HOMESTAKE
Grants Project

Homestake Mining Company of California

Thomas Wohlford
Closure Manager

26 July 2018

ATTN: Document Control Desk
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Washington, DC 20555-0001

ATTN: Mr. Jeffrey Whited
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ATTN: Mr. Bill Pearson
Ground Water Quality Bureau
New Mexico Environment Department
PO Box 5469
Santa Fe, NM 87502-5469

RE: Proposed Adjustment in Groundwater Monitoring of the San Andres-Glorieta Aquifer near the Grants Reclamation Project (Nuclear Regulatory Commission Docket No. 40-8903, License No. SUA 1471, and New Mexico Environmental Department DP-200 Ground Water Discharge Plan)

Dear Sirs:

The US Nuclear Regulatory Commission (NRC) responded to the Homestake Mining Company's Well 943 Hydrologic Test Report on May 10, 2018. This letter is in response to that correspondence and presents a proposed adjustment in the groundwater monitoring of the San Andres-Glorieta (SAG) aquifer for the next year due to the leakage into the SAG aquifer in well 943 that occurred prior to its abandonment in late July of 2018 (SAG sealed on 7/19/2018). The additional monitoring is proposed to determine water quality changes at nearby SAG water users from the past leakage into the SAG aquifer from well 943. NRC and the New Mexico Environmental Department are presently reviewing a proposed revision in the groundwater monitoring program for the Grants Reclamation Project (GRP) and this proposal increases the monitoring of this aquifer in this area for the next year.

The following information on SAG groundwater flow direction and groundwater usage is presented for consideration prior to the discussion of the proposed monitoring changes:

SAG Groundwater Flow Direction - The groundwater conditions in the SAG aquifer in this area of New Mexico have been defined by Baldwin and Anderholm (1992) (see US Geologic Survey Water-Resources Investigations Report 91-4033). Figure 14 from Baldwin and Anderholm (1992), which is included in the Attachment A of this letter, shows the potentiometric-surface (water-level elevation) contours for the SAG aquifer in the Bluewater and Grants areas and indicates that the groundwater flow in Township 12N and Range 10W is to the east-southeast.

NM5520
NM55

This is similar to the typical flow direction presented in the GRP Annual Performance reports. Well 943 is located 1.25 miles west and 0.5 miles north of the southeast corner of T12N R10W.

Figure 13 from Baldwin and Anderholm (1992), which is also included in Attachment A, shows a regional map of the SAG water-level elevation which shows that the groundwater farther downgradient changes to an easterly flow direction east of the GRP in the 7W Range. The gradient of the water-level elevation in the SAG aquifer also steepen in this area due to a decrease in the transmissivity of the SAG aquifer. Figure 12 from Baldwin and Anderholm (1992) shows the transmissivity of the SAG aquifer declines from values that are typically greater than 50,000 feet squared per day to 800 feet squared per day to the east of the GRP and then shortly to a value of 150 feet squared per day. This large decline in the transmissivity causes the very flat gradient near well 943 with an increasing gradient to the east.

SAG Groundwater Usage - The SAG aquifer water usage is large in the Bluewater, Milan and Grants area due to the high well yields and good water quality from the SAG aquifer. Water supply for the municipalities of Grants, Milan and Bluewater is produced from the SAG aquifer. Milan supply wells 998, 999 and 532 are the closest municipal wells near the GRP. The power plant operated by Tri-State produces some of its water supply from SAG aquifer wells 949 and 995 in the GRP area. Irrigation water supply is also produced from the SAG aquifer in the GRP area from wells 806R, 938 and 545. HMC uses the SAG aquifer for fresh water supply from wells Deep #2 and 951R with a reduced production rate in recent years. Deep #1 has been used in the past for fresh water supply and the replacement well Deep #1R will be used in the future in addition to the previously mentioned wells. The location of all of these SAG wells is shown on Figure 8.1-1 from the 2017 Annual Performance Report for the GRP and attached Figure 1 shows the locations of all of the wells except wells 532, 545, 938, 995, 998 and 999. Several domestic water supply wells exist in the GRP area but their usage of water is small compared to the previously discussed SAG water usage. Two of these domestic wells exist approximately two miles to the northeast of the GRP. No SAG water wells are known to exist within numerous miles to the east of the GRP. Figure 13 from Baldwin and Anderholm (1992) shows a SAG well located approximately 30 miles east of the GRP. This well is located to the east of Mt. Taylor. It is unlikely that a well would be drilled to the SAG aquifer in the vicinity of Mt. Taylor. The natural water quality of the water in the SAG aquifer at this location would be expected to be very poor based on specific conductance of SAG wells located a similar distance downgradient in the SAG aquifer but to the south of the well presented in Figure 13 in Attachment A from Baldwin and Anderholm (1992). Figure 18 in Attachment A shows the large conductivities from SAG wells to the south. Therefore, no water usage from the SAG aquifer is documented to the east and downgradient of the GRP for approximately 30 miles. The only SAG well within the ten townships to the east (12N and 11N and ranges 5W through 9W) is the SAG well in T11N R5W which is 3390 feet deep. A search of the New Mexico State Engineer's record for these ten townships shows that the deepest well is completed in Section 19 in T12N R6W to a depth of 1990 feet. The well would need to be greater than 6200 feet at this location to reach the San Andres limestone. The poor water quality in the San Andres will likely restrict water usage east of Mt. Taylor in this aquifer.

Adjusted SAG Groundwater Monitoring - Groundwater monitoring of the SAG aquifer is proposed to be increased in the GRP area between well 943 and the known major water users. Figure 1 shows the proposed SAG monitoring wells relative to well 943. No documented water usage from the SAG aquifer exists east and downgradient of the GRP. Table 1 lists the changes in the SAG groundwater monitoring in red. The frequency of sampling the nearby SAG monitoring well 943M is changed to quarterly. Sampling from HMC's three San Andres water supply wells (Deep #1R, Deep #2 and 951R) is also proposed to be changed from semiannual to quarterly sampling. As mentioned in Table 1, the sampling proposed for Deep #2 will be

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replaced by sampling Deep #2R once the pump has been placed in the well and Deep #2 has been abandoned. Table 1 shows the addition of semiannual sampling of non-HMC wells 806R, 949, 955 and 991. Wells 806R and 949 are pumped a significant amount of time and should be good monitoring locations for changes in water quality. Wells 955 and 991 give two additional monitoring locations in the SAG aquifer to the west of well 943. The monitoring of these four non-HMC wells will depend on access from the owners.

Thank you for your time and attention on this matter. If you or anyone on your staff has any questions, please contact me at the Grants office at 505.287.4456, extension 34, or call me directly on my cell phone at 505.290.2187.

Respectfully,

Thomas P. Wohlford

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Homestake Mining Company of California
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M. McCarthy, Barrick, Salt Lake City, Utah (electronic copy)
C. Burton, Barrick, Henderson, Nevada (electronic copy)
G. Hoffman, Hydro-Engineering, Casper, Wyoming (electronic copy)
R. Whicker, Environmental Restoration Group, Albuquerque, New Mexico (electronic copy)

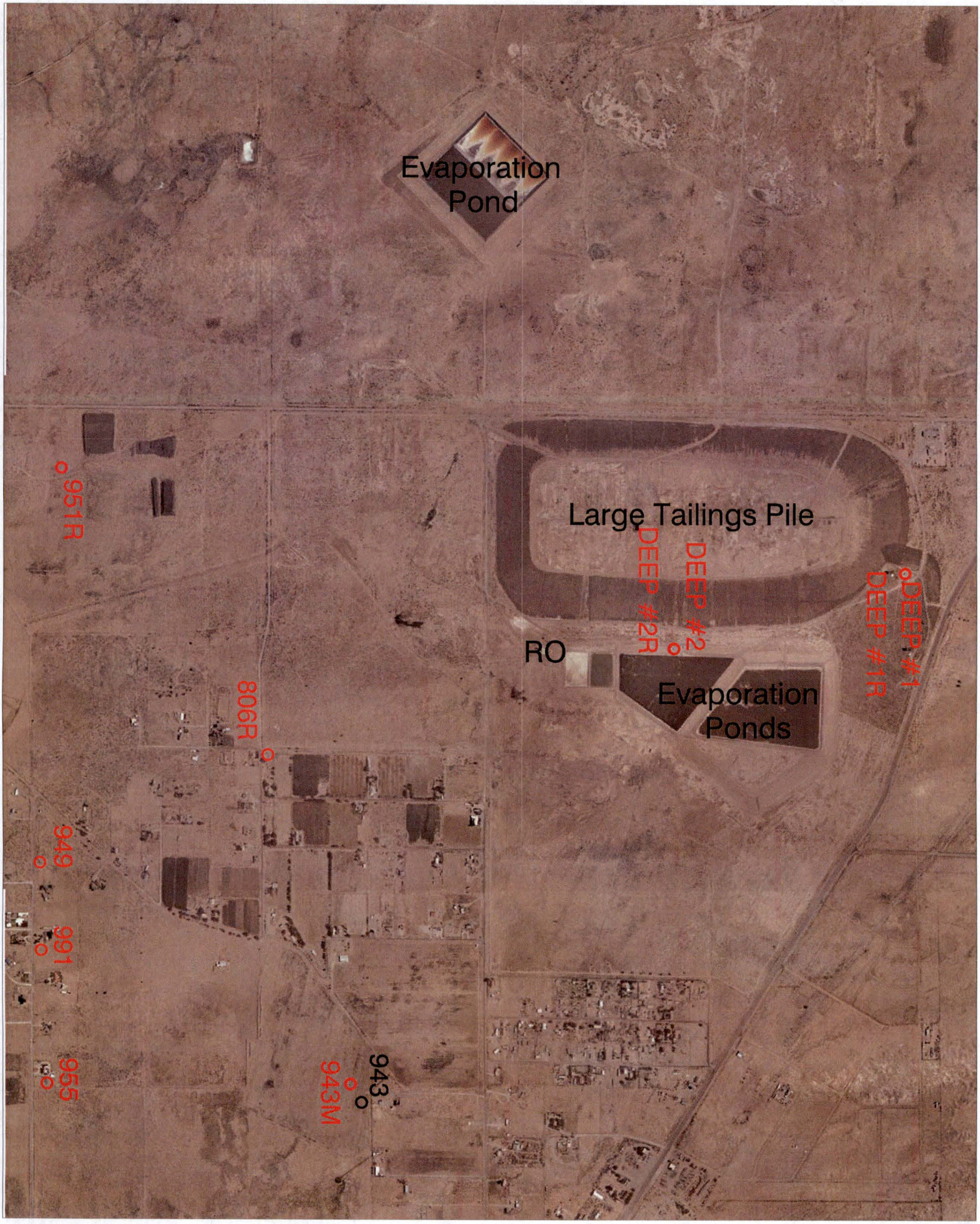


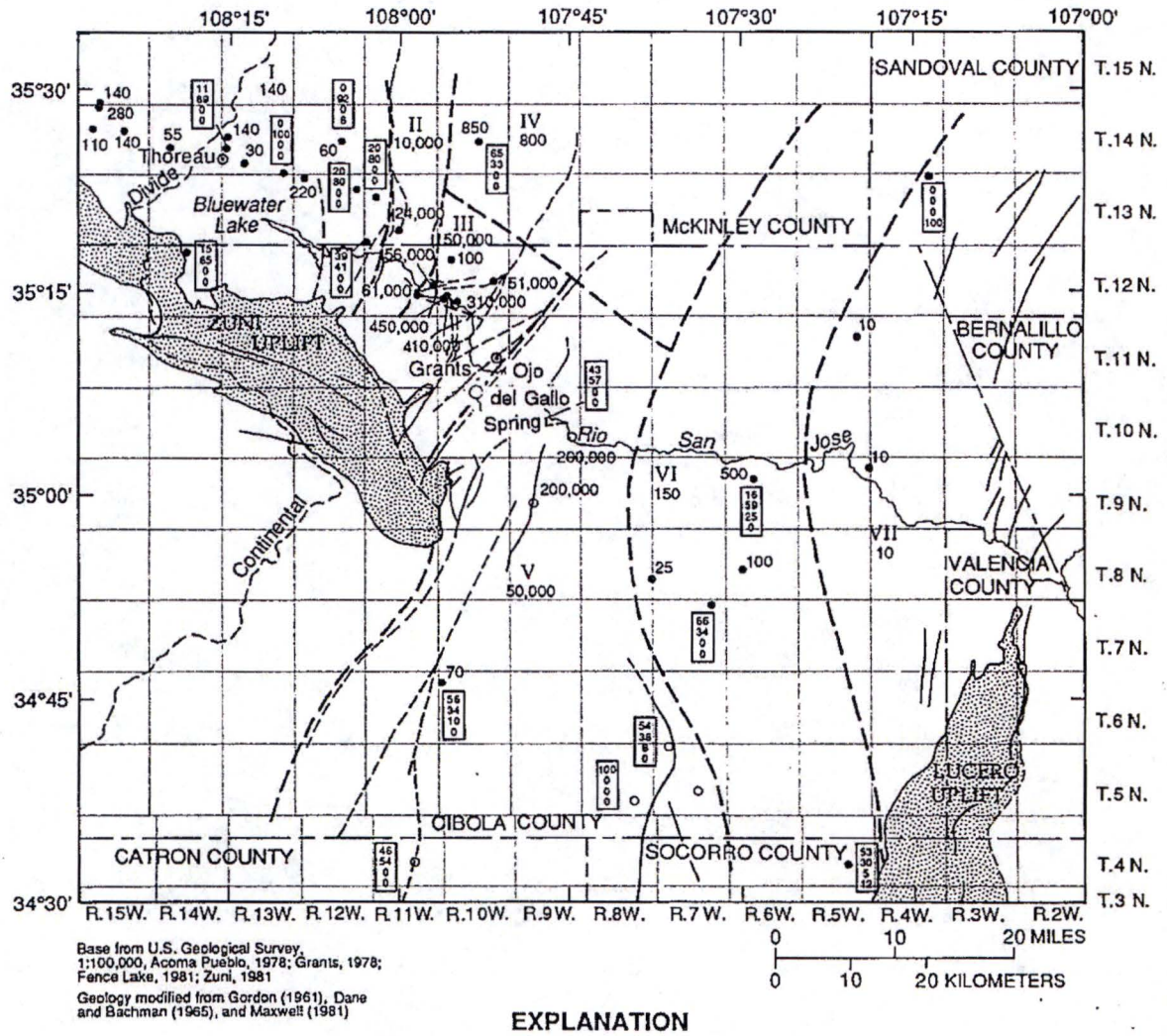
FIGURE 1. LOCATIONS OF PROPOSED SAG MONITORING WELLS NEAR WELL 943.

Table 1. Adjusted San Andres Groundwater Monitoring at the Grants Site		
Well	**Parameter List Code**	**Frequency of Monitoring**
San Andres Wells		
Deep #1@, Deep #2@, 943M, 951R	B, F H	Annual Quarterly
806R, 949, 955, 991	B, F H	Annual Semiannual

Note:
@ = Monitoring will be changed to replacement well when replaced

ATTACHMENT A FIGURES FROM BALDWIN AND ANDERHOLM, 1992. U.S. GEOLOGICAL SURVEY WATER-RESOURCES INVESTIGATIONS REPORT 91-4033

List of Figures



Base from U.S. Geological Survey, 1:100,000, Acoma Pueblo, 1978; Grants, 1978; Fence Lake, 1981; Zuni, 1981

Geology modified from Gordon (1961), Dane and Bachman (1965), and Maxwell (1981)

EXPLANATION

AREA WHERE SAN ANDRES LIMESTONE AND GLORIETA SANDSTONE ARE ABSENT

FAULT -- Dashed where approximately located

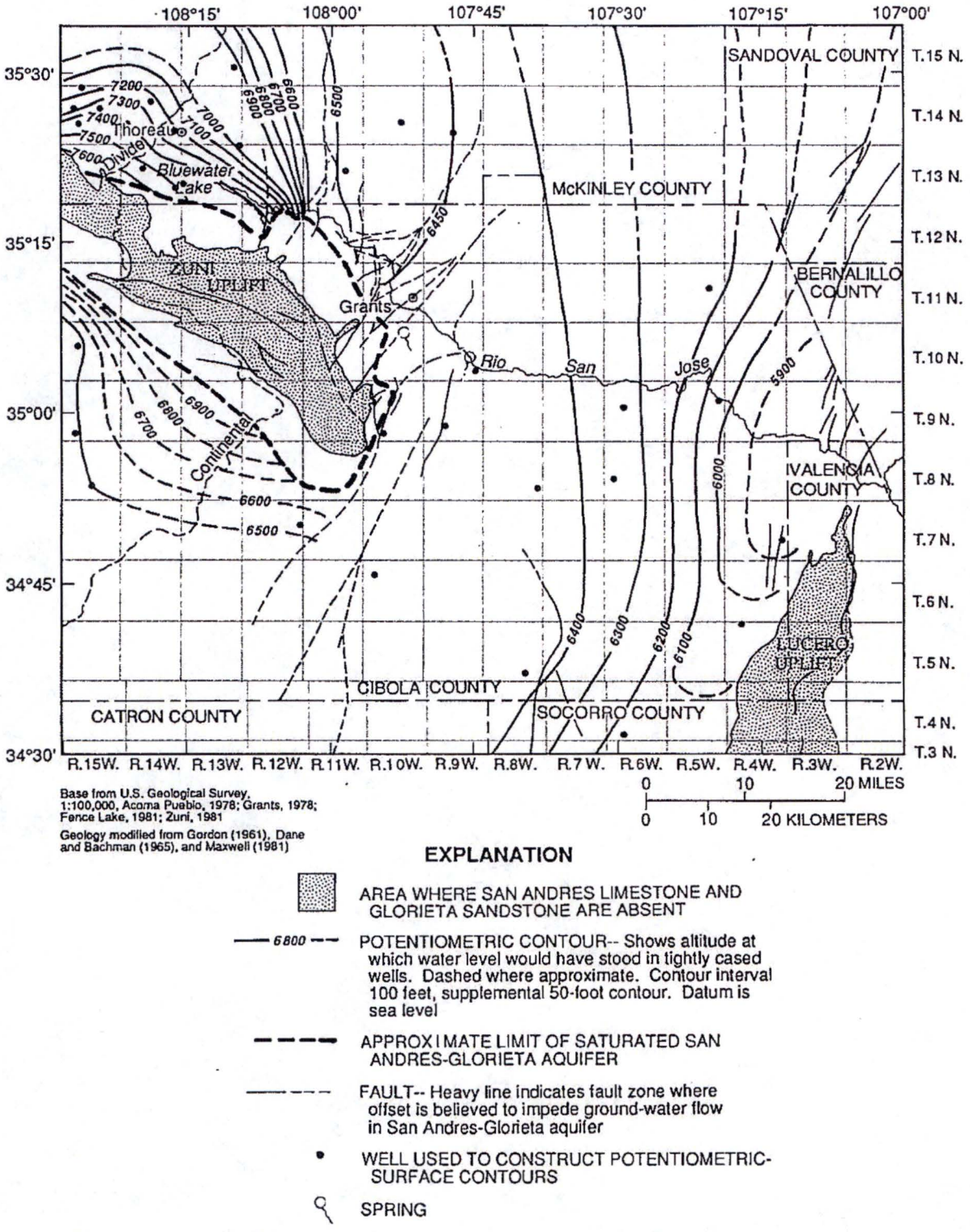
I 140 TRANSMISSIVITY ZONE BOUNDARY--Number is estimated transmissivity, in feet squared per day

LITHOLOGIC COMPOSITION OF SAN ANDRES-GLORIETA AQUIFER, IN PERCENT OF ROCK TYPE, FROM TOP TO BOTTOM--Carbonates, sandstone, evaporites, and shale

OIL-TEST HOLE OR WELL WHERE CAVERNOUS OR HIGHLY FRACTURED ZONE WAS PENETRATED IN THE SAN ANDRES-GLORIETA AQUIFER

25 WELL WITH TRANSMISSIVITY DATA--Number is transmissivity, in feet squared per day

Figure 12.--Generalized transmissivity zones for the San Andres-Glorieta aquifer.



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Geology modified from Gordon (1961), Dane and Bachman (1965), and Maxwell (1981)

EXPLANATION

AREA WHERE SAN ANDRES LIMESTONE AND GLORIETA SANDSTONE ARE ABSENT

6800 — POTENTIOMETRIC CONTOUR-- Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximate. Contour interval 100 feet, supplemental 50-foot contour. Datum is sea level

APPROXIMATE LIMIT OF SATURATED SAN ANDRES-GLORIETA AQUIFER

FAULT-- Heavy line indicates fault zone where offset is believed to impede ground-water flow in San Andres-Glorieta aquifer

WELL USED TO CONSTRUCT POTENTIOMETRIC-SURFACE CONTOURS

SPRING

Figure 13.--Potentiometric-surface contours for the San Andres-Glorieta aquifer, drawn on the basis of the highest hydraulic-head values on record.

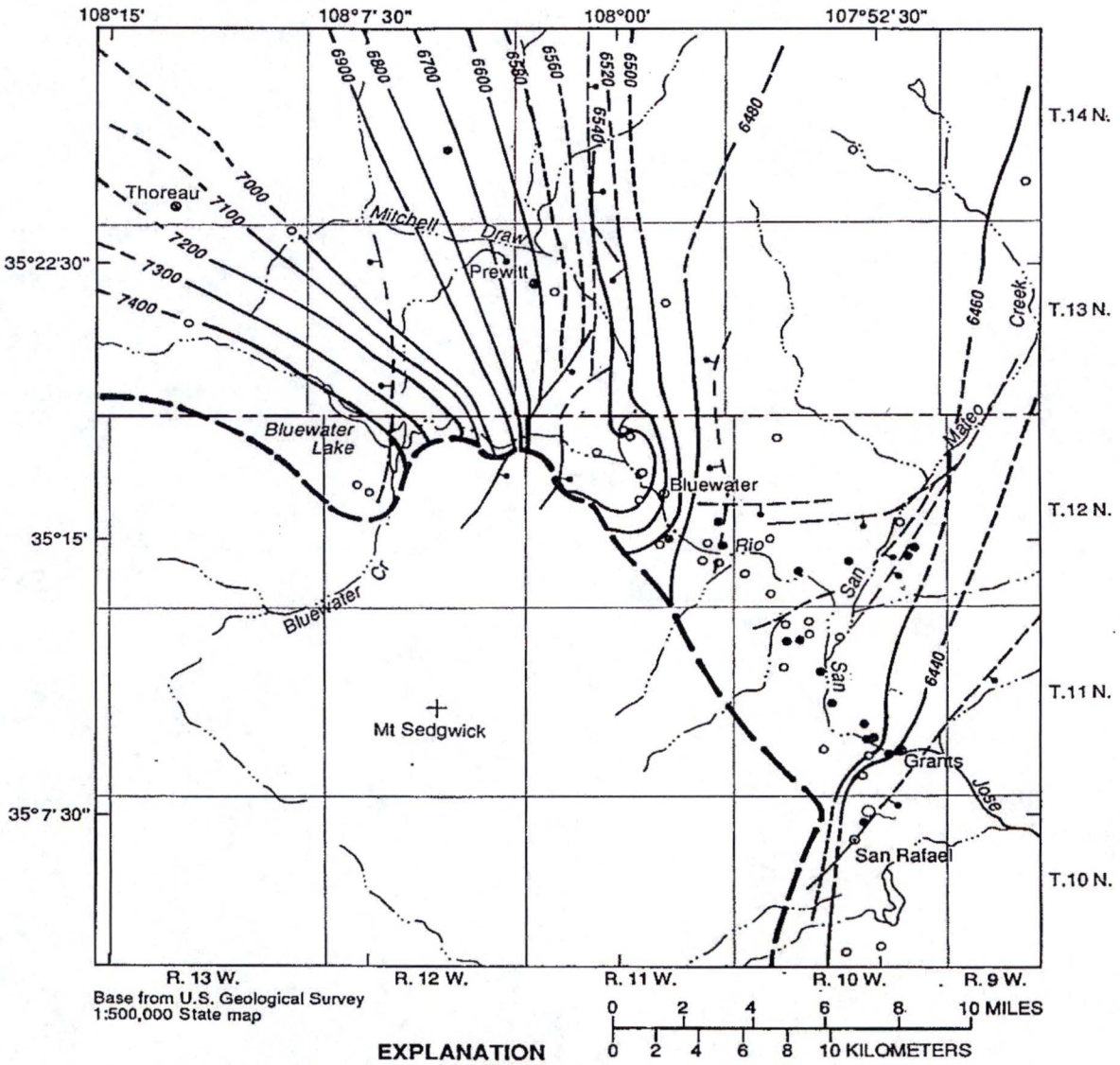
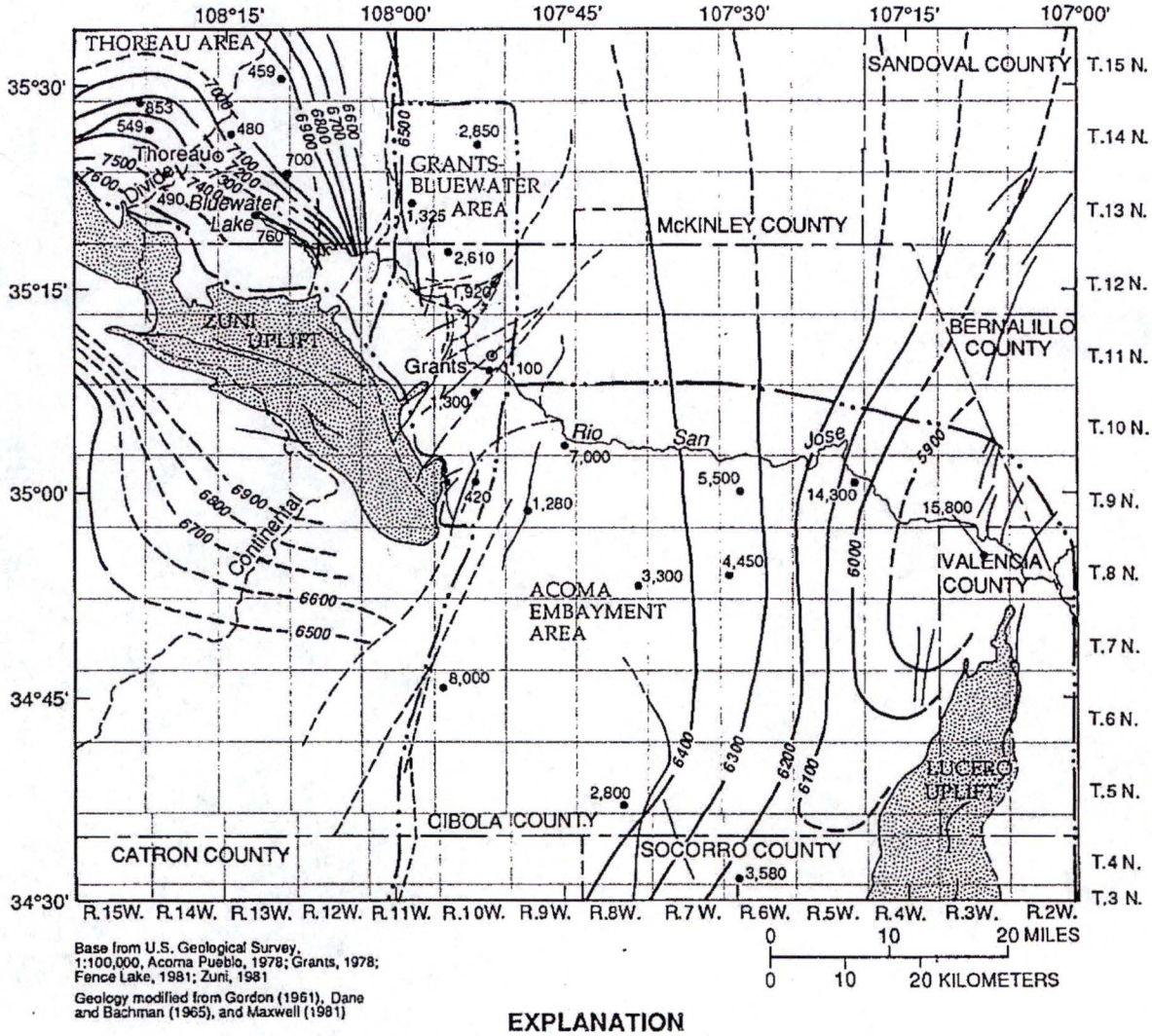


Figure 14.--Potentiometric-surface contours for the San Andres-Glorieta aquifer in the Grants-Bluewater area.



Base from U.S. Geological Survey, 1:100,000, Acoma Pueblo, 1978; Grants, 1978; Fence Lake, 1981; Zuni, 1981

Geology modified from Gordon (1961), Dane and Bachman (1965), and Maxwell (1981)

EXPLANATION

AREA WHERE SAN ANDRES LIMESTONE AND GLORIETA SANDSTONE ARE ABSENT

FAULT -- Dashed where approximately located

BOUNDARY OF AREAS REFERRED TO IN DISCUSSION OF GROUND-WATER CHEMISTRY

6400 POTENTIOMETRIC CONTOUR-- Shows altitude at which water level would have stood in tightly cased wells. Dashed where approximately located. Contour interval 100 feet. Datum is sea level

8,000 WELL--Number is specific conductance, in microsiemens per centimeter at 25 degrees Celsius

Figure 18.--Ground-water-chemistry discussion area, potentiometric surface, and specific conductance of water from the San Andres-Glorieta aquifer.