



1 TO: Bruce Buel, General Manager Nipomo Community Services District  
2 FROM: Joel Degner, Brad Newton, Ph.D., P.G., Bob Beeby, P.E.  
3 RE: Fall 2008 Groundwater in Storage above Mean Sea Level  
4 DATE: December 1, 2008

5 INTRODUCTION

6 Groundwater surface elevations (GSE) underlying the Nipomo Mesa are regularly  
7 measured at many places (wells) across the mesa. Hydrographs from individual wells provide  
8 a temporal record of the GSE measurements at one location. Presented herein is the Fall 2008  
9 GWS estimate along with estimates of historical annual variability in GWS from 1975 to 2008  
10 based on groundwater surface elevation measurements collected during Spring and Fall across  
11 the Nipomo Mesa. Limited measurements of GSE were available for the years 1982, 1983, 1984,  
12 1994 and 1997, thus precluding a reliable estimate of GWS for those years.

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14 RESULTS

15 Estimated Fall 2008 GWS is 65,000 acre-feet (AF), which is 18,000 AF less than Spring 2008  
16 and 1,000 AF lower than Fall 2007 (Table 1, Figure 1).

17

18 METHODOLOGY

19 The annual estimates of Spring and Fall GWS are based on GSE measurements regularly  
20 made by San Luis Obispo County Department of Public Works (SLO DPW), NCSO, USGS, and  
21 Woodlands. The integration of GSE data is accomplished by using computer software to  
22 interpolate between measurements and calculate GWS within the principal production aquifer  
23 assuming an unconfined aquifer and a specific yield of 11.7 percent. Limited measurements of  
24 GSE were available for the years 1982, 1983, 1984, 1994 and 1997, precluding a reliable estimate  
25 of GWS for those years.

26 The amount of GWS under the Nipomo Mesa Management Area (NMMA) was computed  
27 by multiplying the saturated volume above sea level with the aerially weighted specific yield  
28 (DWR, 2002), excluding bedrock (Figure 11: Base of Potential Water-Bearing Sediments,  
29 presented in the report, Water Resources of the Arroyo Grande - Nipomo Mesa Area [DWR  
30 2002]). The amount of GWS under the NMMA was constrained to the boundary determined in  
31 Phase III of the trial.

32 Data provided by DWR, consisting of well completion reports, lithographic logs,  
33 electronic logs, and pump tests, were used to develop an understanding of the hydrogeologic  
34 conditions underlying the NMMA. A systematic review of these data pertaining to wells used

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1 for storage calculations was conducted in order to verify that each well's screened interval is  
2 within the principal production aquifer (Paso Robles Formation).

### 3 **Groundwater Surface Elevation Measurements**

4 Groundwater surface elevation data were obtained from SLO DPW, NCSO, USGS, and  
5 Woodlands (Table 2). SLO DPW measures GSE in monitoring wells during the spring and the  
6 fall of each year. Woodlands and NCSO measures GSE in their monitoring wells monthly. For  
7 the years 1975 to 1999, available representative GSE data were used to estimate GWS. For the  
8 years 2000 to 2008, only GSE data from the same 45 wells were used to estimate GWS.

9 The GSE data was reviewed in combination with well completion reports and historical  
10 hydrographic records in order to exclude measurements that do not accurately represent static  
11 water levels within the principal production aquifer. Wells that do not access the principal  
12 production aquifer or were otherwise determined to not accurately represent static water levels  
13 within the aquifer were not included in analysis.

### 14 **Groundwater Surface Interpolation**

15 The individual GSE measurements from each year were used to produce a GSE field by  
16 interpolation using the inverse distance weighting (IDW) method.

### 17 **Groundwater Volume Estimate**

18 The amount of groundwater in storage under the Nipomo Mesa was estimated for the  
19 boundary determined in Phase III of the trial. The GWS was estimated by subtracting both the  
20 mean sea level surface (elevation equals zero) and the volume of bedrock above sea level from  
21 the saturated volume. The bedrock surface elevation is based on Figure 11: Base of Potential  
22 Water-Bearing Sediments, presented in the report, Water Resources of the Arroyo Grande -  
23 Nipomo Mesa Area (DWR 2002). The bedrock surface elevation was preliminarily verified by  
24 reviewing driller reports obtained from DWR. The saturated volume above sea level was  
25 multiplied by a specific yield of 11.7% to estimate the recoverable amount of GWS. The specific  
26 yield is based on the average weighted specific yield for the Nipomo Mesa Hydrologic Sub-  
27 Area (DWR 2002, pg. 86).

### 28 **REFERENCES**

29 Department of Water Resources (DWR). 2002. Water Resources of the Arroyo Grande -  
30 Nipomo Mesa Area, Southern District Report.

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Table 1

**Spring and Fall  
Groundwater in Storage above Mean Sea Level  
for Phase III Boundary**

| Year | Rainfall<br>(Inches) | Spring GWS<br>(Acre-Feet) | Number<br>of Wells | Fall GWS<br>(Acre-Feet) | Number<br>of Wells | Spring to Fall<br>Difference<br>(Acre-Feet) |
|------|----------------------|---------------------------|--------------------|-------------------------|--------------------|---|
| 1975 | 17.29                | 99,000                    | 54                 | 91,000                  | 54                 | 8,000                                       |
| 1976 | 13.45                | 82,000                    | 45                 | 76,000                  | 65                 | 6,000                                       |
| 1977 | 10.23                | 64,000                    | 59                 | 54,000                  | 63                 | 10,000                                      |
| 1978 | 30.66                | 84,000                    | 62                 | ---                     | 35                 | ---   |
| 1979 | 15.80                | 72,000                    | 57                 | 77,000                  | 63                 | (5,000)                                     |
| 1980 | 16.57                | 88,000                    | 55                 | 89,000                  | 46                 | (1,000)                                     |
| 1981 | 13.39                | 97,000                    | 46                 | 75,000                  | 47                 | 22,000                                      |
| 1982 | 18.58                | 123,000                   | 42                 | ---                     | 31                 | ---   |
| 1983 | 33.21                | ---                       | 35                 | 95,000                  | 42                 | ---   |
| 1984 | 11.22                | ---                       | 14                 | 76,000                  | 37                 | ---   |
| 1985 | 12.20                | 106,000                   | 37                 | 82,000                  | 41                 | 24,000                                      |
| 1986 | 16.85                | 98,000                    | 51                 | 67,000                  | 51                 | 31,000                                      |
| 1987 | 11.29                | 83,000                    | 48                 | 71,000                  | 52                 | 12,000                                      |
| 1988 | 12.66                | 80,000                    | 51                 | 66,000                  | 49                 | 14,000                                      |
| 1989 | 12.22                | 59,000                    | 47                 | 47,000                  | 57                 | 12,000                                      |
| 1990 | 7.12                 | 62,000                    | 55                 | 49,000                  | 53                 | 13,000                                      |
| 1991 | 13.06                | 62,000                    | 52                 | 55,000                  | 54                 | 7,000                                       |
| 1992 | 15.66                | 61,000                    | 52                 | 35,000                  | 48                 | 26,000                                      |
| 1993 | 20.17                | 72,000                    | 54                 | 52,000                  | 61                 | 20,000                                      |
| 1994 | 12.15                | 60,000                    | 54                 | ---                     | 36                 | ---   |
| 1995 | 25.47                | 87,000                    | 35                 | 62,000                  | 52                 | 25,000                                      |
| 1996 | 16.54                | 76,000                    | 45                 | 62,000                  | 57                 | 14,000                                      |
| 1997 | 20.50                | ---                       | 20                 | 91,000                  | 48                 | ---   |
| 1998 | 33.67                | 105,000                   | 41                 | 93,000                  | 44                 | 12,000                                      |
| 1999 | 12.98                | 106,000                   | 56                 | 88,000                  | 49                 | 18,000                                      |
| 2000 | 14.47                | 108,000                   | 44                 | 84,000                  | 41                 | 24,000                                      |
| 2001 | 18.78                | 118,000                   | 43                 | 85,000                  | 35                 | 33,000                                      |
| 2002 | 8.86                 | 96,000                    | 29                 | 79,000                  | 41                 | 17,000                                      |
| 2003 | 11.39                | 94,000                    | 37                 | 66,000                  | 42                 | 28,000                                      |
| 2004 | 12.57                | 89,000                    | 42                 | 81,000                  | 35                 | 8,000                                       |
| 2005 | 22.23                | 98,000                    | 38                 | 79,000                  | 39                 | 19,000                                      |
| 2006 | 20.83                | 107,000                   | 44                 | 78,000                  | 41                 | 29,000                                      |
| 2007 | 6.96                 | 93,000                    | 44                 | 66,000                  | 42                 | 27,000                                      |
| 2008 | 15.18                | 83,000                    | 43                 | 65,000                  | 42                 | 18,000                                      |

---: insufficient for evaluation

Figure 1

