C | 298 | 402 | 341.429 | 33.401 |
| Conductivity (µmhos) | 435 | 500 | 463.333 | 25.311 |
| Alkalinity(as CaCO3) | 217.6 | 232 | 224.883 | 6.431 |
| pH (standard units) | 7.3 | 8.08 | 7.6 | .309 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 2 | 7 | 4.333 | 2.517 |
| Barium | 100 | 250 | 183.333 | 76.376 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | <30 | 150 | 76.667 | 64.291 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | <2 | <2 | 2 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 7 | 7 | 7 | 0 |
| Zinc | 2 | 18 | 10 | 8 |
| Uranium (as U) | 3 | 14 | 9.667 | 4.926 |
| Radium-226(pCi/l) | 0.3 | 1.2 | .8 | .383 |

# FERRET EXPLORATION CO OF NEBRASKA
# CROW BUTTE PROJECT
# WATER QUALITY REPORT



Sample Number: E-3
Distance from Wellfield: 21700 ft.

Sample Type: STREAM SAMPLE
Water System: ENGLISH CREEK

SAMPLE SUMMARY

| PARAMETER | MINIMUM | MAXIMUM | MEAN | STD.DEVIATION |
|---|---|---|---|---|
| All values in mg/l unless noted | | | | |
| Calcium | 59 | 89 | 72.633 | 11.409 |
| Magnesium | 12 | 18 | 14.167 | 2.317 |
| Sodium | 48 | 67 | 59.333 | 7.789 |
| Potassium | 14 | 23 | 17.883 | 2.912 |
| Carbonate | <1 | <2 | 1.6 | .548 |
| Bicarbonate | 375 | 520 | 437.75 | 66.331 |
| Sulfate | <5 | 30 | 19.083 | 10.404 |
| Chloride | 9.5 | 14 | 11.733 | 1.615 |
| Ammonia-N | <0.05 | 0.18 | .12 | .058 |
| Nitrite-N | 0.01 | 0.05 | .023 | .018 |
| Nitrate-N | <0.01 | 0.11 | .075 | .043 |
| Fluoride | 0.8 | 1.70 | 1.183 | .343 |
| Silica(as SiO2) | 41 | 65 | 52.533 | 10.459 |
| TDS-180°C | 290 | 542 | 444 | 87.955 |
| Conductivity (µmhos) | 620 | 778 | 698.833 | 73.931 |
| Alkalinity(as CaCO3) | 320 | 430 | 367.233 | 48.42 |
| pH (standard units) | 7.6 | 8.10 | 7.85 | .188 |
| Ion Balance | | | | |
| TDS Balance | | | | |
| Cond. Balance | | | | |
| All values in µg/l unless noted | | | | |
| Aluminum | <100 | <100 | 100 | 0 |
| Arsenic | 3 | 3 | 3 | 0 |
| Barium | <100 | <100 | 100 | 0 |
| Boron | <500 | <500 | 500 | 0 |
| Cadmium | <1 | <1 | 1 | 0 |
| Chromium | <1 | <1 | 1 | 0 |
| Cobalt | <1 | <1 | 1 | 0 |
| Copper | <1 | <1 | 1 | 0 |
| Iron | 50 | 50 | 50 | 0 |
| Lead | <5 | <5 | 5 | 0 |
| Manganese | <100 | <100 | 100 | 0 |
| Mercury | <0.1 | <0.1 | .1 | 0 |
| Molybdenum | 3 | 3 | 3 | 0 |
| Nickel | <2 | <2 | 2 | 0 |
| Selenium | <2 | <2 | 2 | 0 |
| Vanadium | 1 | 1 | 1 | 0 |
| Zinc | <2 | <2 | 2 | 0 |
| Uranium (as U) | <1 | 14 | 5.167 | 5.037 |
| Radium-226(pCi/l) | 0.1 | 0.6 | .32 | .192 |

# SECTION 2.10

# BACKGROUND RADIOLOGICAL CHARACTERISTICS

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## 2.10 BACKGROUND RADIOLOGICAL CHARACTERISTICS

### 2.10.1 Introduction

This section contains a description of the environmental sampling program that Ferret Exploration Company of Nebraska (FEN) used to assess radiological background conditions of the area in the vicinity of the Crow Butte Project. The results of this program, in conjunction with an operational monitoring program, will be used to determine the effects on the environment, if any, of the Crow Butte Project. Over a period in excess of four years, samples have been collected and analyzed for the concentration of radionuclides in pre-mining environment. This program includes sample data collected through the second quarter of 1986. Environmental monitoring will continue through the program and restoration. The program includes samples of the air, groundwater, surface water, soils, sediments, vegetation, and fish. The pre-mining data indicate that the existing concentrations of the radionuclides are in the range reported in similar studies. The only anomalies reported were elevated radium-226 levels in some groundwater samples. This increase in radium-226 is to be expected in groundwater from mineralized strata containing uranium.

In order to determine background radiological conditions in the immediate area of the Crow Butte CSA, FEN initiated an environmental sampling program in the fourth quarter of 1981. This program was designed to meet the criteria outlined in the USNRC Regulatory Guide 4.14, ***Radiological Effluent and Environmental Monitoring at Uranium Mills*** (1980). Lower limits of detection for the program described below are equivalent to those specified in USNRC Regulatory Guide 4.14. An air sampling program was initiated in April 1982. This program evaluated the background concentration of various airborne radionuclides including ambient radon-222 levels. Gamma dosimeters were also distributed through the area in April 1982. Sampling of private wells began in October 1981 and by April 1982, selected area wells were sampled on a quarterly basis.

Soils in the region have been sampled for the concentration of natural uranium and radium-226. Soils in the immediate area of the proposed plant, ponds and wellfield have also been sampled. Surface water in Squaw Creek was collected at two locations on a quarterly basis. Samples of sediments from the creek were also obtained at these two locations. Water and sediment samples were taken from several area impoundments. Samples of fish were obtained from Squaw Creek and selected impoundments. Vegetation samples have been collected near the air monitoring stations. In June 1983, samples of area crops were also collected.

Table 2.10-1 summarizes the preoperational radiological monitoring program implemented at Crow Butte. Figure 2.10-1, included in a map pocket, is a topographic map of the region surrounding the proposed in situ uranium project showing the locations of the various sample sites.

### 2.10.2 Air Sampling Program

The original locations of the air sampling stations were based on wind data obtained from Scottsbluff, Nebraska. The air sampling stations used during the preoperational and operational phases of the Crow Butte R & D are shown in Figure 2.10-1. AM-1, AM-2, AM-6 and AM-7 were used as operational monitoring sites during the Crow Butte R & D and AM-3, AM-4 and AM-5 were used for preoperational monitoring only.

From April 1982 to 1984, wind data were collected from a meteorological station installed at the Crow Butte Site. The site specific wind data are found in Section 2.5, ***Meteorology***. Based on the site specific wind data an additional monitoring station (AM-8) was added in March of 1987. This station is also shown in Figure 2.10-1.

## TABLE 2.10-1

### RADIOLOGICAL PREOPERATIONAL MONITORING PROGRAM
### CROW BUTTE R&D PROJECT

| | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| Type of Sample | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| **AIR** | | | | | | |
| Particulates | | | | | | |
| | Four | Nearest residences with highest predicted airborne radionuclide concentration in each of the two prevailing wind directions and near the town of Crawford | Continuous low volume air sampler with glass fiber filter | One week or more per month | Quarterly composite of filters according to location | Natural Uranium Th-230, Ra-226 Pb-210 |
| | Three | Additional sites were sampled due to uncertainty in wind data | | | | |
| | One | Control location least prevailing wind direction | same | same | same | same |
| Radon Gas | | | | | | |
| | Eight | Same locations as air particulates | Grab[1],[2] | Monthly | Each Sample | Rn-222 |

[1] A grab sample shall consist of at least three (3) separate forty-eight (48) hour composite samples during a period of one (1) month.

[2] As of July 1987, FEN will use track etch cups to sample radon gas continuously.

Background Radiological Characteristics (Cont'd)

| | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| Type of Sample | Number | Location | Method | Frequency | Frequency | Type of Analysis[1] |
| **WATER** | | | | | | |
| Ground Water | | | | | | |
| | One from each water supply well | All wells within 1 km of restricted area boundary | Grab | Three to establish baseline | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210, Po-210 |
| | One from each | Selected Regional wells | Grab | Three to establish baseline | Each sample | Natural Uranium, Ra-226, Pb-210, Po-210, Th-230 |
| | One from each DEC baseline & monitor well | As required by DEC | Grab | Three to establish baseline | Each sample | Natural Uranium, Ra-226 |
| Surface Water | | | | | | |
| | One from each body of water | All large permanent impoundments within 2-1/4 mile radius of wellfield | Grab | Semiannually for one year | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210, Po-210 |
| | Two from Squaw Creek | One up-stream, one down-stream of restricted area | Grab | Quarterly | Each sample | Natural Uranium, Th-230, Ra-226 |
| | " | " " | | Two to establish baseline | Each sample | Pb-210, Po-210 |

[1] All analyses on water samples will measure total concentration.

Background Radiological Characteristics (Cont'd)

| | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| Type of Sample | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| **SEDIMENT** | | | | | | |
| | One from each body of water | From each permanent impoundment within 2-1/4 mile radius of wellfield | Grab | Once | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210 |
| | Two from Squaw Creek | One up-stream, one down-stream of restricted area | Grab | Semiannually | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210 |
| **SOIL** | | | | | | |
| **Surface** | | | | | | |
| | Three | Plant site before topsoil removal | Grab (top 5 cm) | Once | Each sample | Natural Uranium, Ra-226 |
| | Two | Plant site after topsoil removal | Grab (top 5 cm) | Once | Each sample | Natural Uranium, Ra-226 |
| | Three | Wellfield | Grab (top 5 cm) | Once | Each sample | Natural Uranium, Ra-226 |
| | Three | Restricted Area | Grab (top 5 cm) | Once | Each sample | Natural Uranium, Ra-226 |

Background Radiological Characteristics (Cont'd)

| | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| Type of Sample | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| | One each | Air sampling stations | Grab | Once | Each sample | Natural Uranium, Ra-226 |
| | One each | 42 locations in Commercial Permit Area | Grab (top 5 cm) | Once | Each sample | Natural Uranium, Ra-226 |
| Subsurface | | | | | | |
| | One | Plant site | One-third meter composites to a total depth of one meter | Once | Each sample | Natural Uranium, Ra-226 |
| | Two | Wellfield | same | same | same | same |
| | One each | Evaporation ponds (after excavation at deepest point) | Composite core sample to two meters | Once | Each sample | Natural Uranium, Ra-226 |
| **VEGETATION** | | | | | | |
| | One each | Operational air sampling stations | Composite of dominant vegetation present | Once during grazing season (82,83,84) | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210, Po-210 |

Background Radiological Characteristics (Concluded)

| Type of Sample | Sample Collection | | | | Sample Analysis | |
|---|---|---|---|---|---|---|
| | Number | Location | Method | Frequency | Frequency | Type of Analysis |
| | One each | NE of wellfield | Composite of dominant vegetation present | Once during grazing season (June or July 1987) | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210, Po-210 |
| | One each | Wellfield, plant site | Composite of dominant vegetation present | Once during grazing season (83, 84) | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210, Po-210 |
| **FISH** | | | | | | |
| | Each significant body of water | Fish from each body of water if a significant pathway to man exists | Grab | Once | Each sample | Natural Uranium, Th-230, Ra-226, Pb-210, Po-210 |
| **DIRECT RADIATION** | | | | | | |
| | One each | Air sampling stations and selected area locations | Dosimeter | Continuous | Quarterly | Gamma exposure rate using a continuous integrating device |
| | | Closely spaced grid through wellfield, evaporation ponds and plant areas | Grab | Once | Once | Gamma exposure rate using properly calibrated NaI scintillometer |

# THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

## THAT CAN BE VIEWED AT THE RECORD TITLED:

## FIGURE NO.: 2.10-1, "RADIOLOGICAL SAMPLE LOCATIONS"

## WITHIN THIS PACKAGE... OR, BY SEARCHING USING THE DOCUMENT/REPORT FIGURE NO.: 2.10-1

**D-01**

FEN has collected data continuously at AM-1, AM-2, AM-6 and AM-7 from 1982 to the present. Preoperational data from AM-3, AM-4 and AM-5 were collected in 1982 and 1983 and have been included in this report for completeness. FEN restarted sampling at AM-3, AM-4 and AM-5 in March of 1987 in order to obtain additional preoperational data base as possible. In 1987, an air monitoring station (AM-8) was installed in the direction of the prevailing wind. The data from this station are also included.

The four primary stations (AM-1, AM-2, AM-6, AM-7) are identical and consist of an instrument shelter standing approximately 1.5 m (5 ft) above ground level. A Regulated Air Sampler is housed in the shelter. The inlet to the sampler is fitted with a 47 mm filter holder and glass fiber filters are used. These filters remove 99.9% of the particles larger than 0.3 micron. The samplers operated continuously each month with filter changes on a weekly basis through 1983. Samplers operated continuously one or two weeks each month from 1984 to present. The flow rates are recorded during each filter change and adjusted to a flow indicator reading of 20-60 lpm. The filters are composited according to location and analyzed on a quarterly basis. The samplers are calibrated semiannually. Calibration is accomplished using a mass flowmeter that is certified and calibrated with standards traceable to the National Bureau of Standards (NBS).

Radon-222 was also measured at the four primary air monitoring stations. Radon-222 samples were also collected at AM-3, 4, and 5 through March 1983. The air sample was collected using a radon sampler. This system is a single-pump, single-bag sampler designed to collect a composite ambient air sample over a preselected time interval. Particulates are removed by an inline 37 mm diameter, 5 micron filter. The sample bag is made of Tedlar and has a 30 liter volume. The system is housed in a 225 liter plastic drum.

This unit is used to collect three consecutive composite air samples per month at each air monitoring station. The three samples represent two 48-

hour and one 72-hour composite sample. The air in the sample bag is analyzed by FEN personnel for the concentration of radon-222 by using a Lucas cell and a SAC-R5 scintillation detector with an MS-3 scaler. As of July 1987, FEN is changing the method of measuring environmental radon gas concentration to the track etch cup method.

As was stated earlier, air sampling has been continuous at AM-1, 2, 6, and 7 for the Crow Butte site, beginning in the second quarter of 1982. Research & Development operations did not begin until the third quarter, 1986; therefore, the air monitoring results through the second quarter, 1986 are included as preoperational. The means and standard deviations for radiometric air particulate concentrations from the second quarter 1982 through the third quarter 1986 for AM-1, 2, 6 and 7 are given in Table 2.10-2. Table 2.10-2 also illustrates the results for AM-3, 4 and 5 for the first year of monitoring during which these stations operated. Approximately 2000 $m^3$ of air was sampled during each sampling period. The analyses were performed by a commercial laboratory. The filters from each of the monitoring stations were analyzed for the concentration of natural uranium, thorium-230, radium-226, and lead-210. From these analyses and the total volume of air sampled, the concentration in air is calculated and listed in Table 2.10-2 as uCi/ml of air.

Comparing the concentrations given in this table to those reported by the National Council on Radiation Protection (NCRP45, 1985), these values are consistent with reported background concentrations. As can also be seen from this table, the concentrations of radionuclides vary considerably at any given location and between locations. This variability, according to NCRP-45, is not unusual and has been demonstrated at other locations. For example, the maximum uranium concentration reported for Anaconda's Rhode Ranch Project in South Texas is $3.0 \times 10^{-16}$ uCi/ml, while in Wyoming at Conoco's Sand Rock Mill Project, the concentration of uranium was reported to average $20.3 \times 10^{-16}$ uCi/ml (Texas Department of Health, 1982; USNRC, 1982).

## TABLE 2.10-2

### AVERAGE RESULTS OF THE AIR PARTICULATE SURVEY
### CROW BUTTE PROJECT

| Station Location | Natural Uranium (uCi/ml)x10$^{-16}$ | Thorium-230 (uCi/ml)x10$^{-16}$ | Radium-226 (uCi/ml)x10$^{-16}$ | Lead-210 (uCi/ml)x10$^{-16}$ |
|---|---|---|---|---|
| [1] AM-1 | 10.2 ± 13.9 | 8.1 ± 7.5 | 2.0 ± 1.2 | 147.2 ± 89.3 |
| [1] AM-2 | 18.6 ± 23.9 | 2.8 ± 5.5 | 2.3 ± 1.1 | 146.1 ± 4.3 |
| [2] AM-3 | 2.8 ± 1.7 | 13.6 ± 15.8 | 4.1 ± 5.3 | 120.4 ± 40.5 |
| [2] AM-4 | 2.3 ± 1.7 | 11.6 ± 17.5 | 2.4 ± 1.1 | 282.5 ± 334.0 |
| [2] AM-5 | 14.5 ± 32.9 | 15.2 ± 29.0 | 1.9 ± 1.1 | 215.8 ± 95.1 |
| [1] AM-6 | 1.7 ± 1.5 | 8.4 ± 7.1 | 1.8 ± 0.8 | 147.9 ± 69.6 |
| [1] AM-7 | 3.7 ± 2.9 | 6.0 ± 2.5 | 2.4 ± 2.3 | 164.7 ± 73.6 |
| [3] AM-8 | 76.1 | 20.0 ± 8.0 | 5.8 ± 2.9 | 160.0 ± 30 |
| 10CFR Part 20 Appendix B Table II | 50,000 | 800 | 30,000 | 40,000 |

[1] Time period is from 2nd Quarter 1982 through 1st Quarter 1987.

[2] Time period is from 2nd Quarter 1982 through 1st Quarter 1983.

[3] Time period is 2nd Quarter 1987.

Also included in Table 2.10-2 are the values listed in 10 CFR Part 20, Appendix B Table II. These values represent the maximum offsite concentration of the various radionuclides and are given for the insoluble fraction since it is generally more restrictive than the limits for the soluble fraction. These limits are applicable after consideration of naturally occurring background concentrations. The background concentrations measured at the Crow Butte Project generally range from 1 percent of the thorium-230 limit to less than 0.01 percent of the uranium limit and radium-226 limit.

The results of the radon sampling are presented in Table 2.10-3. This table gives the mean and standard deviations for the concentration of radon in air that were obtained at the four primary air monitoring stations for forty-five months preceding the start-up of the R&D Operations. The data for AM-3, 4 and 5 represent nine months of the monitoring program. Data for each month consisted of three samples collected and analyzed during the month.

The average values for the forty-five month period were quite consistent for all seven monitoring stations with mean values ranging from 0.18 to 0.20 x $10^{-9}$ uCi/ml. AM-7, the background location, averaged 0.20 x $10^{-9}$ uCi/ml. Values for radon-222 near the area of the proposed Sand Rock Mill Project in Campbell County, Wyoming have been reported to range from 0.01 x $10^{-9}$ to 0.81 x $10^{-9}$ uCi/ml (USNRC, 1982). Average values ranging from 0.15 x $10^{-9}$ to 0.20 x $10^{-9}$ uCi/ml of radon-222 have been measured in the region of the Rhode Ranch Project in South Texas (Texas Dept. of Health, 1982). The outdoor levels of radon-222 vary widely and have been reported to range from 0.04 x $10^{-9}$ to 2.0 x $10^{-9}$ uCi/ml (USNRC, 1979A, USEPA, 1979). The limit for radon-222 stated in Table II of Appendix B, 10 CFR Part 20 is 3 x $10^{-9}$ uCi/ml. This limit is for unrestricted locations and is applied after correction for the background radon-222 concentration.

Table 2.10-4 lists the radon-222 and air particulate concentrations during the R&D operation. There is no statistical difference (a = 0.05) between the mean concentration values of radon-222 before and during the operations. With only two quarters of data for the airborne particulate concentrations, statistical differences can only be evaluated based on compar-

## TABLE 2.10-3

### AVERAGE AMBIENT RADON-222 CONCENTRATION
### CROW BUTTE PROJECT

| Air Monitor Station No. | Radon Concentration x $10^{-9}$ uCi/ml |
|---|---|
| | Pre-Mining |
| AM-1 | 0.19 +/- 0.14 |
| AM-2 | 0.19 +/- 0.11 |
| AM-3 | 0.20 +/- 0.13 |
| AM-4 | 0.19 +/- 0.11 |
| AM-5 | 0.20 +/- 0.11 |
| AM-6 | 0.18 +/- 0.13 |
| AM-7 | 0.20 +/- 0.14 |

### TIME PERIODS

| | |
|---|---|
| AM-1, AM-2, AM-6, AM-7 | Samples from 2nd Quarter of 1982 through 4th Quarter of 1985. |
| AM-3, AM-4, AM-5 | Samples taken from 2nd Quarter of 1982 through the 4th Quarter of 1982. |

## TABLE 2.10-4

### AVERAGE AIR PARTICULATE AND RADON-222 CONCENTRATIONS DURING OPERATIONS CROW BUTTE PROJECT

| Air Monitor Station | [1]Radon-222 $x10^{-9}$ uCi/ml | | [2]Nat. Uranium $x10^{-16}$ uCi/ml | [2]Th-230 $x10^{-16}$ uCi/ml | [2]Ra-226 $x10^{-16}$ uCi/ml | [2]Pb-210 $x10^{-16}$ uCi/ml |
|---|---|---|---|---|---|---|
| AM-1 | 0.20 ± 0.18 | 4th 1986 | <1.0 | <0.9 | 6.9 ± 4.3 | 280 ± 70 |
| | | 1st 1987 | 34.0 | <1.0 | 15.1 ± 2.2 | 162 ± 160 |
| AM-2 | 0.21 ± 0.14 | 4th 1986 | 4.4 | <0.9 | 2.6 ± 3.4 | 220 ± 50 |
| | | 1st 1987 | 1.9 | 5.4 ± 1.32 | 2.9 ± 1.8 | 140 ± 20 |
| AM-6 | 0.20 ± 0.27 | 4th 1986 | <1.0 | 54.0 ± 26.0 | 22.6 ± 6.1 | 230 ± 70 |
| | | 1st 1987 | 1.9 | 9.8 ± 5.4 | 3.8 ± 2.1 | 160 ± 30 |
| AM-7 | 0.35 ± 0.50 | 4th 1986 | <1.0 | <0.9 | <0.8 | 180 ± 60 |
| | | 1st 1987 | 1.9 | <1.0 | 2.2 ± 1.8 | 160 ± 20 |

[1] Monthly samples from August 1986 through March 1987

[2] 4th Quarter 1986 and 1st Quarter 1987; air volume sampled greater than 2000 $m^3$.

ing the individual quarterly results with the mean concentrations prior to operation. The statistical differences which exist consistently include increased radium-226 concentrations at AM-1, and below average concentrations of thorium-230 at AM-7. Other differences which exist between the concentrations prior to and during R&D operations, however, were not consistent. Given the large standard errors associated with air particulate concentrations and the minimal data available for air particulate concentrations during operation, statistical comparisons are probably inappropriate.

### 2.10.3 Water Sampling Program

Ground Water. In the area around the Crow Butte Site, 20 private water wells were used to determine the concentrations of various radionuclides in the groundwater. The locations of these wells are shown in Figure 2.10-1. Samples from these wells were analyzed for radionuclides. This section will be limited to the results of the radiometric analyses.

The sampling program began in October 1981 when a few wells were sampled. By May 1982, all wells within one kilometer of the commercial permit area had been sampled for radionuclides at least once. The analyses of these wells are shown in Table 2.10-5. The samples were collected at a discharge point closest to the well and preserved following EPA Guidelines. The samples were not filtered and the results represent the concentration of the total radionuclides. The primary analytical laboratories were Core Laboratories, Inc. in Denver, Colorado and Energy Laboratories in Casper, Wyoming. Some of the analyses for uranium and radium-226 were performed by Natural Resources Laboratory in Denver, Colorado. Duplicate analyses were performed on sample splits by Jordan Laboratories in Corpus Christi, Texas.

Table 2.10-6 contains the results of the analyses on all wells sampled from 1981 to 1986 for the concentration of natural uranium and radium-226. Some of these wells were also included in Table 2.10-5. The locations of these wells are shown in Figure 2.10-1. The results of the analyses indicate concentrations of the radionuclides are within the expected ranges for naturally occurring background concentrations.

## TABLE 2.10-5

### RESULTS OF THE RADIOMETRIC ANALYSIS OF AREA WATER WELLS CROW BUTTE R&D PROJECT

| Well No. See Figure 2.10-1 for Location | Date of Sample | Nat. Uranium (uCi/ml)x10$^{-9}$ | Thorium-230 (uCi/ml)x10$^{-9}$ | Radium-226 (uCi/ml)x10$^{-9}$ | Lead-210 (uCi/ml)x10$^{-9}$ | Polonium-210 (uCi/ml)x10$^{-9}$ |
|---|---|---|---|---|---|---|
| 8 | 05/10/82 | 14 | 0.1 ± 0.3 | 0.3 ± 0.1 | 0.7 ± 0.7 | 0.1 ± 0.2 |
| 11 | 05/04/82 | 5. | 0.3 ± 0.5 | 0.3 ± 0.1 | 0.0 ± 0.7 | 0.5 ± 0.4 |
| 12 | 05/10/82 | 2. | 0.7 ± 0.5 | 0.2 ± 0.1 | 0.6 ± 0.8 | 0.2 ± 0.2 |
| 13 | 04/29/82 | 5. | 0.0 ± 0.2 | 0.1 ± 0.1 | 0.2 ± 0.7 | 0.5 ± 0.3 |
| 16 | 05/04/82 | 5 | 0.5 ± 0.6 | 0.3 ± 0.1 | 0.0 ± 0.8 | 0.3 ± 0.2 |
| 17 | 04/28/82 | 1 | 0.1 ± 0.6 | 0.4 ± 0.1 | 0.4 ± 0.6 | 0.1 ± 0.3 |
| | 07/13/82 | 6 | 0.0 ± 0.8 | 0.1 ± 0.1 | o.o ± 3.5 | 0.4 ± 0.3 |
| | 10/05/82 | 4 | ----- | 0.6 ± 0.1 | 0.0 ± 1.8 | 0.1 ± 0.1 |
| 24 | 05/08/82 | 2 | 0.2 ± 0.4 | 0.3 ± 0.1 | 0.0 ± 0.7 | 0.0 ± 0.1 |
| 25 | 04/28/82 | 2 | 0.0 ± 0.3 | 0.3 ± 0.1 | 0.5 ± 0.6 | 0.6 ± 0.3 |
| | 04/28/82 | 3 | -0.4 ± 2.7 | 0.1 ± 0.1 | -1.5 ±-2.3 | -.02 ± 0.2 |
| | 07/13/82 | 4 | 0.3 ± 1 | 0.1 ± 0.1 | 0.9 ± 3.6 | 1.4 ± 1.0 |
| | 10/04/82 | 5 | ----- | 0.4 ± 0.1 | 0.0 ± 1.6 | 0.3 ± 0.4 |
| 26 | 04/28/82 | 2 | 0.6 ± 0.5 | 0.1 ± 0.1 | 0.0 ± 0.6 | 0.2 ± 0.2 |
| | 07/14/82 | 4 | 0.0 ± 0.8 | 0.2 ± 0.1 | 0.0 ± 3.2 | 0.3 ± 0.9 |
| | 10/05/82 | 8 | ----- | 0.4 ± 0.1 | 0.0 ± 1.6 | 1.3 ± 1.2 |
| 27 | 05/08/82 | 3 | 0.4 ± 0.4 | 0.3 ± 0.1 | 0.4 ± 0.7 | 0.4 ± 0.3 |
| | 07/14/82 | 4 | 0.6 ± 1.0 | 0.2 ± 0.1 | 0.0 ± 3.4 | 0.0 ± 0.5 |
| | 10/05/82 | 3 | ----- | 0.5 ± 0.2 | 0.0 ± 1.7 | 0.6 ± 0.5 |

TABLE 2.10-5 (Cont'd)

| Well No. See Figure 2.10-1 for Location | Date of Sample | Nat. Uranium (uCi/ml)x10$^{-9}$ | Thorium-230 (uCi/ml)x10$^{-9}$ | Radium-226 (uCi/ml)x10$^{-9}$ | Lead-210 (uCi/ml)x10$^{-9}$ | Polonium-210 (uCi/ml)x10$^{-9}$ |
|---|---|---|---|---|---|---|
| 28 | 05/08/82 | 3 | 0.1 ± 0.4 | 0.5 ± 0.1 | 0.7 ± 0.7 | 0.3 ± 0.2 |
| 31 | 05/06/82 | 3 | 0.0 ± 0.3 | 0.1 ± 0.1 | 0.0 ± 1.0 | 0.2 ± 0.2 |
| 37 | 05/04/82 | 4 | 0.2 ± 0.4 | 0.3 ± 0.1 | 0.0 ± 0.7 | 0.5 ± 0.3 |
| 38 | 05/04/82 | 6 | 0.4 ± 0.6 | 0.2 ± 0.1 | 0.0 ± 0.7 | 0.3 ± 0.5 |
| 41 | 05/06/82 | 2 | 0.7 ± 0.5 | 0.4 ± 0.1 | 0.0 ± 0.8 | 0.5 ± 0.4 |
| 57 | 04/28/82 | 5 | 0.8 ± 0.7 | 0.4 ± 0.1 | 0.9 ± 0.7 | 0.3 ± 0.3 |
| 58 | 05/04/82 | 10 | 0.5 ± 0.4 | 0.5 ± 0.1 | 0.0 ± 0.7 | 0.5 ± 0.5 |
| 59 | 05/04/82 | 26 | 1.0 ± 0.6 | 0.2 ± 0.1 | 0.4 ± 0.9 | 0.6 ± 0.3 |
| 62* | 04/27/82 | 22 | 0.4 ± 0.5 | 13.8 ± 0.6 | 10.6 ± 1.3 | 0.8 ± 0.4 |
| | 04/27/82 | 21 | .7 ± 1.7 | 17 ± 1 | 22 ± 4 | 0.9 ± 0.3 |
| 63 | 04/28/82 | 8 | 0.1 ± 0.5 | 0.5 ± 0.1 | 0.1 ± 0.7 | 0.5 ± 0.3 |

* Chadron Formation. All other wells are in the Brule Formation.

## TABLE 2.10-6

### AVERAGE RESULTS OF URANIUM AND RADIUM-226 ANALYSES OF AREA WATER WELLS CROW BUTTE PROJECT

| Well No. | Formation | Dates | Nat. Uranium (uCi/ml) x $10^{-9}$ | Radium-226 (uCi/ml) x $10^{-9}$ |
|---|---|---|---|---|
| 13 | Brule | 01/82- 7/85 | 5.01 +/- 2.20 | 0.26 +/- 0.28 |
| 17 | Brule | 10/81-10/86 | 2.44 +/- 2.17 | 0.43 +/- 0.55 |
| 19 | Brule | 07/85-10/85 | 2.37 +/- 1.42 | 0.45 +/- 0.35 |
| 25 | Brule | 10/81-10/86 | 3.05 +/- 2.30 | 0.45 +/- 0.53 |
| 26 | Brule | 10/81-10/86 | 3.66 +/- 2.10 | 0.64 +/- 0.98 |
| 27 | Brule | 10/81-10/86 | 3.10 +/- 2.78 | 0.54 +/- 0.71 |
| 30 | Brule | 01/82-10/85 | 10.56 +/- 3.15 | 0.54 +/- 0.23 |
| 40 | Brule | 01/82/07/85 | 3.11 +/- 1.49 | 0.36 +/- 0.23 |
| 56 | Brule | 10/81-07/85 | 12.19 +/- 3.66 | 0.29 +/- 0.22 |
| 57 | Brule | 10/81-04/86 | 4.40 +/- 2.78 | 1.2 +/- 2.9 |
| 61 | Chadron | 10/81-07/85 | 0.95 +/- 0.34 | 3.3 +/- 0.85 |
| 62 | Chadron | 01/81-07/85 | 16.42 +/- 4.47 | 13.98 +/- 3.9 |
| 63 | Brule | 10/81-07/85 | 7.38 +/- 3.72 | 0.44 +/- 0.22 |
| 65 | Chadron | 10/81-07/85 | 1.29 +/- 0.98 | 19.29 +/- 3.68 |
| 66 | Brule | 10/81-07/85 | 18.90 +/- 6.57 | 0.58 +/- 0.64 |
| 74 | Brule | 10/81-07/85 | 6.97 +/- 1.96 | 0.42 +/- 0.19 |
| 88 | Brule | 01/82-07/85 | 11.58 +/- 3.99 | 0.46 +/- 0.26 |
| 95 | Brule | 01/82-07/85 | 15.64 +/- 2.78 | 0.53 +/- 0.35 |

In addition to the thirty private wells that were sampled, eleven additional wells were drilled by FEN. These wells were screened in specific formations, four wells being completed in the Brule and seven wells in the the Chadron. These wells were sampled from late July 1982 through October 1985 and analyzed for the concentration of uranium and radium-226. The results of the sampling for these wells are shown in Table 2.10-7.

In addition to these regional baseline wells and the area private wells, samples have been collected from eleven monitor wells for a mininum of four samples. The mean uranium concentration is 22.1 +/- 12 uCi/ml x $10^{-9}$, with a mean radium-226 concentration of 51.2 +/- 80.6 x $10^{-9}$ uCi/ml. Table 2.10-8 lists the means and standard deviations for the individual monitor wells. These values will be used to establish the actual background concentrations of the radionuclides in the zone to be mined.

The concentration of uranium in the wells completed in the Brule Formation (Tables 2.10-5, 2.10-6, 2.10-8, 2.10-9) ranges from 1 x $10^{-9}$ to 26 x $10^{-9}$ uCi/ml, while the Chadron wells vary between 0.95 x $10^{-9}$ and 426 x $10^{-9}$ uCi/ml. A recent study of uranium concentrations in groundwater was conducted in southcentral Nebraska on the north side of the Platte River. This study found uranium concentrations ranging from 0.3 x $10^{-9}$ to 370 x $10^{-9}$ uCi/ml with an average of 54 x $10^{-9}$ uCi/ml. The source of this uranium was concluded to be from upgradient irrigated croplands (Spalding, 1981).

In another study performed on groundwater in Southeastern Harding County, South Dakota, the uranium concentrations were reported to range from 0.7 x $10^{-9}$ to 15 x $10^{-9}$ uCi/ml (Struempler, 1980). This area of South Dakota has been studied due to the potential for uranium deposits in the region. Groundwater samples collected in the Brule Formation in Northwestern Nebraska and analyzed for uranium concentrations average 12 x $10^{-9}$ uCi/ml, while samples from wells completed in the Chadron Formation averaged 32 x $10^{-9}$ uCi/ml (Struempler, 1979).

The analyses of the baseline wells completed in the Brule display the fairly low concentrations of uranium and radium-226 that are typical of the Brule Formation. Some baseline wells completed in the Chadron Formation

## TABLE 2.10-7

### AVERAGE RADIOMETRIC ANALYSIS OF REGIONAL BASELINE WELLS
### CROW BUTTE PROJECT

| Well No. | Formation | Nat. Uranium (uCi/ml)x10$^{-9}$ | Radium-226 (uCi/ml)x10$^{-9}$ |
|---|---|---|---|
| RA-1 | Brule | 4.2 +/- 3.5 | 6.9 +/- 2.1 |
| RA-2 | Brule | 9.8 +/- 3.3 | 2.1 +/- 5.38 |
| RB-1 | Brule | 2.0 +/- 3.1 | 1.9 +/- 1.4 |
| RB-3 | Brule | 3.4 +/- 2.2 | 2.6 +/- 4.7 |
| RC-1 | Chadron | 1.5 +/- 0.9 | 0.8 +/- 0.6 |
| RC-2 | Chadron | 1.8 +/- 1.2 | 1.4 +/- 1.4 |
| RC-3 | Chadron | 2.1 +/- 1.7 | 1.2 +/- 0.8 |
| RC-4 | Chadron | 425 +/- 591.7 | 366 +/- 120 |
| RC-5 | Chadron | 1.42+/- 1.2 | 4.3 +/- 2.1 |
| RC-6 | Chadron | 1.8 +/- 1.4 | 2.3 +/- 4.3 |
| RC-7 | Chadron | 2.2 +/- 2.1 | 1.1 +/- 0.8 |

## TABLE 2.10-8

### AVERAGE URANIUM AND RADIUM-226 IN MONITOR WELLS CROW BUTTE PROJECT

| Well No. | Formation | Date | Nat. Uranium (uCi/ml)x $10^{-9}$ | Radium-226 (uCi/ml)x$10^{-9}$ |
|---|---|---|---|---|
| PM-1 | Chadron | 12/82-10/86 | 33.2 +/- 14.2 | 84.0 +/- 49.3 |
| PM-2 | Chadron | 11/85-10/86 | 17.9 +/- 9.4 | 5.2 +/- 2.3 |
| PM-3 | Chadron | 11/85-10/86 | 25.1 +/- 10.6 | 12.6 +/- 6.3 |
| PM-4 | Chadron | 12/82-10/86 | 13.5 +/- 5.9 | 60.1 +/- 20.0 |
| PM-5 | Chadron | 11/85-10/86 | 35.5 +/- 28.2 | 27.9 +/- 44.5 |
| PM-6 | Brule | 12/82-10/86 | 4.4 +/- 2.3 | 2.4 +/- 2.7 |
| PM-7 | Brule | 01/83-10/86 | 15.2 +/- 7.0 | 1.8 +/- 2.6 |
| PM-8 | Chadron | 11/85-10/86 | 25.5 +/- 10.6 | 60.2 +/- 19.9 |
| PM-9 | Chadron | 11/85-10/86 | 44.6 +/- 17.5 | 34.8 +/- 10.3 |
| PM-10 | Chadron | 11/85-10/86 | 18.5 +/- 7.11 | 19.7 +/- 6.5 |
| PM-11 | Brule | 11/85-10/86 | 10.0 +/- 9.1 | 4.9 +/- 5.2 |

have radionuclide concentrations that are low, while the other wells have elevated concentrations of uranium and radium-226. An explanation for these elevated levels is that these wells were completed in or near the mineralized zone of the Chadron Formation. The Chadron is known to be mineralized and is the formation from which the uranium will be extracted and therefore, these elevated levels are not unexpected. As can be seen from the data presented, radium-226 concentrations in the Chadron Formation can be extremely high. In the current R&D wellfield, values exceeding 1000 x $10^{-9}$ uCi/ml are present. (Appendix 2.9A - **PT Wells**)

<u>Surface Water</u>. Surface waters in the region surrounding the Crow Butte Project have been sampled as part of the preoperational radiological monitoring program. Eight impoundments have been incorporated into the program. These impoundments are labeled I-1 through I-8 on the topographic map (Figure 2.10-1). There are no impoundments located within the restricted area boundary.

The impoundments were sampled semiannually for one year. The samples were collected in June, 1982 and January, 1983. Samples collected in June, 1982 were analyzed for the concentration of natural uranium, thorium-230, radium-226, lead-210 and polonium-210. The samples were not filtered and the results of the analysis represent the combination of both the dissolved and suspended concentrations. A commercial laboratory performed the analyses. The samples collected in January, 1983 were analyzed for uranium and radium-226.

The results of the analyses for the two sets of samples are shown in Table 2.10-9. All the impoundments appear to have similar concentrations of radionuclides. Uranium varied from 2.7 x $10^{-9}$ to 7.1 x $10^{-9}$ uCi/ml, while radium varied from 0.3 x $10^{-9}$ to 0.8 x $10^{-9}$ uCi/ml. All of the values are within ranges considered as natural background. Concentrations of uranium in impoundments near the Anaconda Rhode Ranch Project, in South Texas, have been reported to vary between <1.2 x $10^{-9}$ and 4.6 x $10^{-9}$ uCi/ml, while radium-226 ranged from 0.0 x $10^{-9}$ to a maximum of 1.4 x $10^{-9}$ uCi/ml (Texas Department of Health, 1982).

## TABLE 2.10-9

### AVERAGE RADIOMETRIC ANALYSIS OF WATER SAMPLES FROM SURFACE WATER IMPOUNDMENTS CROW BUTTE PROJECT

| Sample Location | Nat. Uranium (uCi/ml)x10$^{-9}$ | Thorium-230 (uCi/ml)x10$^{-9}$ | Radium-226 (uCi/ml)x10$^{-9}$ | Lead-210 (uCi/ml)x10$^{-9}$ | Polonium-210 (uCi/ml)x10$^{-9}$ |
|---|---|---|---|---|---|
| I-1 | 2.7 | 1.4 ± 0.8 | 0.6 | 0.2 ± 0.9 | 0.8 ± 0.6 |
| I-2 | 6.4 ± 1.4 | 2.3 ± 0.7 | 0.3 | 0.3 ± 0.6 | 0.9 ± 1.0 |
| I-3 | 4.4 ± 3.4 | 1.5 ± 0.6 | 0.8 ± 0.3 | 1.0 ± 1.0 | 2.0 ± 1.2 |
| I-4 | 6.1 ± 0.95 | 3.8 ± 1.7 | 0.45 ± 0.21 | 0.6 ± 1.3 | 0.3 ± 0.6 |
| I-5 | 4.7 ± 0.95 | 2.7 ± 1.1 | 0.65 ± 0.2 | 0.1 ± 0.9 | 0.0 ± 0.3 |
| I-6 | 4.1 ± 1.4 | 2.0 ± 1.3 | 0.5 ± 0.2 | 1.8 ± 1.4 | 0.2 ± 0.4 |
| I-7 | 6.4 ± 1.4 | ------ | 0.6 ± 0.0 | ------ | ------ |
| I-8 | 7.1 ± 1.4 | ------ | 0.6 ± 0.1 | ------ | ------ |

A small stream, Squaw Creek, passes north of the Crow Butte restricted area. This stream eventually enters the White River downstream of Crawford. In the preoperational radiological monitoring program, four sample sites (2 primary S-2, S-3) were designated on Squaw Creek. These sites are shown in Figure 2.10-1. Site S-2 is located on Squaw Creek as it enters the restricted area and S-3 is downstream from the restricted area. Site S-1 is located southeast of the Permit Area and Site S-4 is located north of the Permit Area.

Samples were collected from these locations on a quarterly basis beginning in February 1982. The first samples from S-2 were analyzed for the concentrations of total uranium, thorium-230 and radium-226. Additionally, on a semiannual basis, the downstream sample was analyzed for lead-210 and polonium-210. Core Laboratories in Denver performed a majority of the analyses. Samples from S-1 and S-4 were analyzed for uranium and radium-226 only.

Samples were also taken from White Clay Creek which flows near the Permit Area over the time period of 4/82 to 10/85 and analyzed for uranium and radium-226. These samples are designated as WC-1 and WC-2 on Figure 2.10-1.

The results obtained on samples collected from February 1982 are listed in Table 2.10-10. The upstream (S-2) and downstream (S-3) samples were consistent within a given sampling period, but varied between quarterly samples. The differences in stream flowrate at various sampling times may have resulted in these perturbations. The results displayed in Table 2.10-10 are consistent with concentrations normally considered as naturally occurring. Squaw Creek empties into the White River and samples collected from the White River show average uranium concentrations of between 2.5 x $10^{-9}$ and 7.8 x $10^{-9}$ uCi/ml and average radium concentrations between 0.3 x $10^{-9}$ and 1.0 x $10^{-9}$ uCi/ml.

Uranium concentrations in the Platte River in southcentral Nebraska have been reported to average 16 x $10^{-9}$ uCi/ml (Spalding, 1981). The Brazos River in Central Texas has been reported to have uranium concentrations between 0.4 x $10^{-9}$ and 1.8 x $10^{-9}$ uCi/ml (Spalding and Exner, 1976). In the study of the Brazos River, the source of uranium was identified as the

## TABLE 2.10-10

### AVERAGE RADIOMETRIC ANALYSIS OF WATER SAMPLES FROM SQUAW CREEK CROW BUTTE PROJECT

| Sample Location | Sample Period | Nat. Uranium (uCi/ml)x10$^{-9}$ | Thorium-230 (uCi/ml)x10$^{-9}$ | Radium-226 (uCi/ml)x10$^{-9}$ | Lead-210 (uCi/ml)x10$^{-9}$ | Polonium-210 (uCi/ml)x10$^{-9}$ |
|---|---|---|---|---|---|---|
| S-1 | 2/82-10/85 | 2.5 ± 2.4 | ----- | 0.5 ± 0.95 | ----- | ----- |
| S-2 | 2/82-01/87 | 2.8 ± 3.5 | 2.0 ± 1.7 | 0.6 ± 0.8 | ----- | ----- |
| S-3 | 2/82-01/87 | 8.3 ±24.1 | 0.6 ± 0.2 | 0.4 ± 0.4 | 0.7 ± 0.5 | 0.3 ± 0.1 |
| S-4 | 4/82-07/84 | 3.1 ± 1.7 | ----- | 0.4 ± 0.3 | ----- | ----- |
| WC-1 | 4/82-10/85 | 5.9 ± 2.9 | | 0.4 ± 0.2 | | |
| WC-2 | 4/82-10/85 | 6.1 ± 4.2 | | 0.3 ± 0.1 | | |

phosphate fertilizers used in the region. This source of uranium was also identified as contributing to a uranium concentration of 1.3 x $10^{-9}$ uCi/ml found in the Navasota River and an average of 0.66 x $10^{-9}$ uCi/ml in the Little Brazos, both located in Central Texas (Spalding and Sackett, 1972).

### 2.10.4 Soil Sampling Program

Samples of the soils in and nearby the Commercial Permit Area have been collected. The samples were collected in July 1982 at 50 locations in the Commercial Permit Area and vicinity. The locations are shown in Figure 2.10-1. The samples were all surface samples, collected to a depth of 5 centimeters. Two of the sites, Nos. 24 and 27, also served as subsurface sites. One-third meter composite samples to a total depth of one meter were collected at each of the two locations. Once collected, the samples were bagged and sent to a commercial lab for analysis. The concentrations of uranium and radium-226 were determined as well as the concentrations of various metals. Only the radiometric analyses will be presented in this section. The nonradiometric analyses are discussed in Section 2.9.

The results of the surface soil sampling program are presented in Table 2.10-11 and the subsurface soil sample results are in Table 2.10-12. The uranium concentration varied from 0.36 x $10^{-6}$ to 6.7 x $10^{-6}$ uCi/g, while radium-226 ranged between 0.1 x $10^{-6}$ and 2.0 x $10^{-6}$ uCi/g. The radionuclide concentrations are found to be homogeneous through the first meter of soil. Also included in Table 2.10-11 are the results of the surface soil samples collected at the air monitoring stations. These results appear similar to the samples collected in the area with the exception of the uranium concentration in the sample collected at AM-6 (Sample location 6). This uranium value is slightly higher than the other samples. A possible explanation for this anomaly is that AM-6 is located very close to the compacted dirt driveway of a local motel and that the surface sample may have included a substantial contribution from the roadbed material. This value for uranium is still considered low and at this time, there does not appear to be a need for resampling AM-6.

## TABLE 2.10-11

### RADIONUCLIDES IN SURFACE SOILS FROM COMMERCIAL PERMIT AREA AND VICINITY

| Sample[1] Location | Date | Natural U $x10^{-6}$ uCi/g | Ra-226 $x10^{-6}$ uCi/g | Sample[1] Location | Date | Natural U $x10^{-6}$ uCi/g | Ra-226 $x10^{-6}$ uCi/g |
|---|---|---|---|---|---|---|---|
| 1 | 07/24/82 | 1.4 | 1.1 ± 0.2 | 35 | 07/24/82 | 0.86 | 1.0 ± 0.2 |
| 2 | 07/24/82 | 0.75 | 1.4 ± 0.3 | 36 | 07/24/82 | 1.1 | 0.7 ± 0.2 |
| 3 | 07/24/82 | 0.68 | 0.9 ± 0.3 | 37 | 07/24/82 | 1.2 | 0.8 ± 0.3 |
| 4 | 07/24/82 | 0.83 | 1.4 ± 0.3 | 38 | 07/24/82 | 1.7 | 1.0 ± 0.2 |
| 5 | 07/24/82 | 5.2 | 1.4 ± 0.3 | 39 | 07/24/82 | 1.5 | 1.0 ± 0.2 |
| 6 | 07/24/82 | 6.7 | 0.9 ± 0.2 | 40 | 07/24/82 | 1.1 | 0.5 ± 0.1 |
| 7 | 07/24/82 | 1.4 | 2.0 ± 0.4 | 41 | 07/24/82 | 0.59 | 0.8 ± 0.2 |
| 8 | 07/24/82 | 1.1 | 1.3 ± 0.3 | 42 | 07/24/82 | 0.81 | 0.7 ± 0.2 |
| 9 | 07/24/82 | 2.0 | 1.2 ± 0.3 | 43 | 07/24/82 | 1.5 | 0.9 ± 0.2 |
| 10 | 07/24/82 | 0.51 | 1.6 ± 0.3 | 44 | 07/24/82 | 1.7 | 1.0 ± 0.3 |
| 11 | 07/24/82 | 1.2 | 1.6 ± 0.3 | 45 | 07/24/82 | 1.8 | 1.3 ± 0.3 |
| 12 | 07/24/82 | 1.8 | 1.2 ± 0.2 | 46 | 07/24/82 | 1.6 | 0.8 ± 0.2 |
| 13 | 07/24/82 | 1.9 | 1.2 ± 0.2 | 47 | 07/24/82 | 1.7 | 0.4 ± 0.2 |
| 14 | 07/24/82 | 2.3 | 1.2 ± 0.2 | 48 | 07/24/82 | 1.1 | 0.4 ± 0.2 |
| 15 | 07/24/82 | 1.6 | 1.3 ± 0.2 | 49 | 07/24/82 | 2.4 | 0.9 ± 0.2 |
| 16 | 07/24/82 | 1.3 | 1.4 ± 0.2 | 50 | 07/24/82 | 1.5 | 0.8 ± 0.2 |
| 17 | 07/24/82 | 2.4 | 1.5 ± 0.3 | | | | |
| 18 | 07/24/82 | 1.8 | 1.3 ± 0.3 | | | | |
| 19 | 07/24/82 | 1.5 | 0.7 ± 0.2 | | | | |
| 20 | 07/24/82 | 1.9 | 0.8 ± 0.2 | | | | |
| 21 | 07/24/82 | 3.2 | 1.6 ± 0.3 | | | | |
| 22 | 07/24/82 | 3.3 | 1.3 ± 0.2 | | | | |
| 23 | 07/24/82 | 1.3 | 1.2 ± 0.2 | | | | |
| 24 | 07/24/82 | 0.36 | 1.4 ± 0.3 | | | | |
| 25 | 07/24/82 | 1.6 | 0.9 ± 0.2 | | | | |
| 26 | 07/24/82 | 1.2 | 0.8 ± 0.2 | | | | |
| 27 | 07/24/82 | 1.7 | 0.9 ± 0.2 | | | | |
| 28 | 07/24/82 | 0.38 | 0.7 ± 0.2 | | | | |
| 29 | 07/24/82 | 1.2 | 1.2 ± 0.2 | | | | |
| 30 | 07/24/82 | 0.65 | 1.0 ± 0.2 | | | | |
| 32 | 07/24/82 | 1.2 | 0.7 ± 0.2 | | | | |
| 32 | 07/24/82 | 1.2 | 0.5 ± 0.2 | | | | |
| 33 | 07/24/82 | 1.4 | 0.9 ± 0.3 | | | | |
| 34 | 07/24/82 | 1.2 | 1.3 ± 0.3 | | | | |

(1) Samples 1 - 7 taken from air monitoring stations.
Samples 8 -50 taken from sites shown in Figure 2.10-1.

## TABLE 2.10-12

### RADIOMETRIC ANALYSES OF SUBSURFACE SOIL SAMPLES IN SECTION 19 CROW BUTTE PROJECT

| Sample Location | Depth | Nat.Uranium (uCi/g)x10$^{-6}$ | Radium-226 (uCi/g)x10$^{-6}$ |
|---|---|---|---|
| 24 | 0-0.33 m | 1.2 | 0.4 +/- 0.1 |
| 24 | 0.34-0.66 m | 1.2 | 0.3 +/- 0.1 |
| 24 | 0.67-1.0 m | 1.2 | 0.2 +/- 0.1 |
| 27 | 0-0.33 m | 1.2 | 0.2 +/- 0.1 |
| 27 | 0.34-0.66 m | 0.6 | 0.1 +/- 0.1 |
| 27 | 0.67-1.0 m | 0.6 | 0.2 +/- 0.1 |

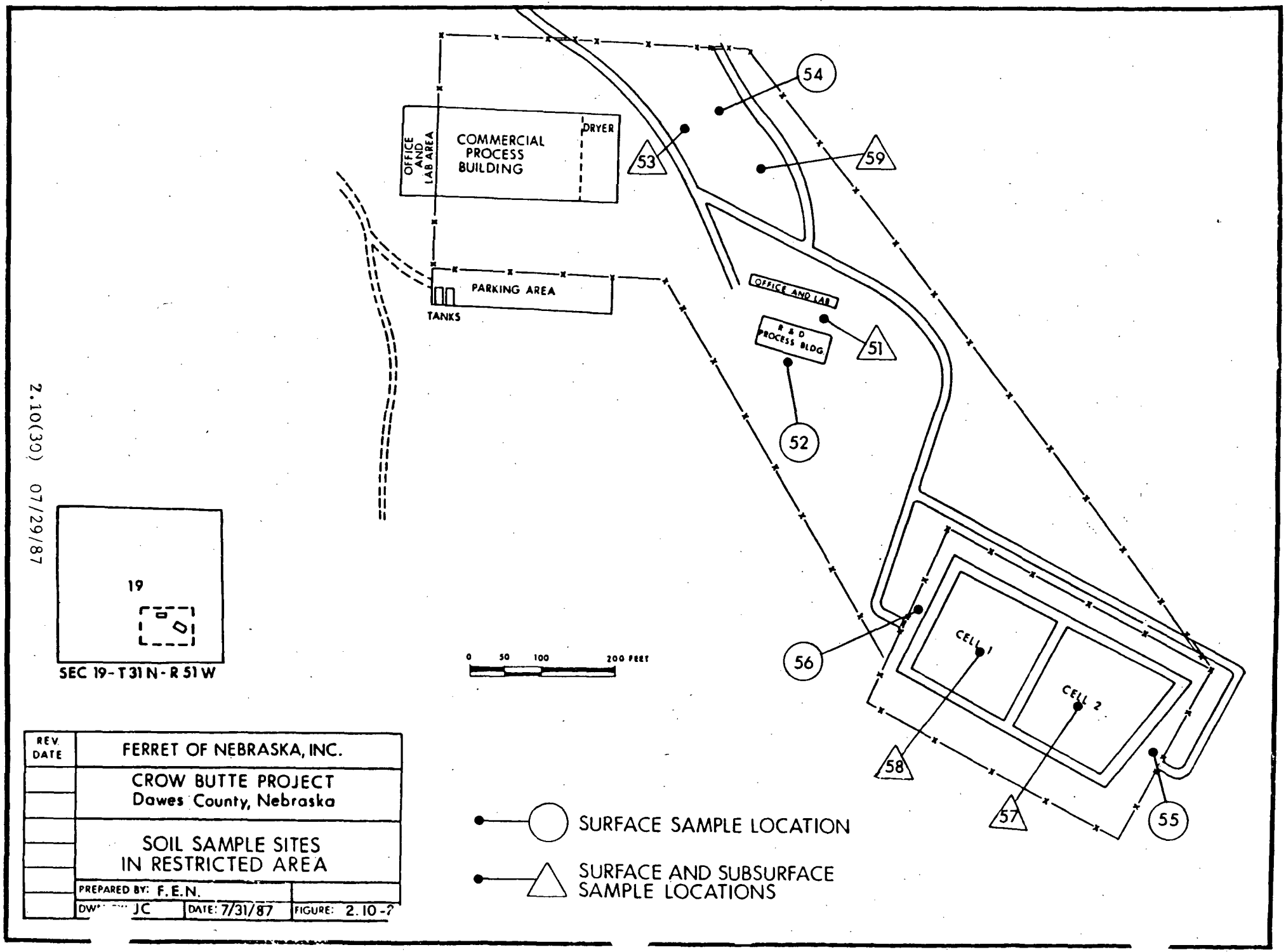
The concentration of uranium in sandstones has been reported to be between 0.3 x $10^{-6}$ and 0.4 x $10^{-6}$ uCi/g (Eisenbud, 1973, Eicholz, 1976). In Campbell County, Wyoming near Conoco's proposed Sand Rock Mill Project, the results of the surface soil sampling showed radium-226 in the range of 0.1 x $10^{-6}$ to 1.8 x $10^{-6}$ uCi/g and the highest concentration of uranium was reported to be 5.1 x $10^{-6}$ uCi/g (USNRC, 1982). Soil samples collected around Ray Point and Falls City, Texas had a reported average radium-226 concentration of 0.9 x $10^{-6}$ uCi/g with a range of 0.5 x $10^{-6}$ to 1.4 x $10^{-6}$ uCi/g (USNRC, 1979a).

In addition to the 50 surface samples collected in The Commercial Permit Area and vicinity, nine surface samples were collected within the Crow Butte restricted area boundary. The locations of the samples in the Crow Butte proposed commercial restricted area are shown in Figure 2.10-2. Of the nine surface sample sites, five sites were chosen for subsurface sampling - one subsurface site in each R&D wellfield and one in the plant area. These subsurface sites were sampled to a depth of one meter with composite samples prepared at one third meter intervals. When the R&D ponds were excavated, one sample was collected from the lowest point in each pond. This sample was a composite sample to a total depth of 60 centimeters below pond bottom.

All of the samples collected within the restricted area boundary were analyzed for the concentration of natural uranium and radium-226. All the samples were collected in December 1982 with the exception of the subsurface samples from the pond bottoms and the surface samples in the plant area after topsoil removal. The results of the analyses are contained in Table 2.10-13. The radionuclide concentrations are consistent with those obtained from samples collected in Section 19 and presented in Tables 2.10-11 and 2.10-12.

### 2.10-5 Sediment Sampling Program

Sediments in selected impoundments and Squaw Creek have been sampled as part of the preoperational radiological sampling program. These sediments were analyzed for the concentration of natural uranium, Th-230, Ra-226, Pb-

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## TABLE 2.10-13

### RADIOMETRIC ANALYSES OF SOIL SAMPLES WITHIN THE CROW BUTTE RESTRICTED AREA BOUNDARY

| Sample Location | Depth | Nat.Uranium (uCi/g)x10$^{-6}$ | Radium-226 (uCi/g)x10$^{-6}$ |
|---|---|---|---|
| 51 | Surface | 1.2 | 0.1 +/- 0.1 |
| 51 | 0-0.33 m | 1.8 | 0.3 +/- 0.1 |
| 51 | 0.34-0.66 m | 1.2 | 0.1 +/- 0.1 |
| 51 | 0.67-1.0 m | 1.2 | 0.2 +/- 0.1 |
| 52 | Surface | 1.2 | 0.1 +/- 0.1 |
| 53 | Surface | 1.8 | 0.0 +/- 0.1 |
| 53 | 0-0.33 m | 0.6 | 0.1 +/- 0.1 |
| 53 | 0.34-0.66 m | 0.6 | 0.1 +/- 0.1 |
| 53 | 0.67-1.0 m | 1.2 | 0.2 +/- 0.1 |
| 54 | Surface | 4.2 | 0.1 +/- 0.1 |
| 55 | Surface | 1.2 | 0.4 +/- 0.1 |
| 56 | Surface | 1.2 | 0.1 +/- 0.1 |
| 57 | 0-0.23 m | 1.5 | 1.0 +/- 0.2 |
| 57 | 0.23-0.44 m | 1.3 | 1.1 +/- 0.2 |
| 57 | 0.44-0.60 m | 1.3 | 1.5 +/- 0.3 |
| 58 | 0-0.27 m | 1.5 | 1.5 +/- 0.3 |
| 58 | 0.27-0.46 m | 1.8 | 1.3 +/- 0.3 |
| 58 | 0.46-0.60 m | 1.5 | 1.4 +/- 0.3 |
| 59 | Surface | 1.2 | 0.2 +/- 0.1 |
| 59 | 0-.33 m | 1.8 | 0.1 +/- 0.1 |
| 59 | 0.34-0.66 m | 1.2 | 0.1 +/- 0.1 |
| 59 | 0.67-1.0 m | 1.8 | 0.2 +/- 0.2 |

210 and Po-210. Sediments from Squaw Creek were sampled semi-annually. The sediment sampling began in May 1982 and continued through April 1986. The location for the sampling was the same as for the water samples. Site S-2 is upstream from the R&D restricted area while S-3 is downstream of the restricted area. The results from the analysis of the sediments collected from May 1982 through October, 1986 are listed in Table 2.10-14.

The radionuclide concentrations in the sediments at the two sites are very similar and are less than the maximums reported by the NRC (1982). Sediment samples collected near the Sand Rock Mill Project in Wyoming had reported maximum values of $13.x10^{-6}$ uCi/g for uranium, $3.5x10^{-6}$ uCi/g for radium-226, $3.4x10^{-6}$ uCi/g for thorium-230 and $22.x\ 10^{-6}$ uCi/g for lead-210 (USNRC, 1982). Sediments from impoundments near Anaconda's proposed Rhode Ranch Project in South Texas had maximum uranium concentrations of $11.x10^{-6}$ uCi/g and radium-226 concentrations ranged from $0.1x10^{-6}$ to $1.2x10^{-6}$ uCi/g with an average of $0.5x10^{-6}$ uCi/g (Texas Department of Health, 1982).

Eight impoundments, I-1 through I-8 also had sediment samples collected in December of 1982 and January of 1983. The results of the analyses of these samples are presented in Table 2.10-15. The concentrations of radionuclides in these sediments are similar to those reported for sediments from Squaw Creek.

### 2.10.6 Vegetation Sampling Program

As part of the preoperational radiological monitoring program vegetation samples were collected at the four primary air monitoring stations (AM-1, AM-2, AM-6, AM-7) and in the proposed R&D wellfield area. These samples were collected from June 1982 through July 1984 and analyzed for the concentrations of natural uranium, Th-230, Ra-226, Pb-210 and Po-210. Samples were also taken at air monitoring stations AM-3, Am-4 and AM-5 in June of 1982 and in the pasture in the prevailing wind direction in 1987.

The results of the analyses are presented in Table 2.10-16. The vegetation sample at each air monitoring station was a composite sample of the vegetation present in proportion to occurrence. Table 2.10-17 lists the

TABLE 2.10-14

AVERAGE RADIOMETRIC ANALYSES OF SEDIMENT SAMPLES
FROM SQUAW CREEK
CROW BUTTE PROJECT

| Sample Location | Sample Period | Nat. Uranium (uCi/g)x10$^{-6}$ | Thorium-230 (uCi/g)x10$^{-6}$ | Radium-226 (uCi/g)x10$^{-6}$ | Lead-210 (uCi/g)x10$^{-6}$ | Polonium-210 (uCi/g)x10$^{-6}$ |
|---|---|---|---|---|---|---|
| S-2 | 5/82-10/86 | 4.9 ± 9.43 | 2.4 ± 4.6 | 0.9 ± 1.1 | 0.4 ± 0.3 | 1.0 ± 0.5 |
| S-3 | 5/82-10/86 | 2.5 ± 4.2 | 2.2 ± 4.0 | 0.8 ± 0.5 | 0.3 ± 0.4 | 0.5 ± 0.2 |

## TABLE 2.10-15

### RADIOMETRIC ANALYSES OF SEDIMENT SAMPLES FROM AREA IMPOUNDMENTS

| Sample Location | Date | Nat. Uranium (uCi/g)x10$^{-6}$ | Thorium-230 (uCi/g)x10$^{-6}$ | Radium-226 (uCi/g)x10$^{-6}$ | Lead-210 (uCi/g)x10$^{-6}$ | Polonium-210 (uCi/g)x10$^{-6}$ |
|---|---|---|---|---|---|---|
| I-1 | 12/15/82 | 0.6 | 2.8 ± 4.5 | 0.2 ± 0.1 | 1.1 ± 0.9 | 0.8 ± 0.3 |
| I-2 | 01/07/83 | 1.8 | 0.8 ± 0.4 | 1.2 ± 0.2 | 1.8 ± 0.8 | 0.6 ± 0.5 |
| I-3 | 12/15/82 | 1.2 | 0.0 ± 2.4 | 0.3 ± 0.1 | 0.7 ± 0.9 | 0.8 ± 0.3 |
| I-4 | 12/15/82 | 1.2 | 3.2 ± 1.5 | 0.4 ± 0.1 | 1.0 ± 1.0 | 0.4 ± 0.3 |
| I-5 | 01/07/83 | 1.2 | 1.0 ± 0.6 | 1.0 ± 0.2 | 1.7 ± 0.8 | 0.6 ± 0.4 |
| I-6 | 01/07/83 | 1.2 | 1.0 ± 0.6 | 0.8 ± 0.1 | 3.7 ± 0.9 | 0.1 ± 0.2 |
| I-7 | 01/07/83 | 1.2 | 1.3 ± 0.5 | 1.2 ± 0.2 | 2.4 ± 0.9 | 0.9 ± 0.6 |
| I-8 | 01/07/83 | 1.8 | 1.1 ± 0.4 | 1.1 ± 0.1 | 2,4 ± 0.9 | 0.4 ± 0.3 |

## TABLE 2.10-16

### AVERAGE CONCENTRATION OF RADIONUCLIDES IN VEGETATION CROW BUTTE PROJECT

| Sample Location | Nat. Uranium (uCi/kg)x10$^{-6}$ | Thorium-230 (uCi/kg)x10$^{-6}$ | Radium-226 (uCi/kg)x10$^{-6}$ | Lead-210 (uCi/kg)x10$^{-6}$ | Polonium-210 (uCi/kg)x10$^{-6}$ |
|---|---|---|---|---|---|
| AM-1 | 144 ± 206 | 4 ± 7 | 11 ± 18 | 28 ± 25 | 18 ± 15 |
| AM-2 | 17 ± 22 | 8 ± 14 | 12 ± 20 | 19 ± 21 | 40 ± 61 |
| AM-3* | 90 | 11 ± 8 | 32 ± 4 | 26 ± 12 | 26 ± 9 |
| AM-4* | 6 | 14 ± 16 | 51 ± 6 | 30 ± 18 | 20 ± 6 |
| AM-5* | 30 | 19 ± 15 | 41 ± 5 | 27 ± 14 | 20 ± 7 |
| AM-6 | 22 ± 11 | 8 ± 10 | 16 ± 22 | 203 ± 316 | 101 ± 147 |
| AM-7 | 87 ± 112 | 4 ± 6 | 10 ± 16 | 46 ± 39 | 31 ± 26 |
| Wellfield Area | 151 ± 139 | 1 ± 1 | 1 ± 1 | 297 ± 515 | 307 ± 510 |
| Pasture Sample* | 6 | 48 ± 4 | 28 ± 3 | 16 ± 4 | 0.7 |

* Data represents a single sample.

**Note:** Wellfield Area sample taken in the R&D wellfield. Pasture sample was taken in June of 1987 NE of the restricted area in the direction of the prevailing wind.

## TABLE 2.10-17

### VEGETATION USED IN RADIOLOGICAL COMPOSITE SAMPLE CROW BUTTE PROJECT

| Species | Sample Location | | | |
|---|---|---|---|---|
| | AM-1 | AM-2 | AM-6 | AM-7 |
| Crested Wheatgrass (Agropyron cristatum) | | | X | |
| Intermediate Wheatgrass (Agropyron intermedium) | X | X | | X |
| Western Wheatgrass (Agrophron smithii) | X | | | X |
| Blue Grama (Bouteloua gracilis) | | | | X |
| Smooth Brome (Bromus inermis) | X | | X | |
| Japanese Brome (Bromus japonicus) | | X | | |
| Brome (Bromus tectorum) | X | X | X | X |
| Buffalo grass (Buchloe dactyloides) | | | | X |
| Sixweeks Fescue (Festuca octoflora) | X | X | | X |
| Yellow Sweetclover (Melitotus officinalis) | | X | | |
| Little Barley (Hordeum pusillum) | | X | | |
| Kentucky Bluegrass (Poa pratensis) | | | X | |
| Needlegrass | | | | |
| (Stipa comata) | X | | | X |
| (Stipa viridula) | | | | X |

vegetation species that were composited at each location. The results of the analyses are typical of naturally occurring concentrations. Vegetation samples collected in the vicinity of the proposed Rhode Ranch Mill in South Texas had a range in the Ra-226 concentrations from $10x10^{-6}$ to $700x10^{-6}$ uCi/kg while the concentration of Pb-210 ranged from $500x10^{-6}$ to $1080x10^{-6}$ uCi/kg (Texas Department of Health, 1982). Vegetation collected in Campbell County, Wyoming had maximum uranium concentrations of $140x10^{-6}$ uCi/kg, $52x10^{-6}$ uCi/kg of Ra-226, $93x10^{-6}$ uCi/kg of Th-230, $3,200x10^{-6}$ uCi/kg of Pb-210 and $410x10^{-6}$ uCi/kg of Po-210 (USNRC, 1982). The concentrations reported for Campbell County were considered normal background levels. The uranium concentration in pine tree branches has been reported to be $3.1x10^{-6}$ uCi/kg, $11x10^{-6}$ uCi/kg in grapes, $180x10^{-6}$ uCi/kg in celery leaves and and $270x10^{-6}$ uCi/kg in garlic (Eichholz, 1976).

### 2.10.7 Fish Sampling Program

As part of the preoperational radiological sampling program, fish were collected from several area impoundments for radiological analyses. Impoundments designated I-2, I-5 and I-6 possessed a significant fish population and were sampled while impoundments I-1, I-3 and I-4 did not have a sufficient fish population to justify sampling. Additionally impoundment L-1 was sampled. This impoundment is in a different watershed than the Crow Butte commercial restricted area and as a result it should not be influenced by the commercial plant operation. In addition to these impoundments, two larger impoundments, Johnson Lake and Whitney Lake were sampled.

The fish samples were collected during the fourth week of June 1982. The collection methods used were electric shocking and netting. The fish were composited in the following order of preference; 1) game and food fish, 2) marginal game fish and 3) forage fish. After collection the fish were eviscerated and the internal organs discarded. The samples were bagged and transported to Core Laboratories in Denver, Colorado for analysis. The samples were analyzed for the concentration of natural uranium, Th-230, Ra-226, Pb-210 and Po-210.

Table 2.10-18 contains the results of the analyses. Table 2.10-19 lists the species that were included in each composite sample. The samples appear to have similar concentrations with uranium exhibiting the greatest variability. These values are considered background concentrations. For example samples of fish collected in South Texas near Anaconda's proposed Rhode Ranch Mill were determined to have lead-210 concentrations between $20x10^{-6}$ to $120x10^{-6}$ uCi/kg and a maximum polonium-210 concentration of $400x10^{-6}$ uCi/kg (Texas Department of Health, 1982). Samples of fish collected from Lake Corpus Christi located north of the city of Corpus Christi, Texas were reported to contain radium-226 concentrations ranging from $70x10^{-6}$ to $580x10^{-6}$ uCi/kg. Thorium-230 values ranged from $10x10^{-6}$ to $30x10^{-6}$ uCi/kg $30x10^{-6}$ uCi/kg in the same samples while radium-226 was reported to vary between $10x10^{-6}$ and $80x10^{-6}$ uCi/kg (Texas Department of Health, 1981).

### 2.10.8 Direct Gamma Radiation

As part of the preoperational monitoring program the gamma radiation in the environment around the Crow Butte R&D Project area was measured. This was accompliished using thermoluminescence dosimtry (TLD). Lithium fluoride chips were used and housed in rugged containers to provide protection from the weather. A total of five chips are located in each container. The containers or monitors are placed at predetermined locations approximately one meter above ground level. They are exchanged with new monitors on a quarterly basis and the exposed monitors are returned to Eberline Instrument Corporation for processing. The results are reported by Eberline in mRem per week. These devices provide an integrated exposure for the period between annealing and processing. A control monitor is stored in a lead shield during the environmental exposure period.

A total of fifty locations in the Commercial Permit Area were chosen for placement of the gamma TLD monitors. These locations are shown on the topographic map (Figure 2.10-1). These fifty include, 43 monitors located in and nearby the Permit Area and 7 TLD's; one at each of the air monitoring stations. The monitors were initially placed in service during the second quarter of 1982 and remained in place through April, 1983. The average

TABLE 2.10-18

RADIOMETRIC ANALYSIS OF FISH
SAMPLES FROM AREA IMPOUNDMENT
CROW BUTTE PROJECT

| Sample Location | Date | Nat. Uranium (uCi/kg)x10$^{-6}$ | Thorium-230 (uCi/kg)x10$^{-6}$ | Radium-226 (uCi/g)x10$^{-6}$ | Lead-210 (uCi/kg)x10$^{-6}$ | Polonium-210 (uCi/kg)x10$^{-6}$ |
|---|---|---|---|---|---|---|
| I-2 | 06/26/82 | 30 | 51.3 ± 19.7 | 38.7 ± 5.2 | 183.6 ± 19.9 | 145.3 ± 21.2 |
| I-5 | 06/23/82 | 60 | 17.2 ± 18.6 | 32.8 ± 4.8 | 91.9 ± 15.6 | 71.4 ± 12.9 |
| I-6 | 06/26/82 | 120 | 51.8 ± 22.0 | 44.7 ± 6.1 | 64.9 ± 19.0 | 56.1 ± 14.1 |
| L-1 | 06/25/82 | 42 | 8.4 ± 6.0 | 23.3 ± 2.7 | 76.7 ± 8.8 | 34.0 ± 8.5 |
| Johnson Lake | 06/24/82 | 18 | 38.8 ± 16.2 | 37.3 ± 4.3 | 195.3 ± 20.5 | 178.2 ± 23.9 |
| Whitney Lake | 06/27/82 | 24 | 34.4 ± 15.5 | 39.0 ± 4.8 | 59.8 ± 18.5 | 53.2 ± 13.8 |

TABLE 2.10-19

SPECIES OF FISH USED FOR
RADIOLOGICAL COMPOSITE SAMPLE
CROW BUTTE PROJECT

| Species | L-1 | I-2 | I-5 | I-6 | Whitney Lake | Johnson Lake |
|---|---|---|---|---|---|---|
| Brown Trout | X | | | | | |
| Rainbow Trout | X | | | | | |
| Brook Trout | X | | | X | | |
| Largemouth Bass | | | | | | X |
| White Bass | | | | | X | |
| Bluegill | | | | | | X |
| Green Sunfish | | X | X | | | |
| Black Crappie | | | | | X | |
| White Sucker | | X | | | | |
| Creek Chub | | X | | | | |
| Fathead Minnow | | | X | X | | |
| Golden Shiner | | | X | X | | |
| Longnose Dace | | | | X | | |

results for five quarters are listed in Table 2.10-20. The data show a range from 1.50 to 1.84 mRem per week.

In addition to the environmental gamma monitors, the background gamma radiation in the plant, and pond areas was measured with a Mount Sopris SC-132 scintillometer. This instrument was calibrated on July 17, 1985 and the gamma survey was performed during the summer of 1985. The areas included in the gamma surveys were the proposed R&D evaporation ponds and plant area. The grid was approximately at fifty foot intervals.

The data obtained from the survey in the plant and pond areas are listed in Table 2.10-21 and in Table 2.10-22 respectively. The data in the tables correspond to instrument readings obtained at the intersection of the transects, while holding the scintillator at approximately one meter above ground level. In both tables the numerical axis corresponds to east-west direction with the numbers increasing to the east and the lettered axis corresponding to the north-south direction with the letter A representing the southern-most boundary. In the plant area 20 readings were obtained ranging from a low value of 0.01 mR/hr to a high of 0.014 mR/hr. The average reading was 0.012 mR/hr with a standard deviation of 0.0011 mR/hr. The results appear to be randomly occurring through the survey area and no attempt was made to contour the results. Survey for the pond area resulted in 45 readings with an average of 0.013 mR/hr and a standard deviation of 0.0008 mR/hr. Again the individual readings seemed to be randomly distributed and contouring of the results was not applicable.

The average of the TLD gamma monitors was 1.69 $\pm$ 0.07 mRem per week which, assuming a relative biological efficiency of unity, corresponds to 0.010 mR/hr. The average background gamma level in the Western Great Plains has been reported to be 0.014 mR/hr (USNRC, 1979b), which corresponds well to the results obtained with the TLD gamma monitors. The results obtained during the gamma survey with a scintillation detector were consistent with the TLD gamma measurements.

## TABLE 2.10-20

## RESULTS OF GAMMA TLD DOSIMETERS
## CROW BUTTE PROJECT

| Location | Average Gamma mRem/week | Location | Average Gamma mRem/week |
|---|---|---|---|
| AM-1 | 1.65 | 26 | 1.57 |
| AM-2 | 1.71 | 27 | 1.65 |
| AM-3 | 1.72 | 28 | 1.75 |
| AM-4 | 1.60 | 29 | 1.74 |
| AM-5 | 1.84 | 30 | 1.57 |
| AM-6 | 1.72 | 31 | 1.59 |
| AM-7 | 1.71 | 32 | 1.64 |
| 8 | 1.71 | 33 | 1.59 |
| 9 | 1.67 | 34 | 1.72 |
| 10 | 1.70 | 35 | 1.78 |
| 11 | 1.66 | 36 | 1.61 |
| 12 | 1.69 | 37 | 1.75 |
| 13 | 1.72 | 38 | 1.83 |
| 14 | 1.72 | 39 | 1.73 |
| 15 | 1.50 | 40 | 1.77 |
| 16 | 1.72 | 41 | 1.68 |
| 17 | 1.73 | 42 | 1.54 |
| 18 | 1.72 | 43 | 1.63 |
| 19 | 1.79 | 44 | 1.70 |
| 20 | 1.72 | 45 | 1.75 |
| 21 | 1.67 | 46 | 1.69 |
| 22 | 1.72 | 47 | 1.68 |
| 23 | 1.70 | 48 | 1.72 |
| 24 | 1.78 | 49 | 1.75 |
| 25 | 1.69 | 50 | 1.68 |

## TABLE 2.10-21

**R&D PLANT PAD TAKEN FROM N-E CORNER**
**STRAIGHT SOUTH AND N 75° W**
**IN AN APPROXIMATE 50 FOOT GRID**

| N-S / E-W | A | B | C | D |
|---|---|---|---|---|
| | | micro R/hr | | |
| 1 | 10.0 | 12.6 | 12.0 | 13.8 |
| 2 | 10.2 | 13.2 | 11.0 | 12.6 |
| 3 | 12.0 | 10.6 | 12.0 | 12.0 |
| 4 | 11.0 | 10.2 | 11.8 | 13.0 |
| 5 | 12.0 | 11.0 | 13.0 | 12.2 |

TABLE 2.10-22

R&D EVAPORATION PONDS TAKEN FROM NW BERM
STAKE AT COMPASS READINGS OF S 55°W AND S 55°E
IN AN APPROXIMATE 50 FOOT GRID

| N-S | A | B | C | D | E |
|---|---|---|---|---|---|
| | | | micro R/hr | | |
| E-W | | | | | |
| 1 | 12.0 | 13.0 | 13.0 | 12.0 | 12.2 |
| 2 | 12.2 | 12.4 | 14.2 | 13.0 | 12.4 |
| 3 | 12.2 | 12.4 | 15.0 | 12.8 | 14.0 |
| 4 | 13.0 | 12.4 | 14.2 | 12.2 | 12.0 |
| 5 | 11.0 | 13.0 | 12.4 | 13.0 | 13.8 |
| 6 | 12.0 | 11.8 | 13.0 | 12.2 | 13.0 |
| 7 | 12.0 | 11.8 | 12.4 | 13.0 | 11.8 |
| 8 | 12.2 | 12.6 | 12.4 | 14.0 | 12.6 |
| 9 | 12.0 | 12.0 | 11.8 | 13.0 | 13.2 |

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