

INTER-OFFICE MEMORANDUM

SUBJECT: Grand View Subsurface Temperatures

DATE March 3, 1978

TO: W. M. Dolan & H. J. Olson

FROM: Frank Dellechaie

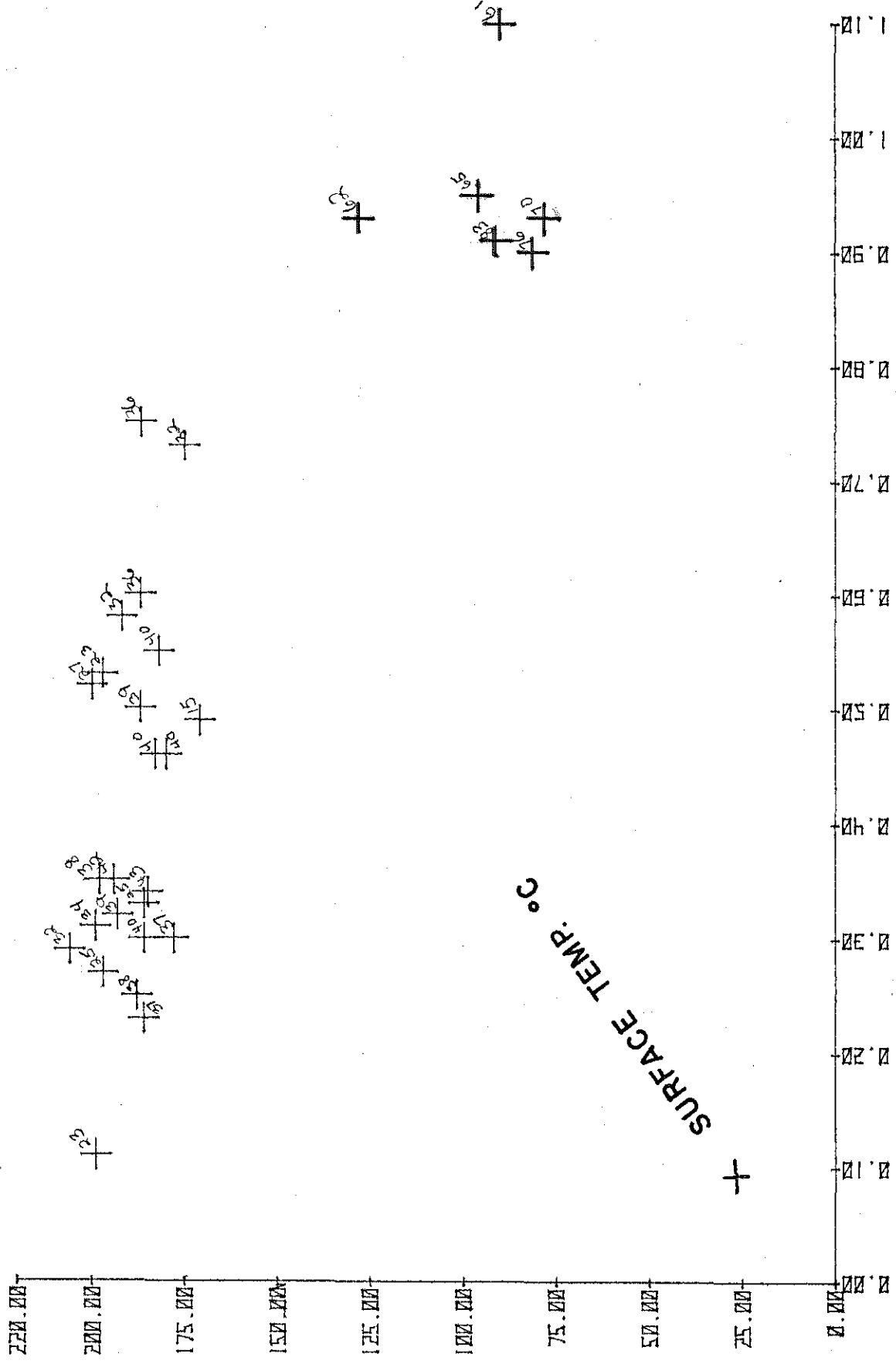
A study of the U.S.G.S. well data has disclosed that the Na-K-Ca subsurface temperatures may be exaggerated by as much as 100 percent. Figure 1 is a plot of Na-K-Ca subsurface temperatures versus well depth. Note that the deepest wells produce the hottest waters at the surface but exhibit the lower subsurface temperatures compared to the shallower wells. Of course this is backwards; the deep-hot wells should exhibit the highest subsurface temperatures and the shallower - cooler wells should have the lowest subsurface temperatures.

Figure 2 is a plot of silica (quartz) subsurface temperatures versus well depth. Note that the deep-hot wells exhibit subsurface temperatures that are equivalent or lower than the shallower - cooler and supposedly "mixed" waters. This relationship is also reversed; deep unmixed water should have more silica than shallow "mixed" waters.

Figure 3 is a symmetry plot of a shallow "mixed" well that is located 1.2 km northwest of the hottest unmixed well in the area. Note that the mixed water contains higher concentrations of chloride, sodium, potassium, boron and an equivalent amount of silica compared to the unmixed water. All of the aforementioned ions should be lower in the mixed water than in the unmixed water.

These facts indicate that the shallow wells exhibiting high subsurface temperatures have encountered formations in the shallow regime which have donated significant quantities of potassium and other ions by processes other than ion exchange. The subsurface temperatures may be high by a factor of 100 percent. The deepest, hottest wells, W11483, for example, exhibit subsurface temperatures between 75 and 143°C which I feel are realistic.

*Frank Dellechaie*  
Frank Dellechaie



depth Km

Figure 1

T Na-K-Ca °C

SURFACE TEMP. °C

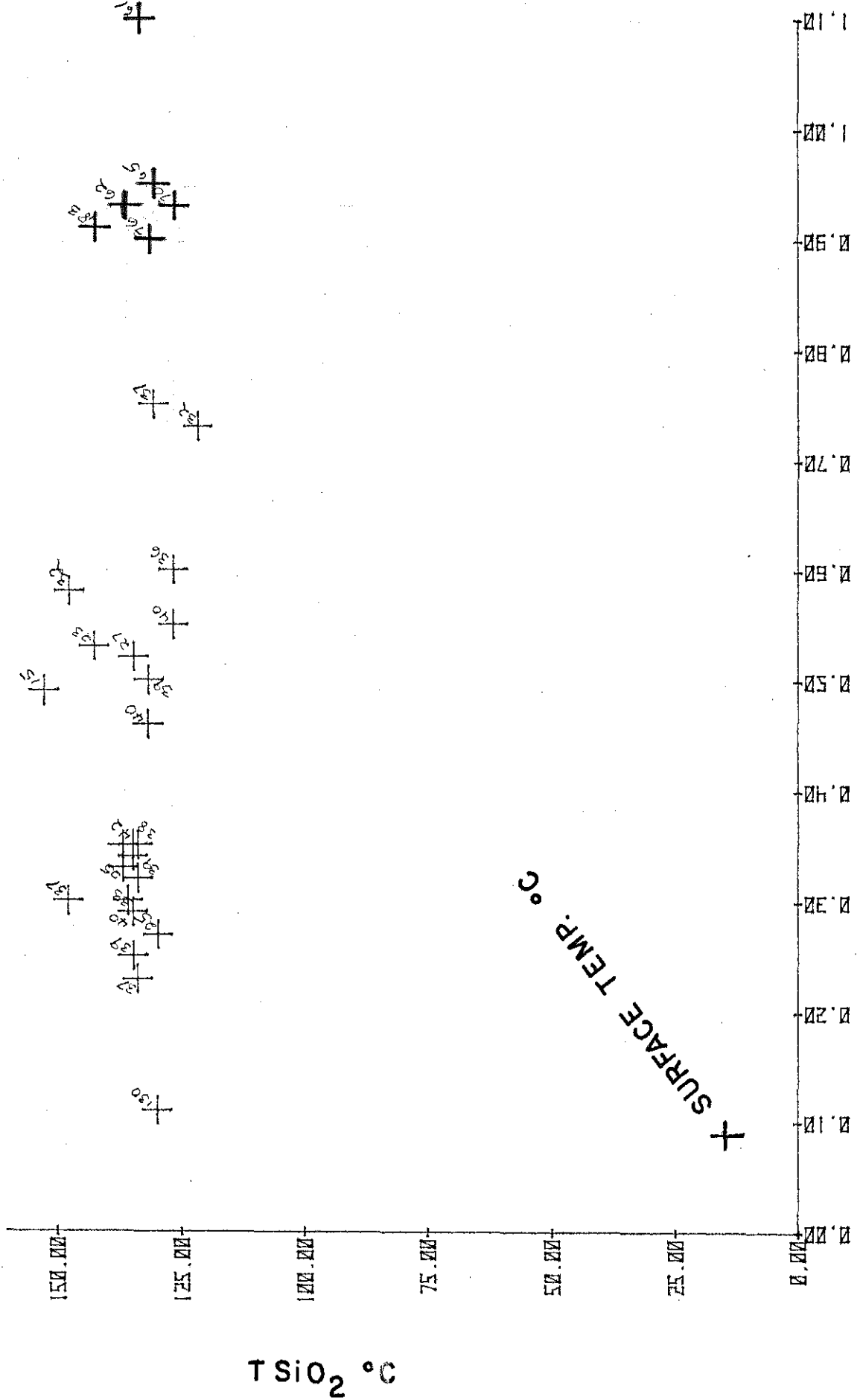


Figure 2

W11483 UNMIXED  
506 METERS DEEP

W11476 MIXED WATER  
533 METERS DEEP

T (<)  
O (GPM)  
P-H  
CL (PPM)  
F (PPM)  
SO4 (PPM)  
HCO3 (PPM)  
CO3 (PPM)  
S102 (PPM)  
NR (PPM)  
K (PPM)  
CR (PPM)  
MG (PPM)  
LI (PPM)  
B (PPM)  
NH3 (PPM)  
H2S (PPM)  
TDS  
CL/F  
CL/HCO3  
CL/SO4  
T S102  
T NR/K  
T NR-K-CR

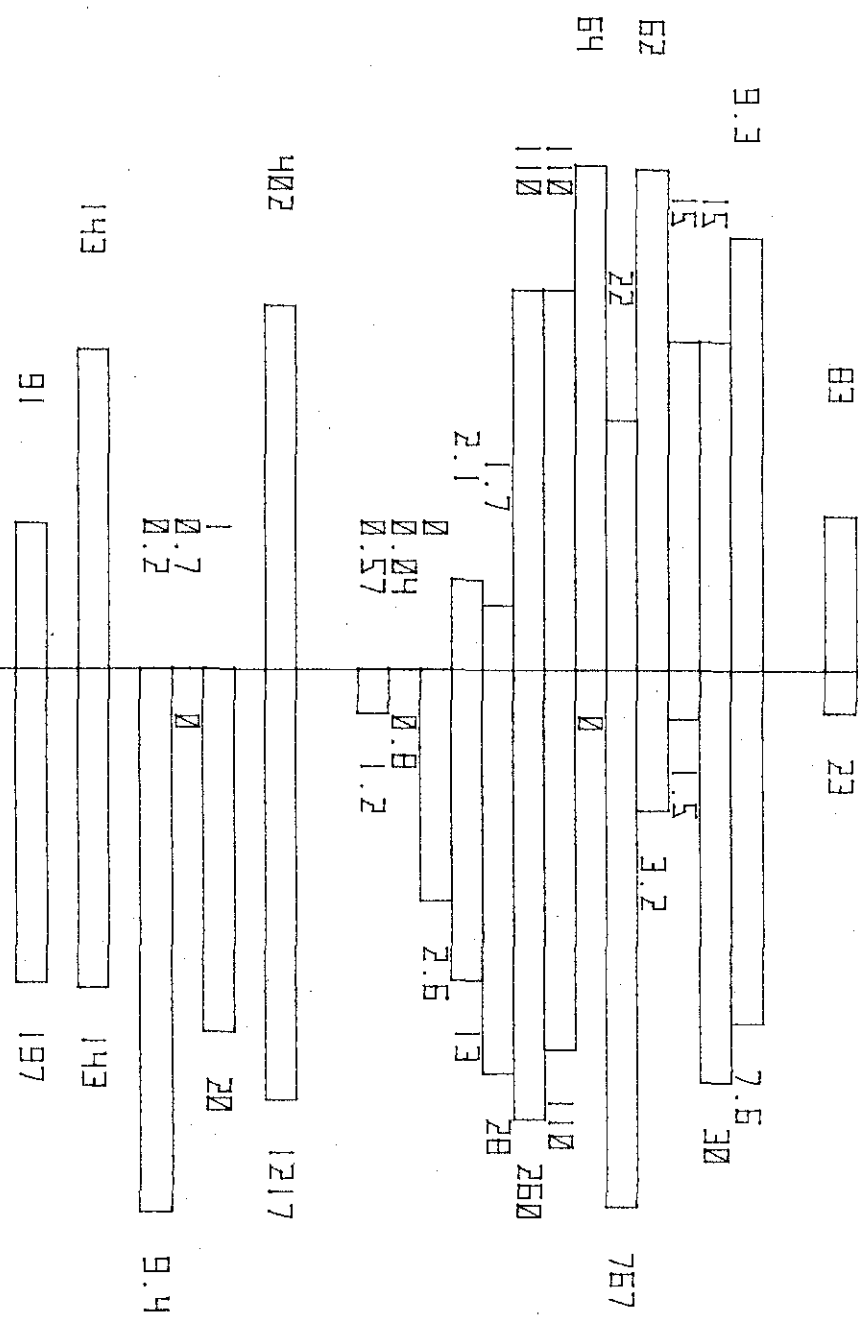


Figure 3