Figure 1. Location map of the Bluewater and San Mateo Creek site investigation areas, Grants Mineral Belt, northwestern, New Mexico.

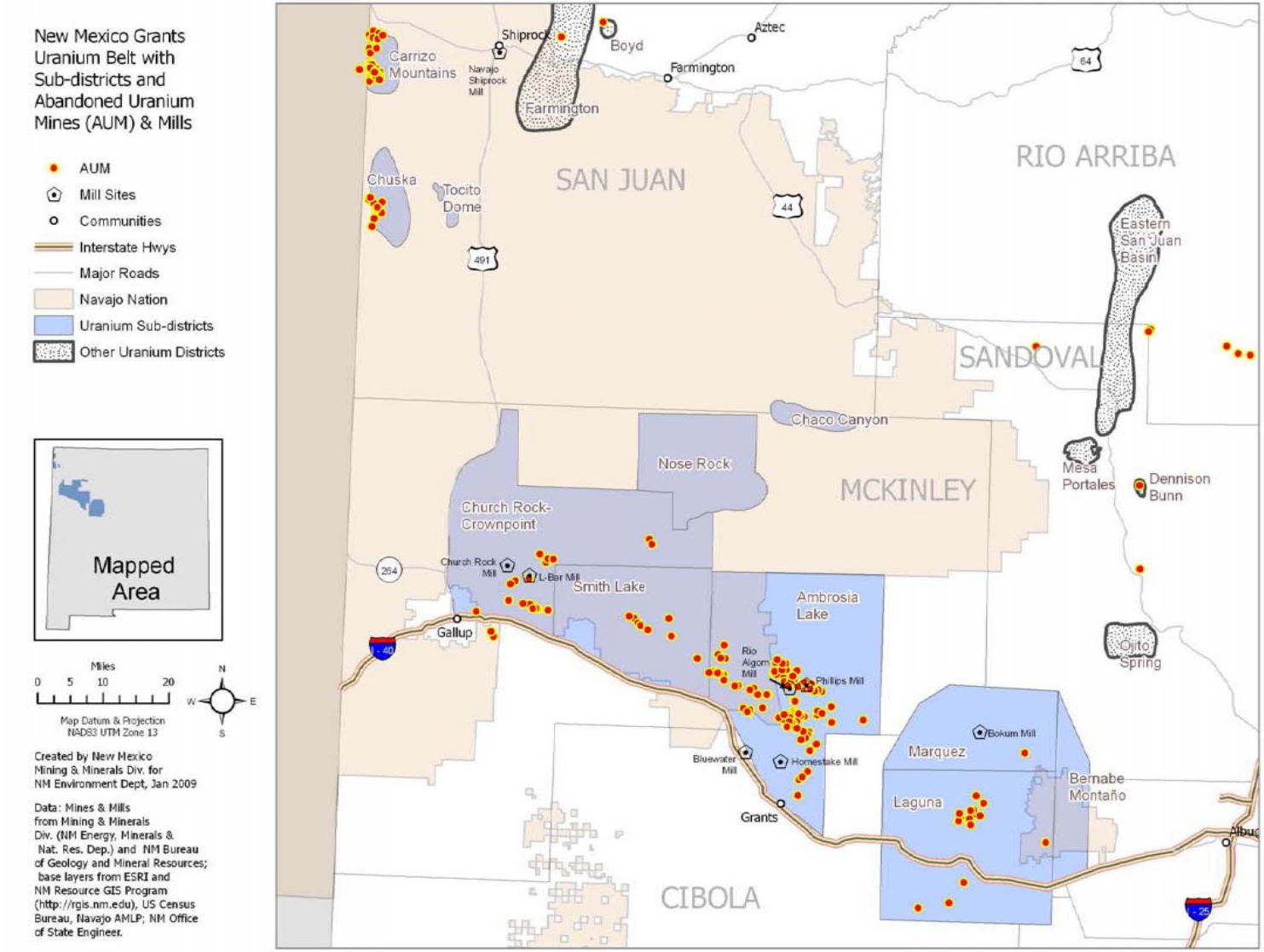




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Figure 2. Location map and generalized ground water sampling transect of the Bluewater site investigation area, New Mexico.

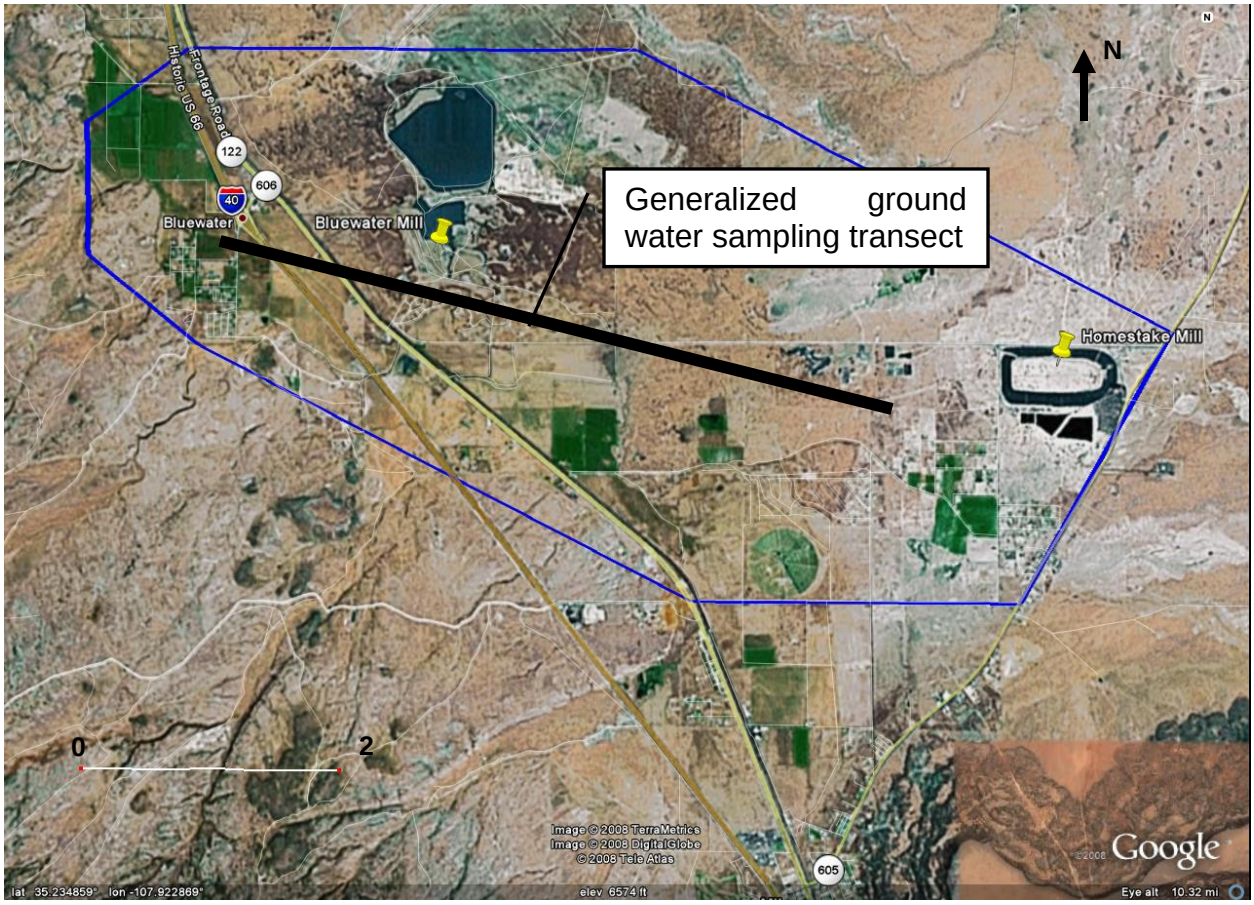


Figure 3. Map of all the ground water sample locations (2008-2009) in the San Mateo Creek Basin site investigation area, Grants Mineral Belt, New Mexico.

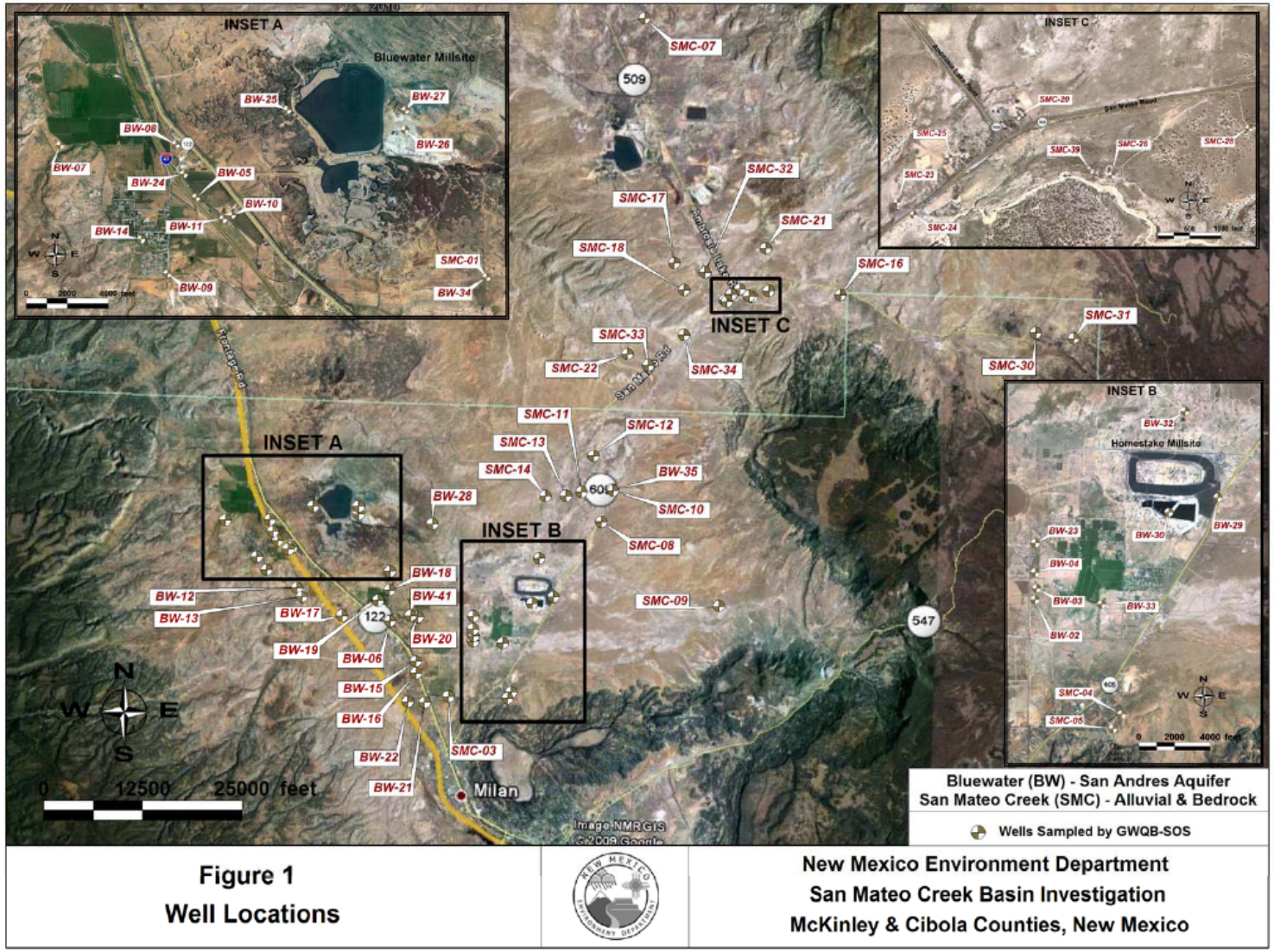


Figure 4. Well locations and water level contour map of the Grants-Bluewater area, Cibola County, New Mexico (after Gordon, 1961).

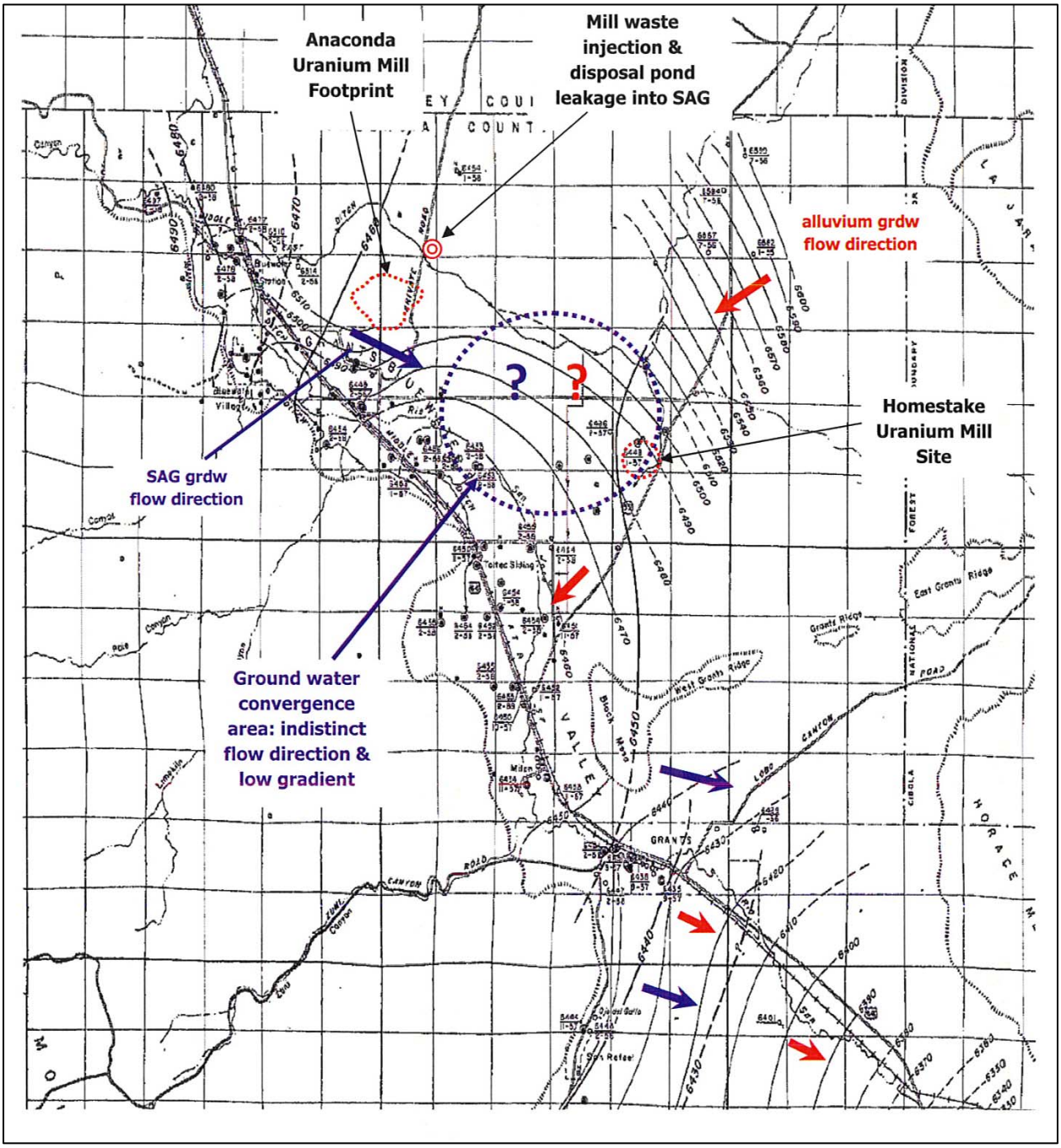


Figure 5. General geologic structure map of the Bluewater-San Mateo Creek area (after Kelly, 1963).

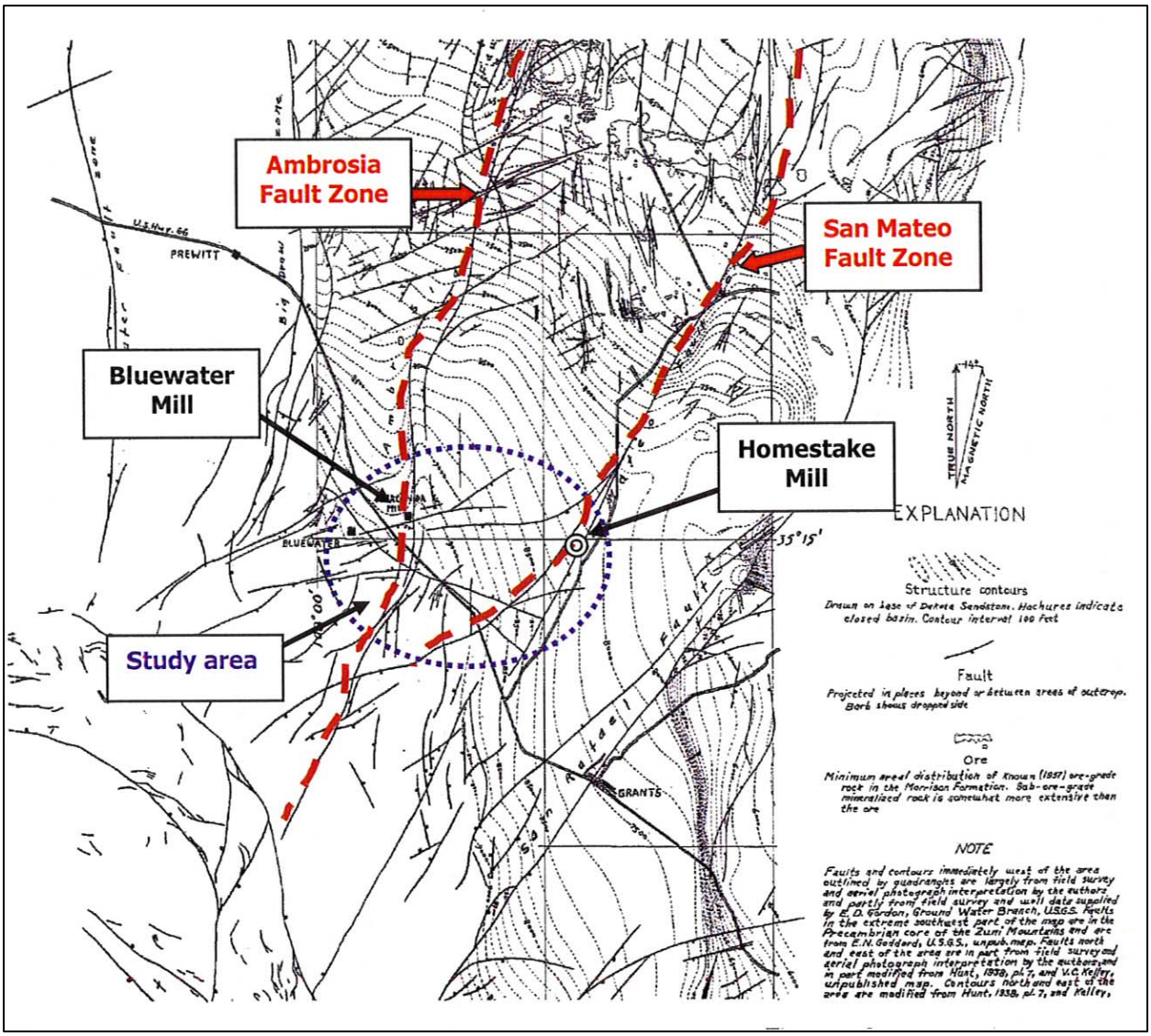
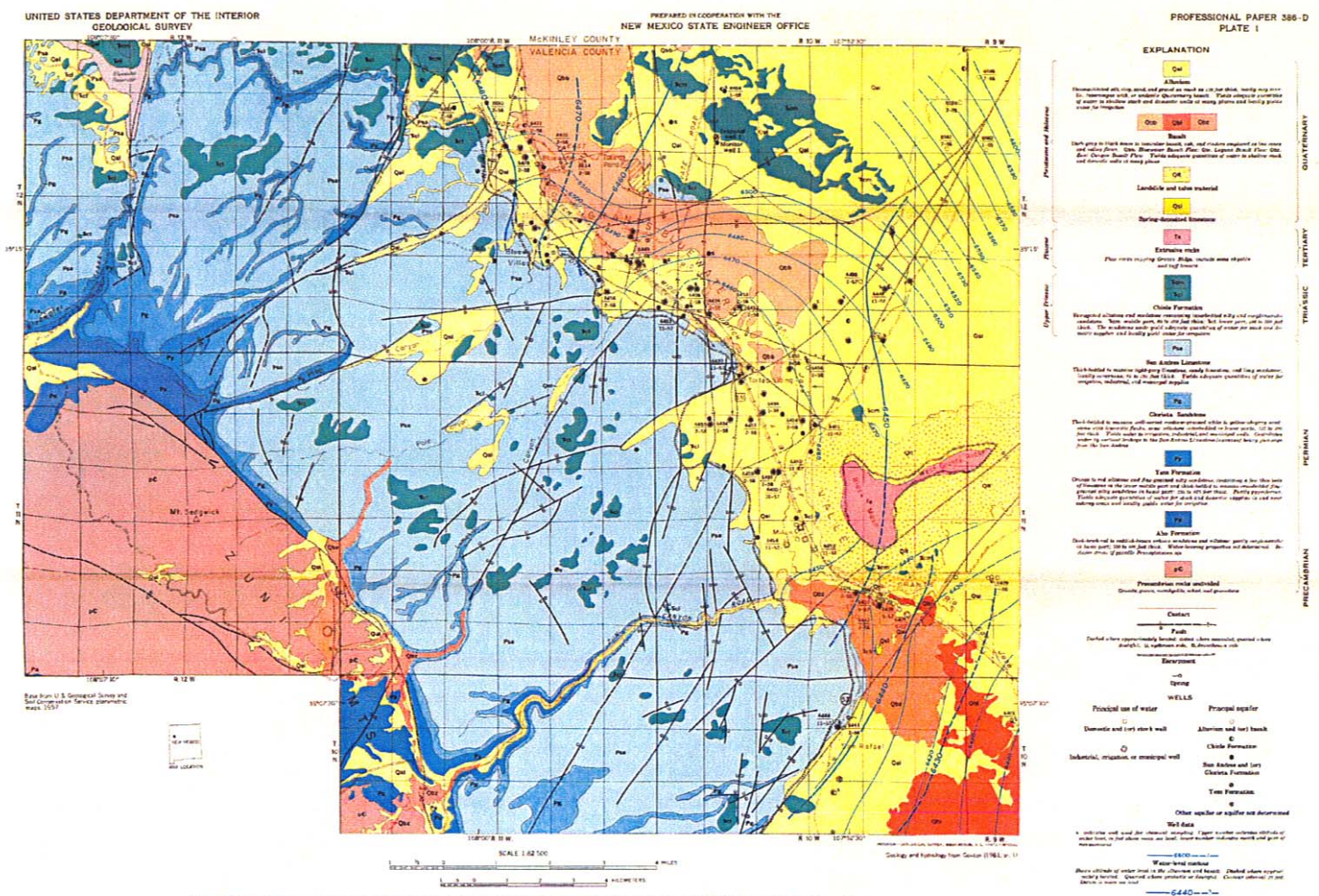


Figure 6. Geohydrologic map (1972) of the Grants area that illustrates the stratigraphic units; geologic structures; Anaconda disposal well location; local well locations; and ground water surface elevation contours in the alluvium-basalt and San Andres Aquifer, Bluewater area, New Mexico (after West, 1972).




GEOHYDROLOGIC MAP OF THE GRANTS AREA IN WHICH THE ANACONDA CO. DISPOSAL WELL 1 AND URANIUM-MILL TAILINGS POND ARE LOCATED, VALENCIA COUNTY, NEW MEXICO

Figure 7. Radium (pCi/l), total dissolved solids (TDS), and chloride concentrations (1975) in mg/l in ground water near the United Nuclear-Homestake Partners Mill site, Bluewater area, New Mexico (after EPA,1975).

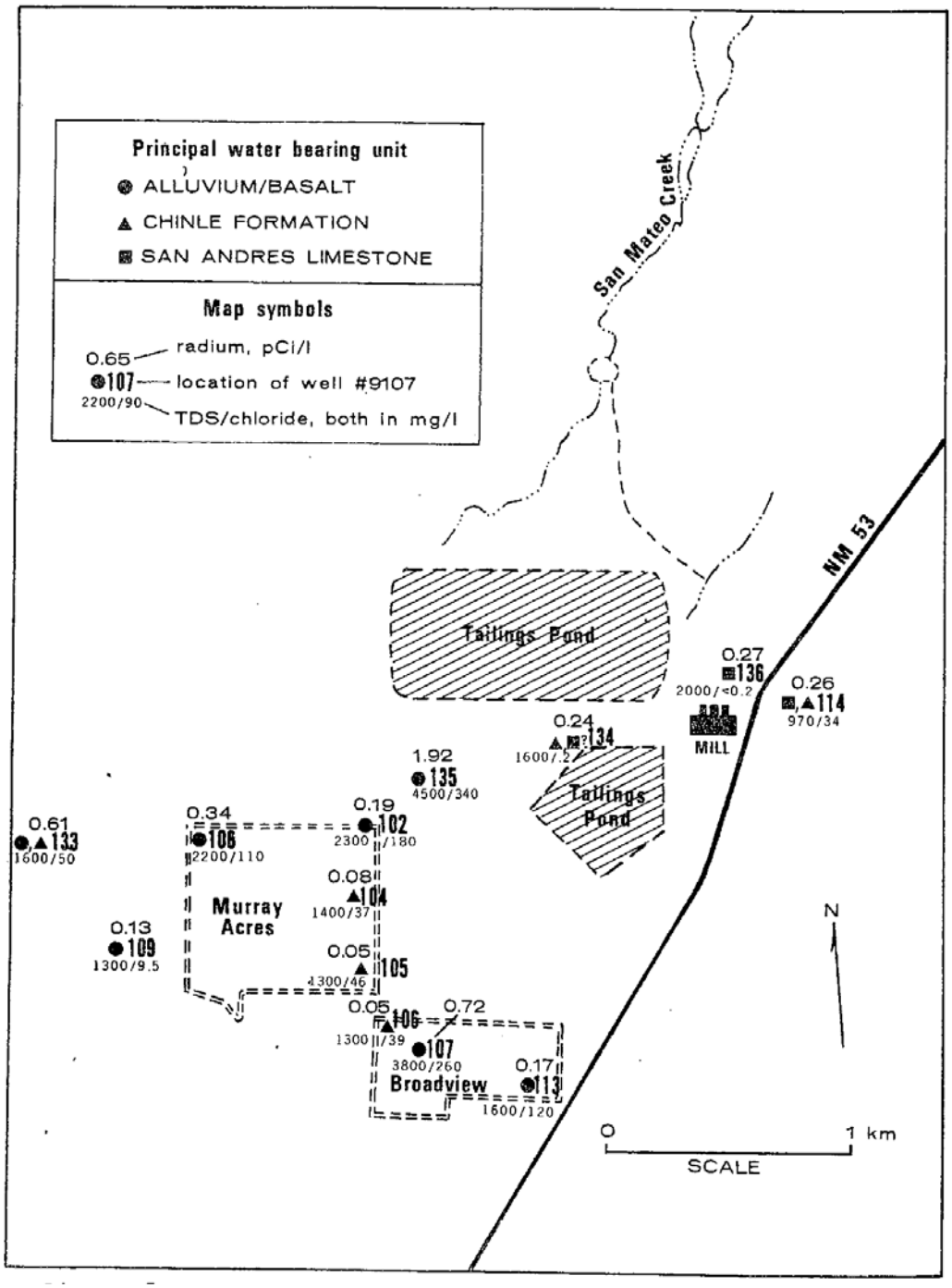
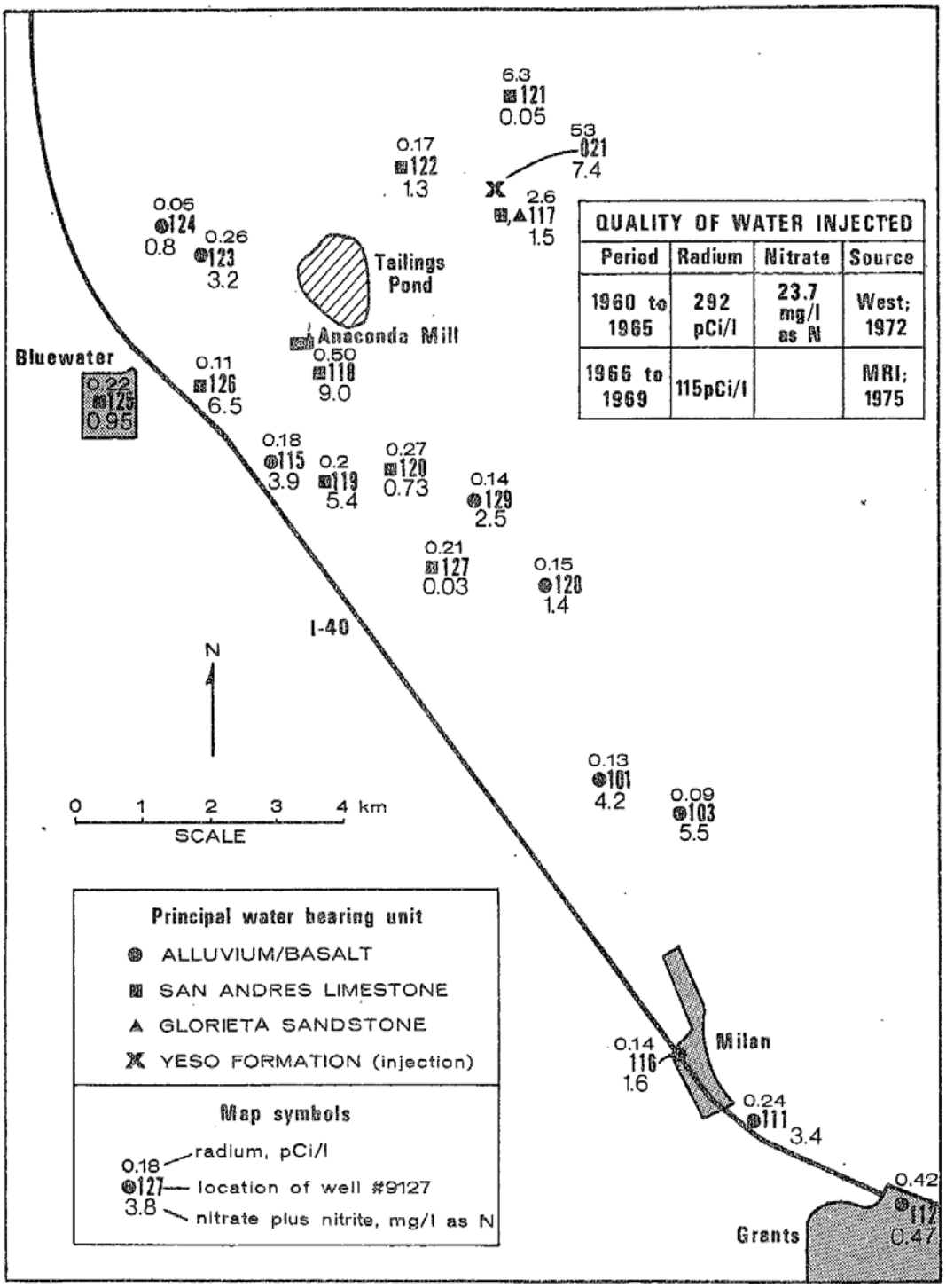


Figure 8. Radium (pCi/l) and nitrate (NO3) concentrations (1975) in mg/l in ground water in the Grants-Bluewater area, New Mexic (after EPA, 1975).




| QUALITY OF WATER INJECTED | | | |
|---|---|---|---|
| Period | Radium | Nitrate | Source |
| 1960 to 1965 | 292 pCi/l | 23.7 mg/l as N | West; 1972 |
| 1966 to 1969 | 115pCi/l | | MRI; 1975 |

Figure 9. Google Earth map of the 1978-79 NURE ground water sample data locations and uranium values in ug/l, Bluewater, Milan, and Dos Lomas 7.5 minute topographic quadrangles, Bluewater area, Grants Mineral Belt, New Mexico.

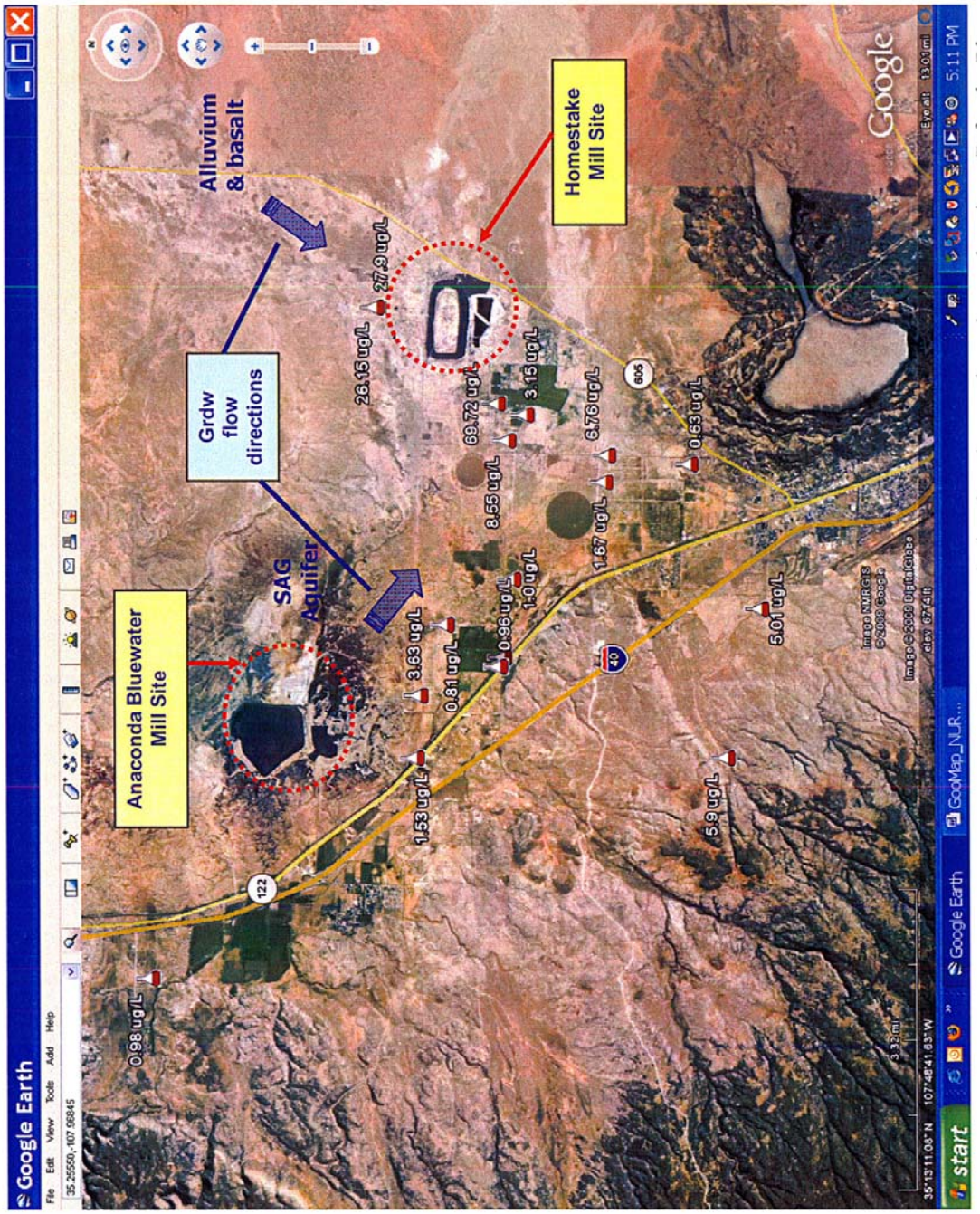


Figure 10. Google Earth map of the 1978-79 NURE ground water sample data locations and uranium values in ug/l, Bluewater, Milan, and Dos Lomas 7.5 minute topographic quadrangles, San Mateo Creek area, Grants Mineral Belt, New Mexico.

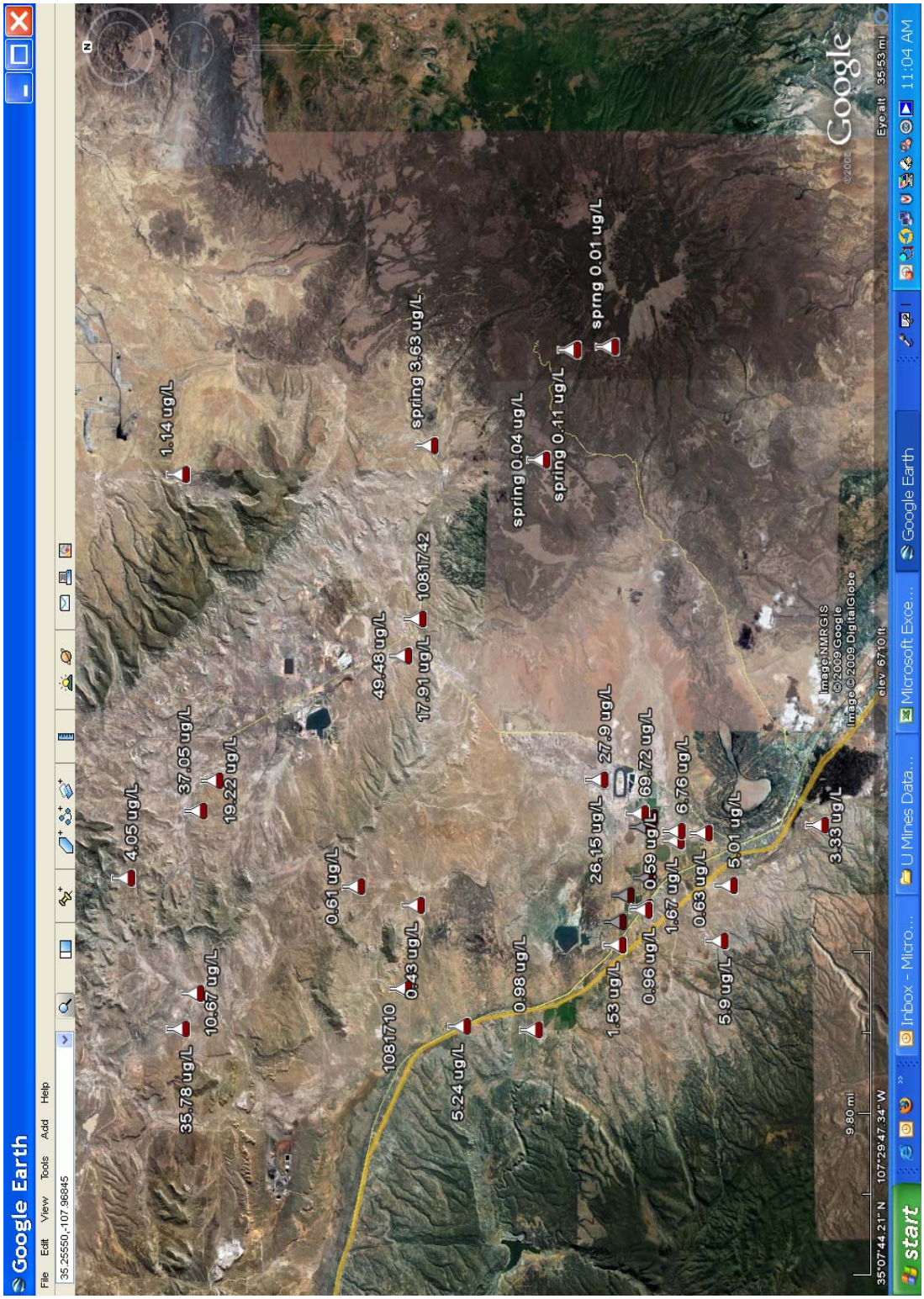
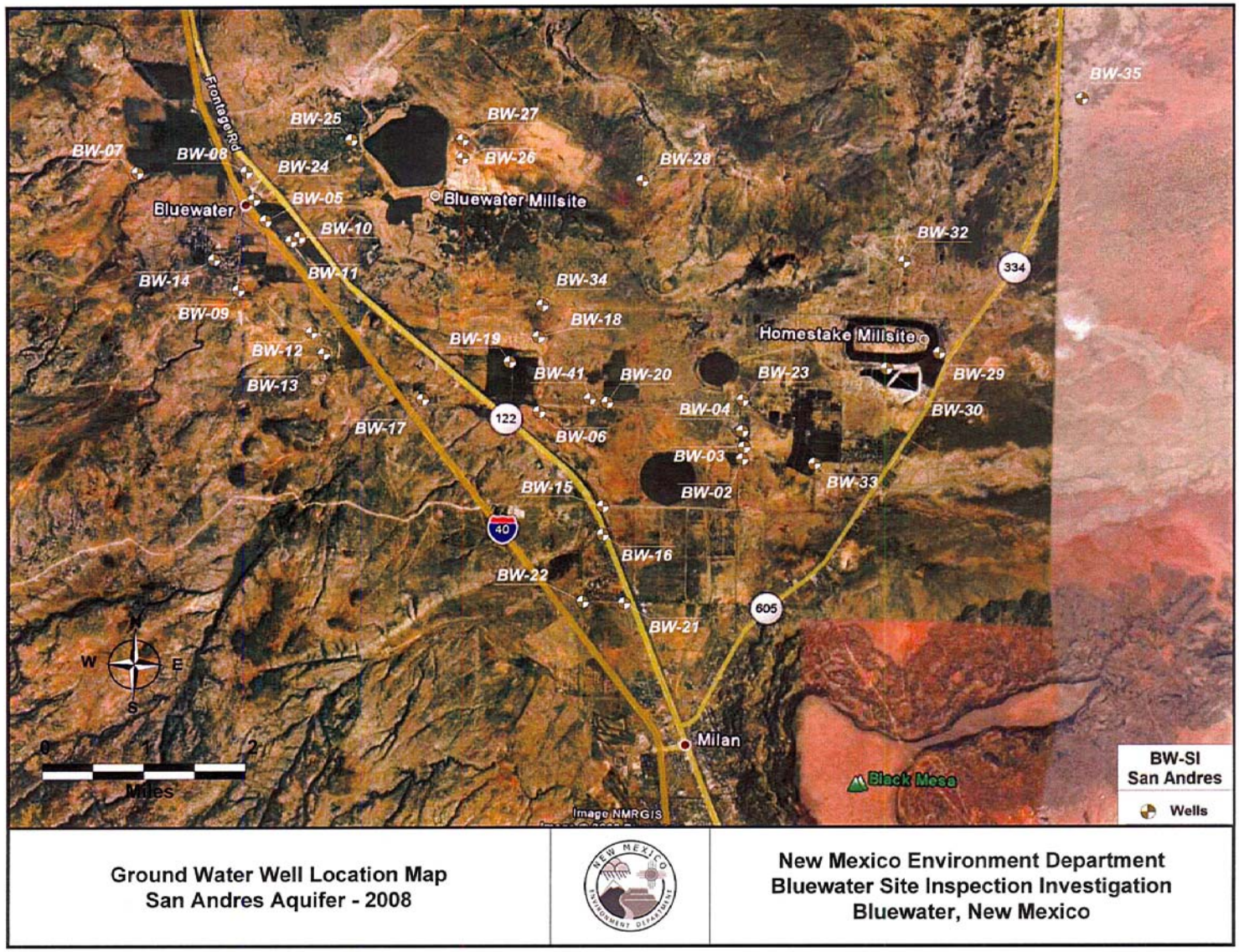


Figure 11. Ground water sample locations in 2008 for the San Andres Aquifer in the Bluewater area, Grants Mineral Belt, New Mexico.




Ground Water Well Location Map
San Andres Aquifer - 2008

New Mexico Environment Department
Bluewater Site Inspection Investigation
Bluewater, New Mexico

Figure 12. Chart of major ion and TDS concentrations (2008) in mg/l for sample locations along the assumed ground water flow path from west to east, Bluewater area, New Mexico.

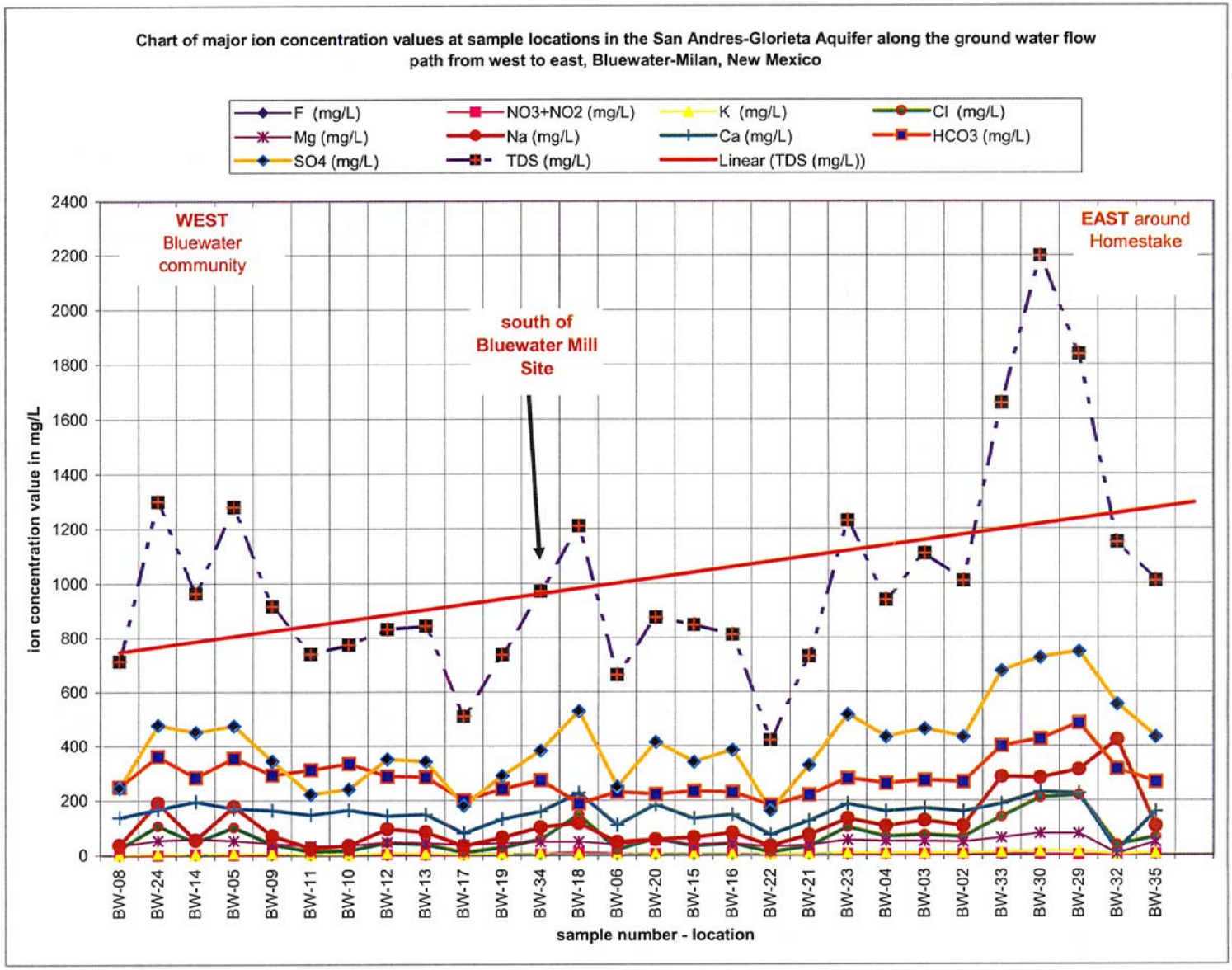


Figure 13. Map of Stiff diagrams for major ion concentrations (2008) in milliequivalents per liter (meq/l) for ground water samples, Bluewater area, New Mexico.

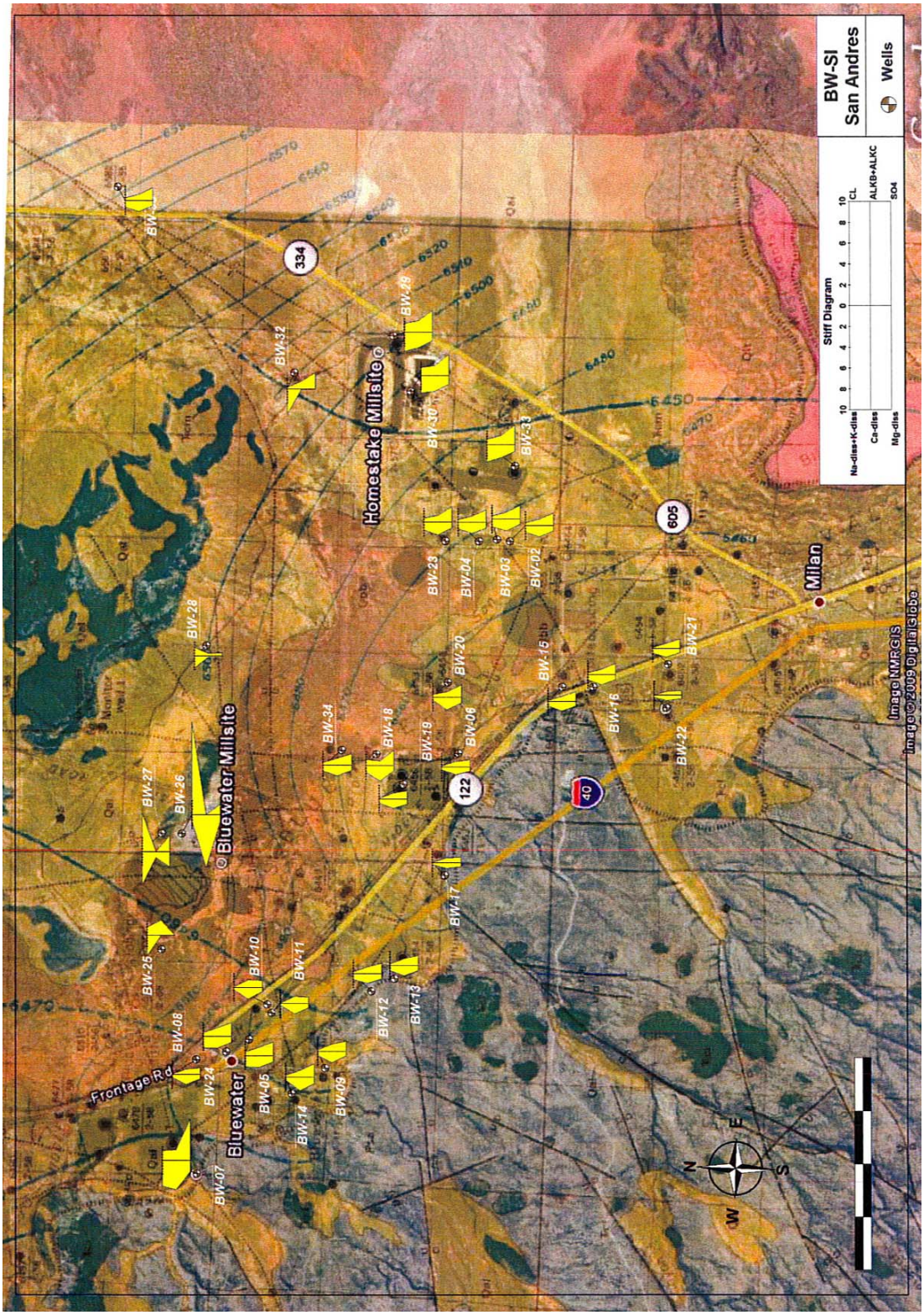


Figure 14. Trilinear (Piper) diagram of the relative percent of major ion concentrations (2008) in milliequivalents per liter (meq/l) for ground water samples, Bluewater area, New Mexico.

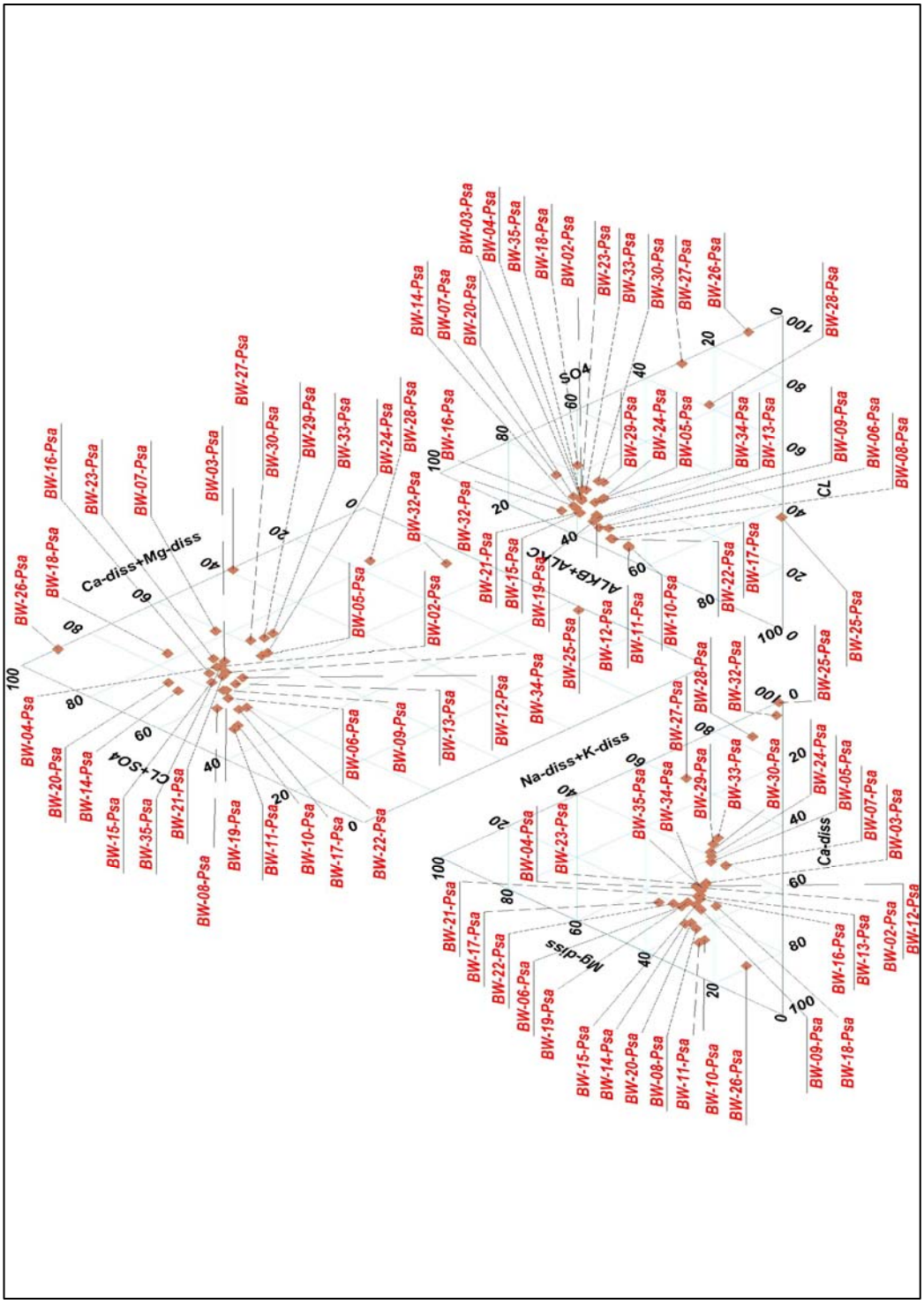
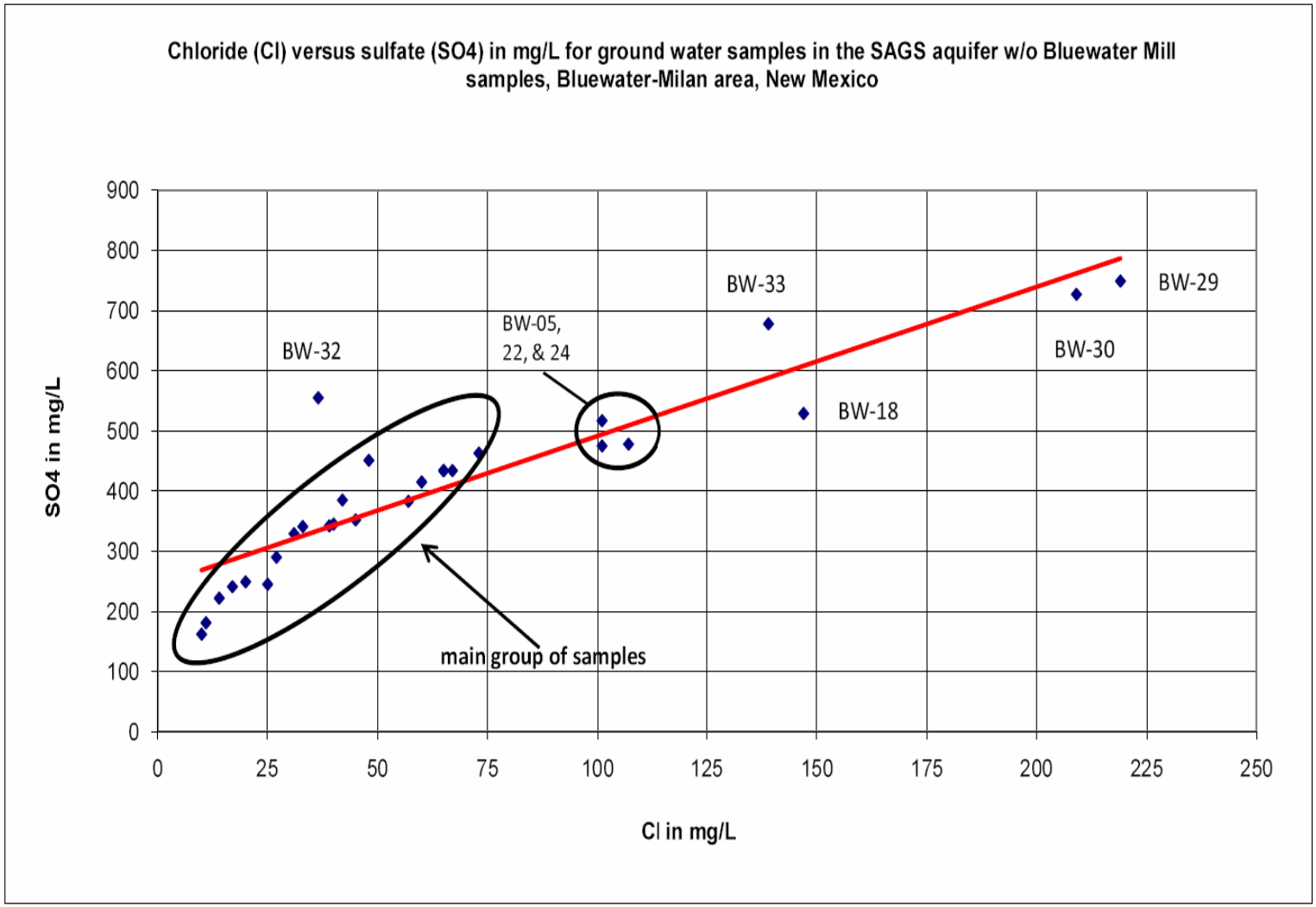


Figure 15. X-Y chart of Cl vs. $SO_4$ concentrations (2008) in mg/l with a trend line for ground water samples, Bluewater area, New Mexico.



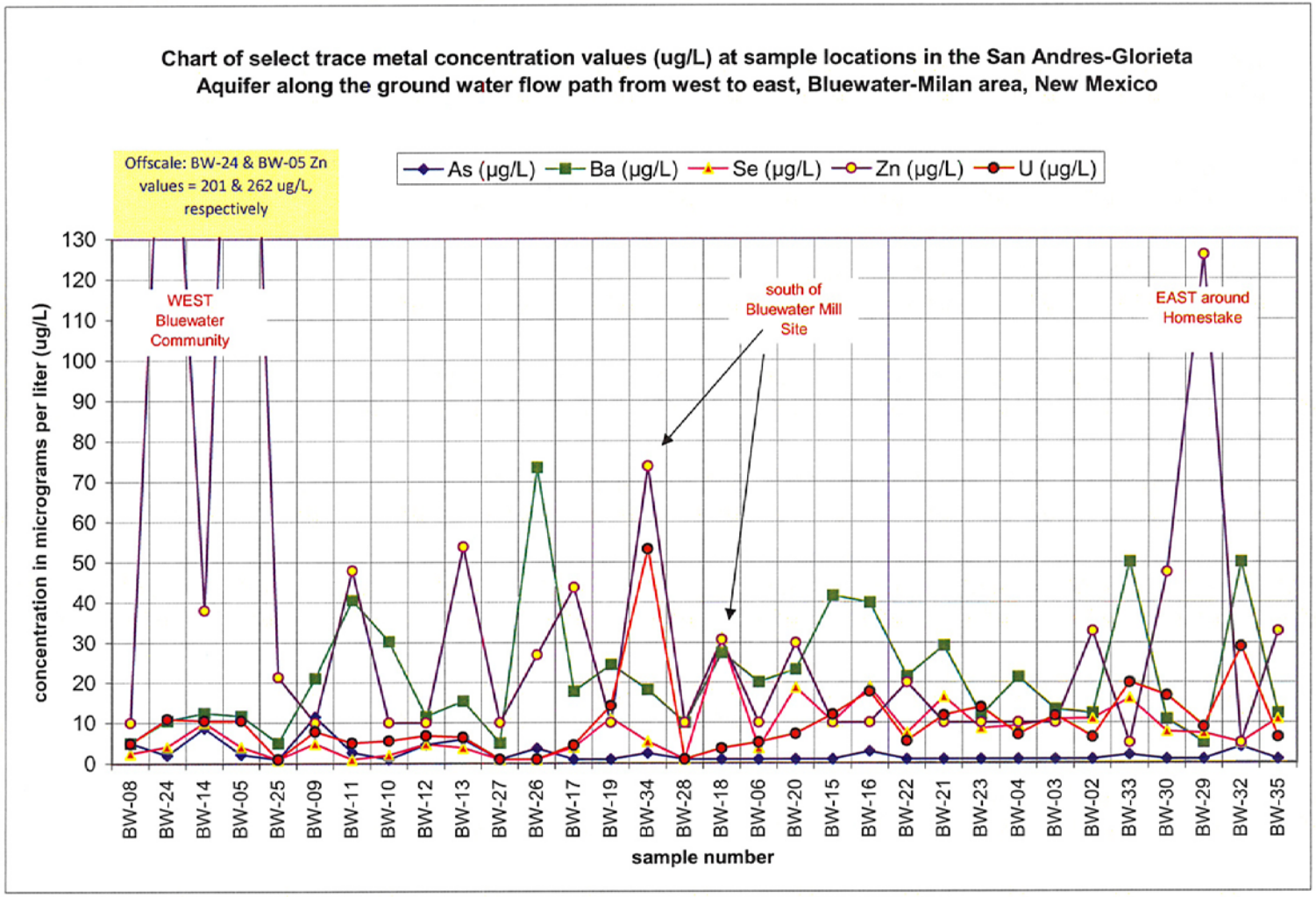



Figure 16. Chart of five trace element concentration (2008) in ug/l for sample locations along the assumed ground water flow path from west to east, Bluewater area, New Mexico.

Figure 17. Location map of dissolved uranium concentrations (2008) in ug/l at ground water sample locations, Bluewater area, New Mexico.

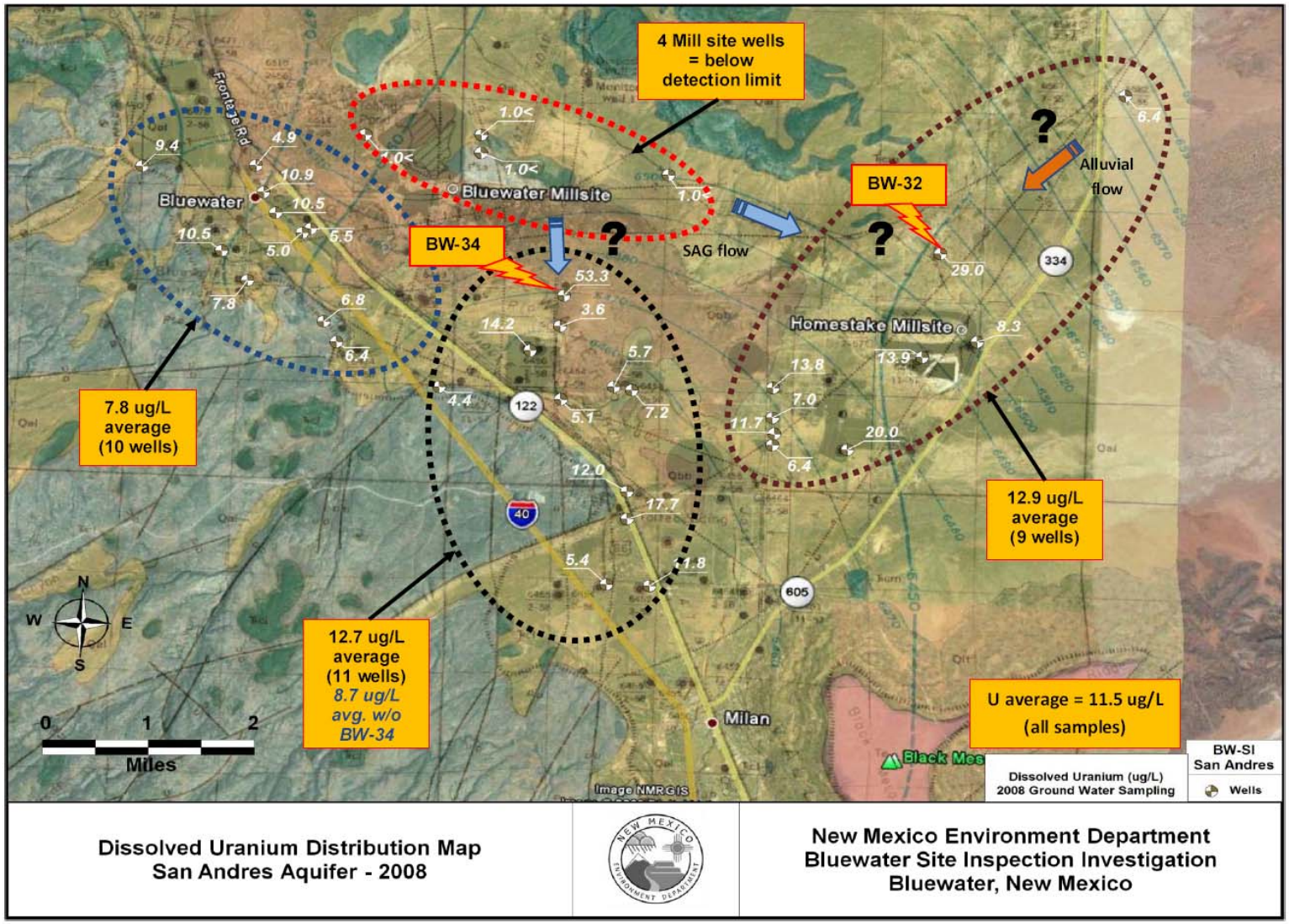


Figure 18. Chart of radium isotope concentrations (2008) in picocuries per liter (pCi/l) for sample locations along the assumed ground water flow path from west to east, Bluewater area, New Mexico.

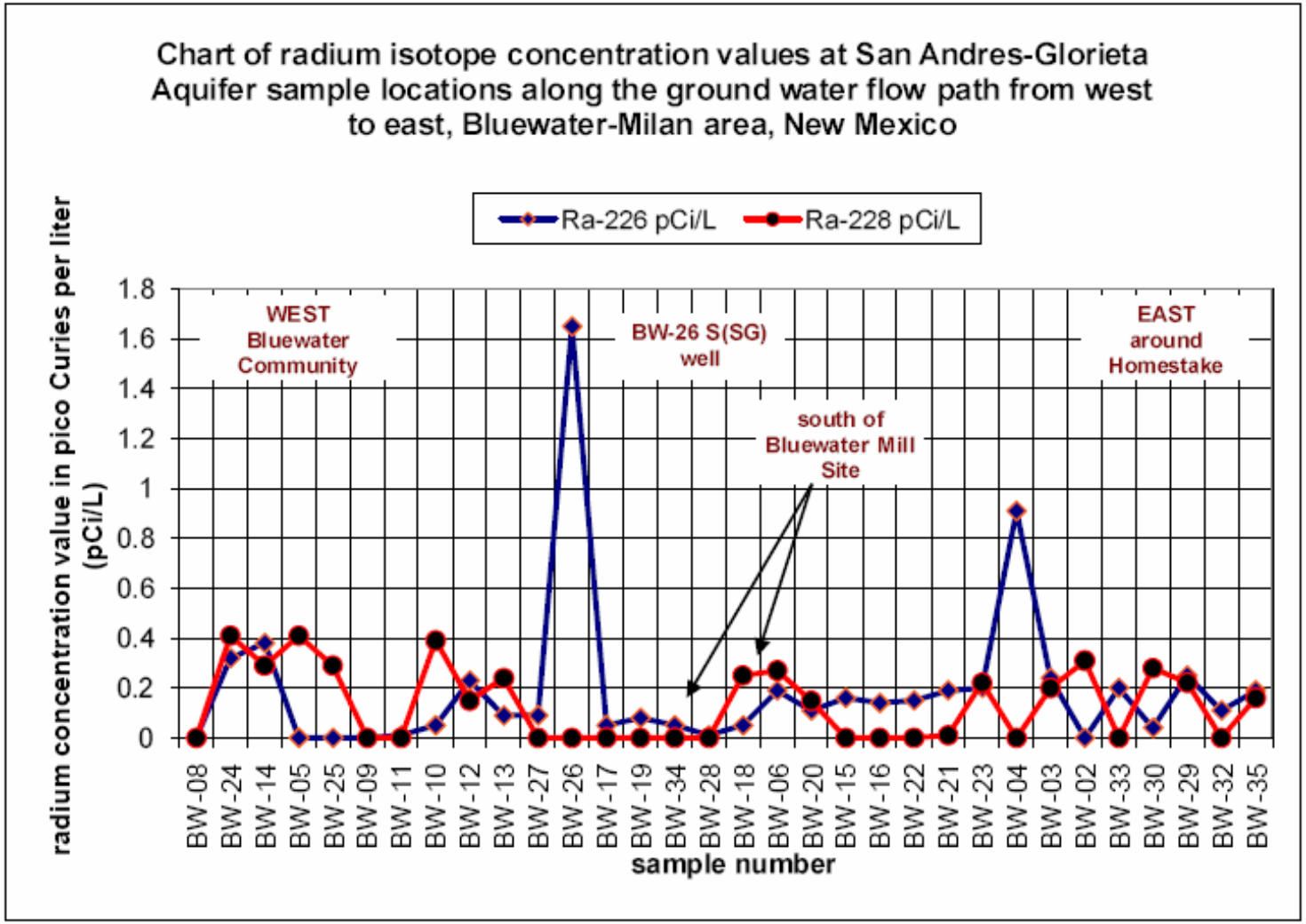


Figure 19. Relation of $^{234}U$: $^{238}U$ alpha activity ration to the reciprocal of uranium concentration for raffinate control samples and samples of alluvial ground water, uranium mill site, southwestern Colorado. Samples additionally coded according to their molybdenum concentrations (after Zielinski et al, 1997).

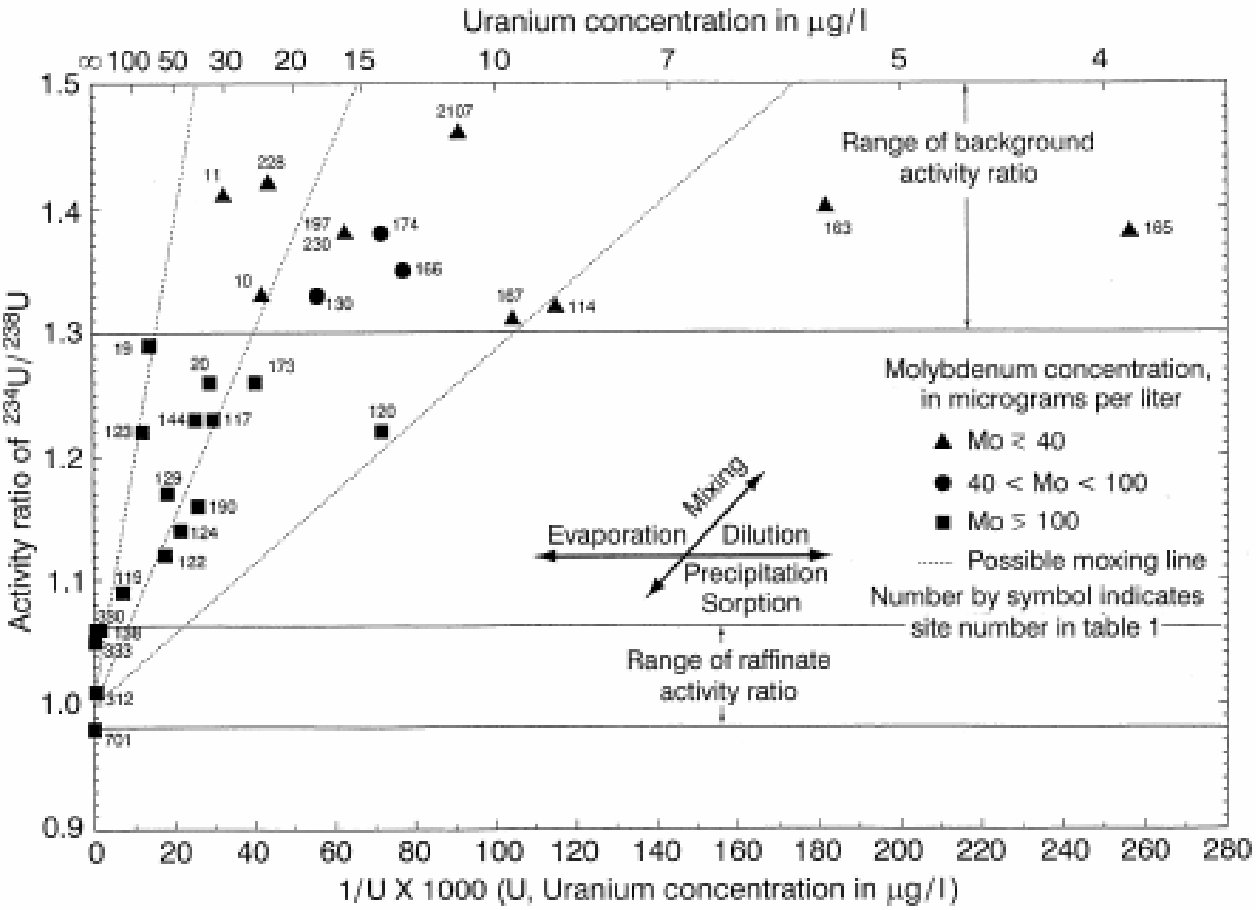


Figure 20. X-Y chart of the $^{234}U$: $^{238}U$ activity ration vs. uranium concentrations (2008) in ug/l for a select set of ground water sample locations, Bluewater area, New Mexico.

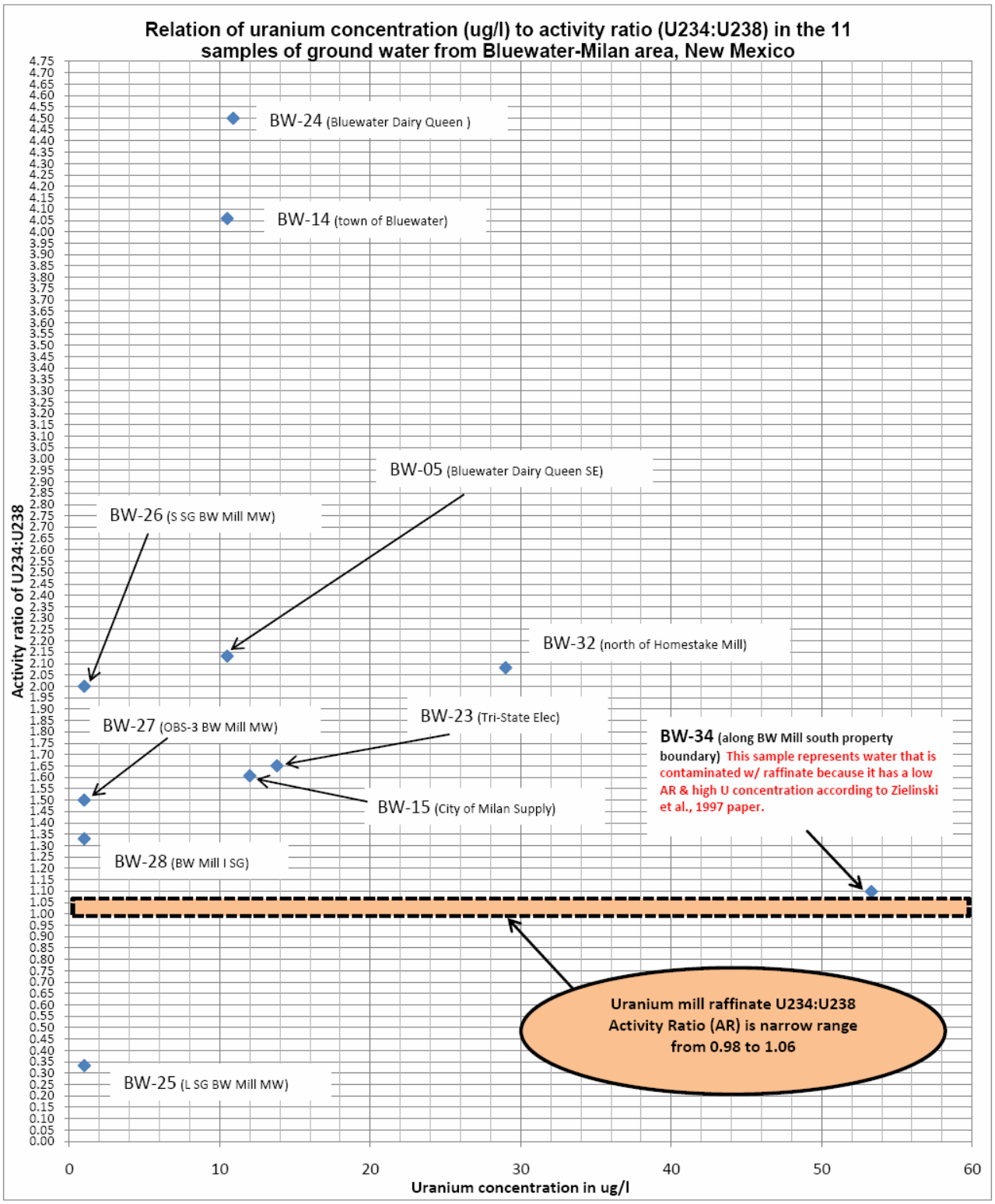


Figure 21. X-Y chart of the stable isotope values (2008) of $\delta^{18}O$ vs. $\delta D$ (o/oo) for a select set of ground water samples, Bluewater area, plotted with the Craig meteoric water line and the local meteoric water line for the Albuquerque area, Bluewater-Milan area, New Mexico.

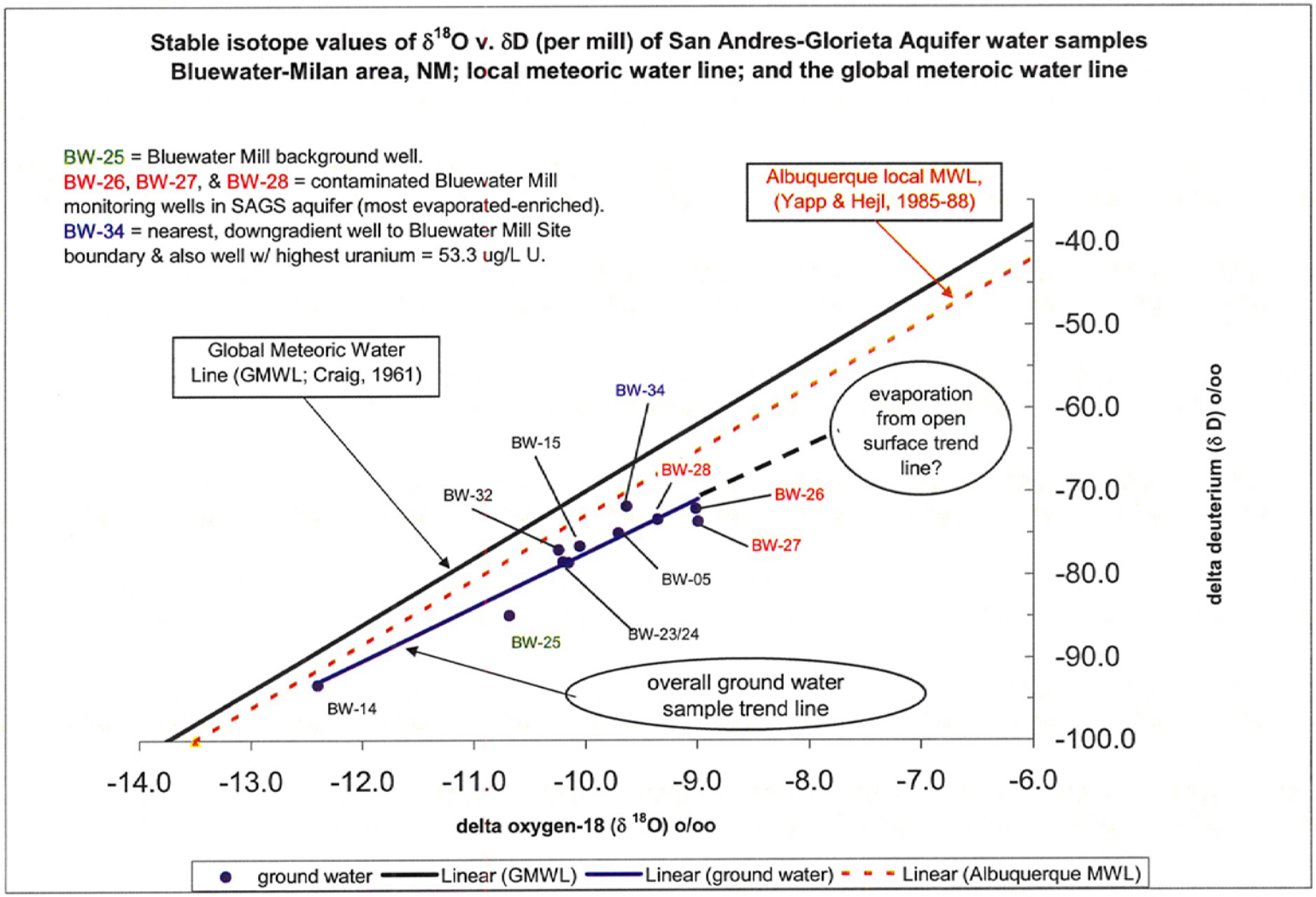


Figure 22. Range of $\delta^{13}C$ isotope values (o/oo) in different types of carbonate reservoirs and the range of $\delta^{13}C$ isotope values (2008) for a select set of ground water samples, Bluewater area, New Mexico (after Eby, 2004).

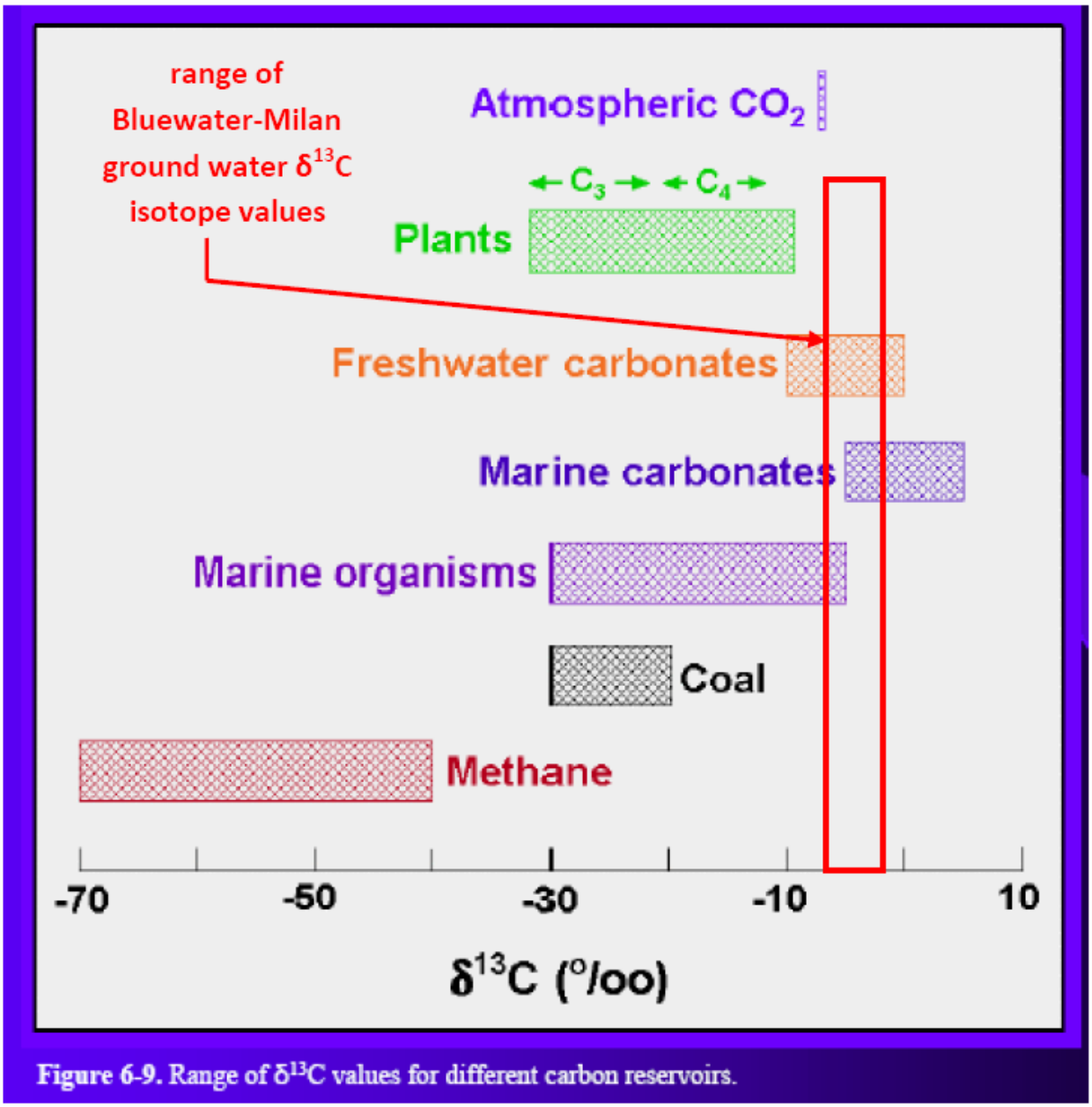



**Figure 6-9.** Range of $\delta^{13}C$ values for different carbon reservoirs.

Figure 23. X-Y chart of $SO_4$ concentration in mg/l vs. isotope values (2008) in o/oo for a select set of ground water samples, Bluewater area, New Mexico.

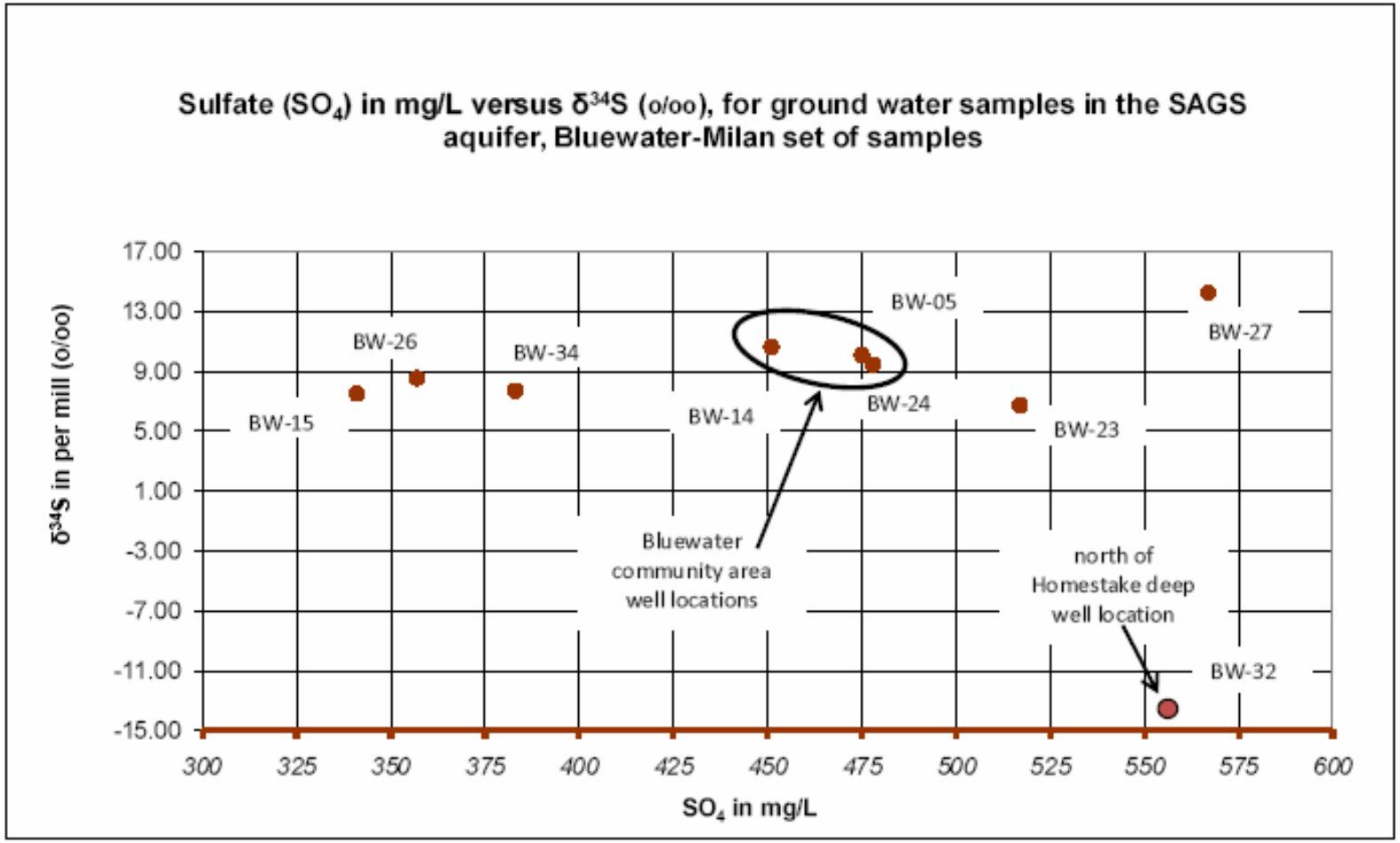


Figure 24. Comparison of biogenic and hydrothermal $\delta^{34}S$ sulfur isotope values(o/oo) from various uranium ore deposits in the western United States and Grants Mineral Belt (after Jensen, 1963). For comparison the range of $\delta^{34}S$ values for the Bluewater-Milan ground water samples are shown in the red area and the $\delta^{34}S$ value of sample BW-32 is shown as the dashed blue line (after Jensen, 1963).

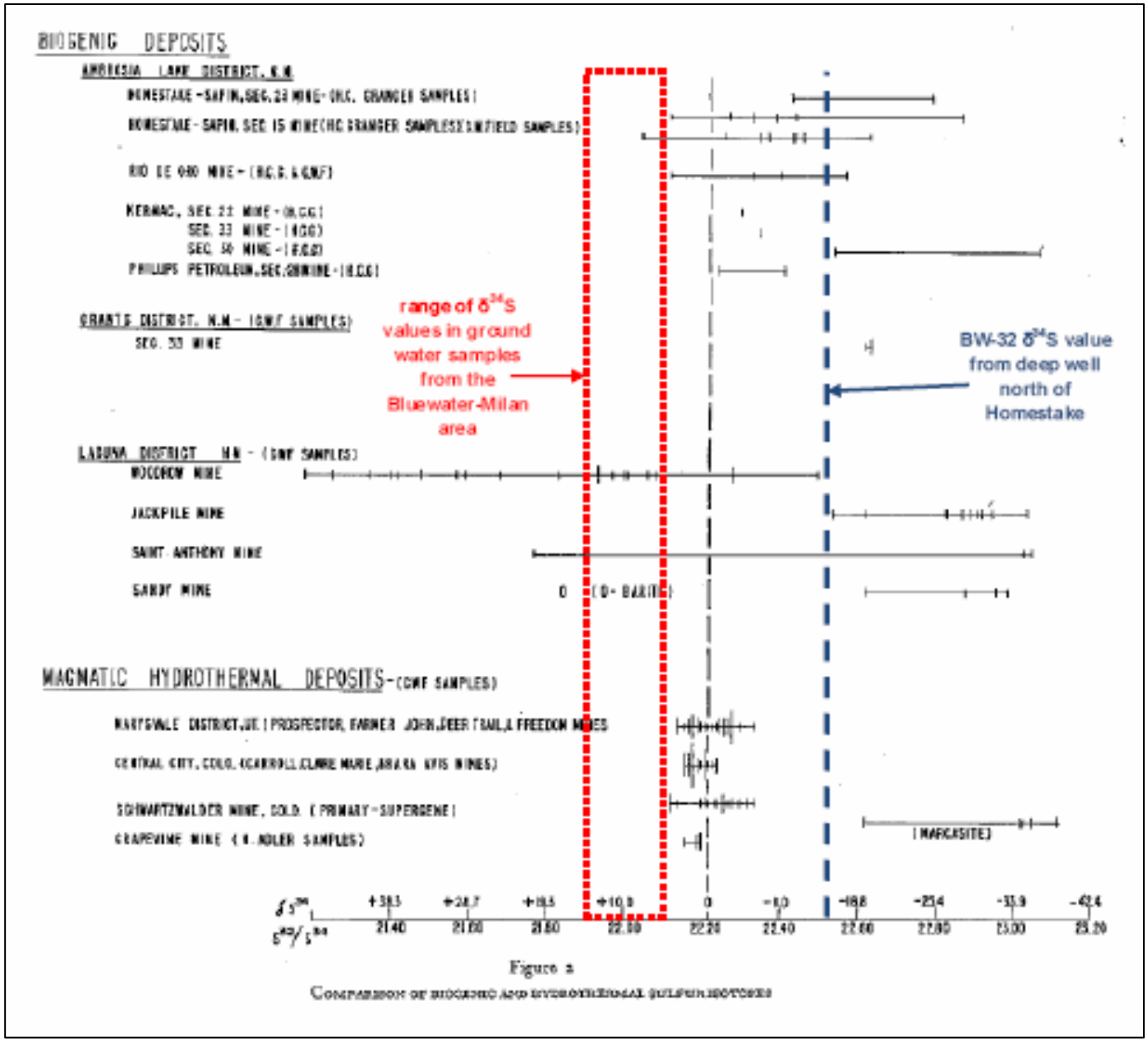



Figure 2

Comparison of biogenic and hydrothermal sulfur isotopes