

MEMORANDUM

December 7, 2000

To: Norm Young and Dennis Dunn

Through: Bob Sutter

From: Shane Bendixsen & Bill Ondrechen

Subject: Large Scale Ground Water Development in the Malad Basin (Basin 15).

It is our understanding that that in the years 2000 and 2001 there have been 31 applications amounting to 154 cfs to divert ground water in the Malad Basin and it is estimated this could increase to 200 cfs by 2002 (per communication Dennis Dunn, IDWR Eastern Office). It is also our understanding that only approximately one third of the new applications are for new development. The rest are for conversion from surface to ground water or supplemental to surface water. Concern has also been raised that the loss of recharge from the surface water delivery system will be lost

Attachment #1 presents the extent of the Malad Basin with ground water elevations and flow directions. No mass measurement has been completed so measurements over time were combined to provide enough data. While only a generalization, it is seen the flow direction is south out of the basin into Utah.

Attachment #2 presents ground water hydrographs. Four are currently monitored by the USGS and one has several 'spot' measurements since 1992 associated with water quality monitoring. As presented, ground water levels fluctuate seasonally and with dry and wet periods, but are still at approximately the same level as they were in the mid 1940's. Well 15S35E-01DAA1 does show a loss of approximately 10 feet, but has remained stable since 1960.

Pluhowski (1968), estimated that approximately 100,000 acre feet of surface and ground move into the basin each year as recharge. Burnham and others (1969), showed that while the limited amount of data prevents a precise estimate, this was a good estimate. Burnham and other's also stated that approximately 50,000 acre feet of ground water left the basin as underflow. This was based on Darcy's equation with an assumed transmissivity and gradient.

Kramber and others (1993), estimated that approximately 52,177 acres was being irrigated with surface and ground water. Assuming the depletion rate of 1.18 AF/Y (Hill, 1989), the total depletion is approximately 62,000 AF/Y. If it is assumed that the majority of water leaving the basin is underflow, Pluhowski's 100,000 AF/Y estimate of

recharge and Burnham and others estimate of 50,000 AF/Y leaving the basin as underflow closely fits the total depletion rate of 62,000 AF/Y.

Since it is estimated that approximately one third of the new applications are for bringing new land under irrigation this amounts to an additional use of 54 cfs or approximately 2,540 acres. This will create an additional consumptive use of 3,050 acre feet per year or an increase of approximately four percent. The total depletion rate will be 65,000 acre feet per year which is still far below the estimated recharge of 100,000 acre feet per year.

Recharge to the aquifer lost by the conversion from surface water to ground irrigation should be negligible because the surface water will still be used for irrigation on the remaining lands.

Burnham and others (1968) also estimated that water in storage in the upper 300 feet of the aquifer was 1.8 million-acre feet. Therefore the increased depletion to aquifer storage will not be measurable.

Based on our discussions with the State of Utah concerning delivery of natural and stored flow across the state line in the main Bear River, the topic of Idaho's use in the Malad has never been a concern to Utah. Both the surface and ground water in the Utah portion of the Malad Basin become more saline toward south, and they have stated there is limited use of those waters. Most use is made of the relatively cleaner Bear River water.

In closing, ground water levels are approximately the same as they were in the early 1940's. Recharge to the basin is approximately 100,000 AF/Y. Approximately half is lost to evapotranspiration and the other half leaves as underflow. The added four percent increase in total depletion will not be significant relative to the overall Malad Basin water supply.

REFERENCES

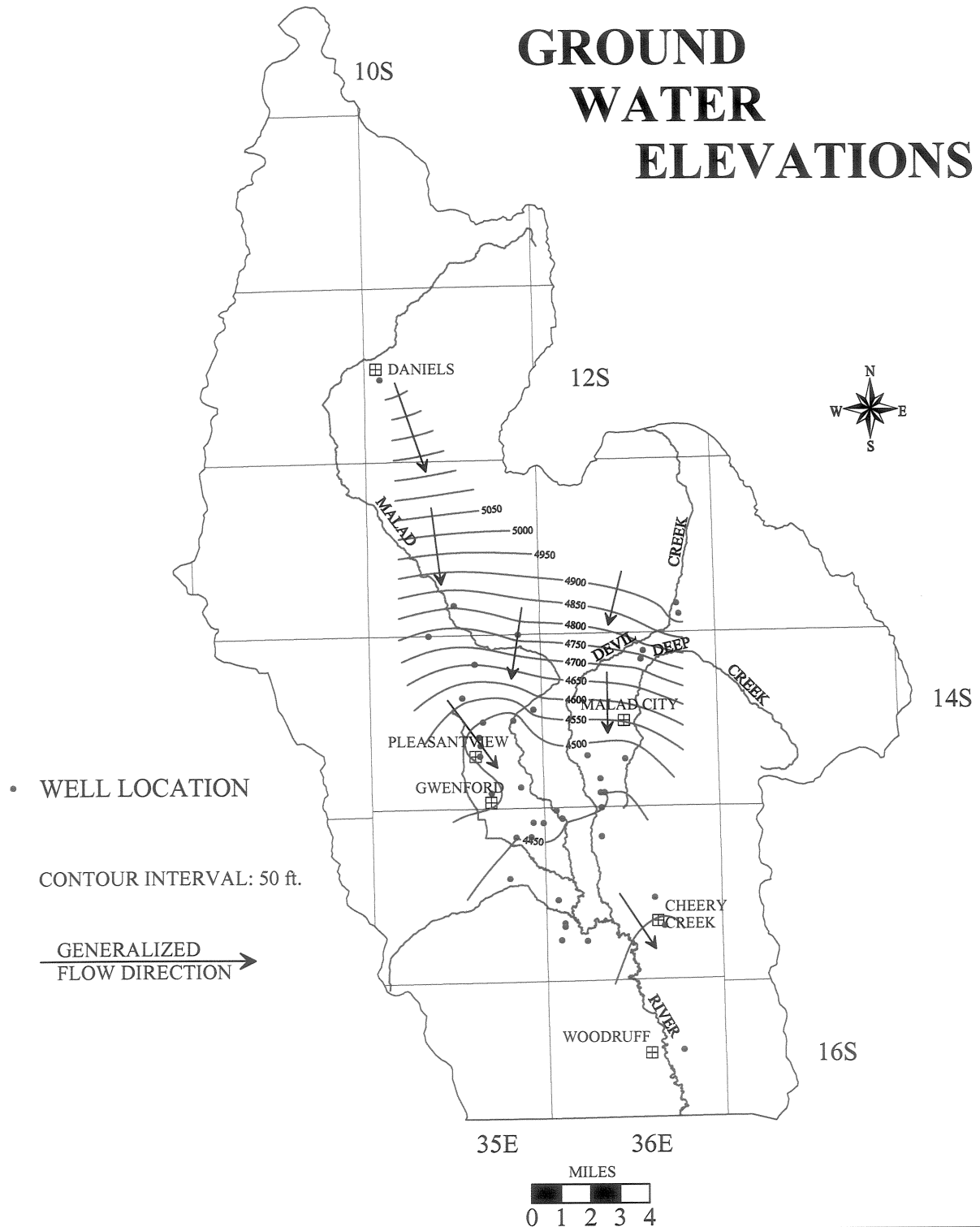
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- Hill, H.W., et al. 1989 Duty of Water Under the Bear River Compact: Field Verification of Empirical Methods for Estimating Depletion. Research Report 125. Utah Agricultural Experiment Station, Utah State University, Logan Utah.
- Kramber, W.J., and others, 1993, Idaho's System of Water Use in the Bear River Basin, published in Geo Info Systems , May 1993, p.48.
- Pluhowski, E.J., 1968, Hydrology of the Upper Malad River, Southeastern Idaho: U.S. Geological Survey open file report.

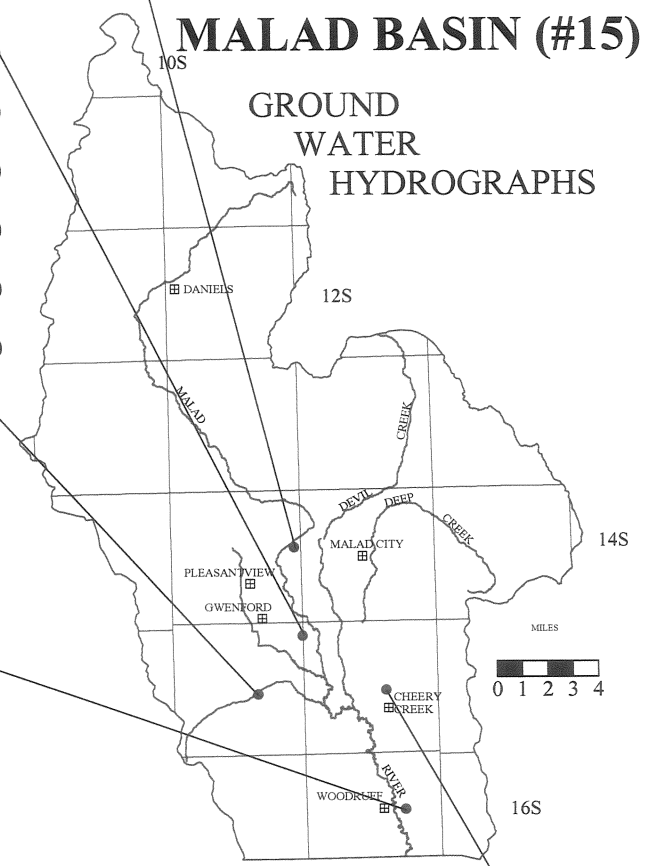
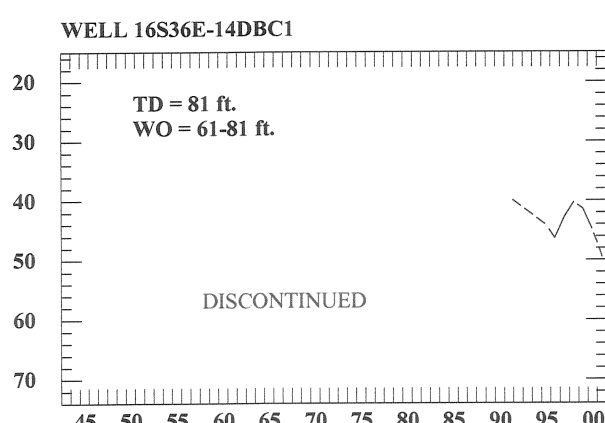
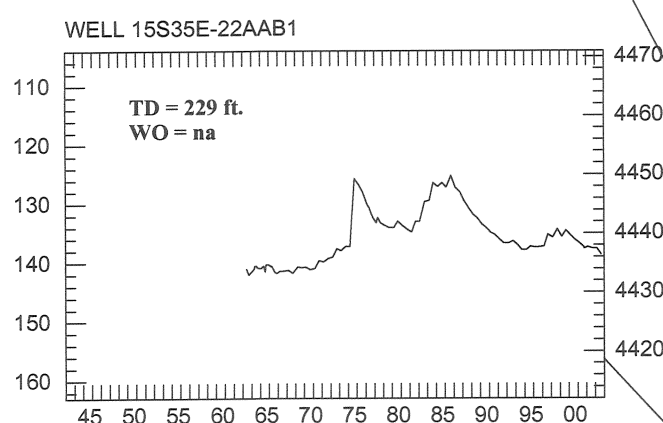
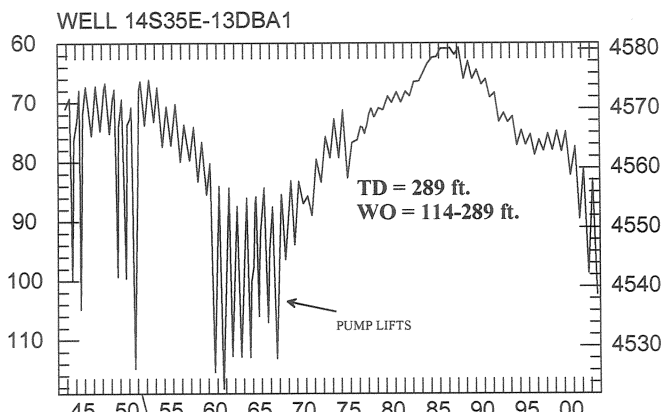
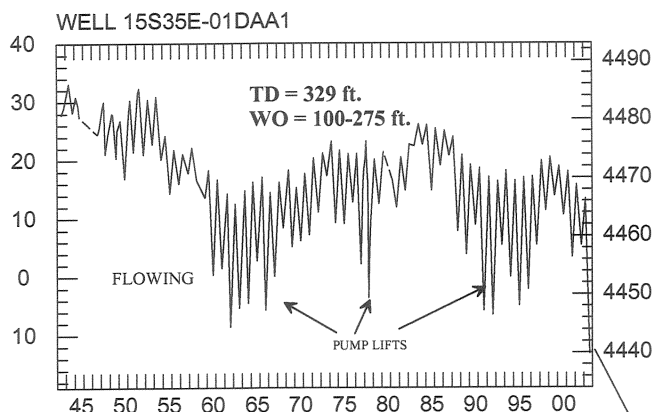
cc

Hal Anderson
Glenn Saxton

MALAD BASIN (#15)

GROUND WATER ELEVATIONS





LEGEND

- TD: TOTAL DEPTH
- WO: INTERVAL AT WHICH THE WELL IS PERFORATED OR OPEN TO THE AQUIFER
- WATER BEARING FORMATION
- NA: NOT AVAILABLE
- : MORE THAN 1 YEAR BETWEEN DATA POINTS
- LEFT SIDE: DEPTH TO WATER
- RIGHT SIDE: WATER ELEVATION
- BASE: YEAR
- ALL MEASUREMENTS IN FEET
- WELL LOCATION
- CURRENT TO FALL 2003

