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Attachment A

Recommendation for the Boundary of the Area of Adjudication

The recommended adjudication boundary for the Antelope Valley water adjudication is based on the boundaries of the watershed for streams that flow into the Antelope Valley groundwater basin. The watershed boundary corresponds to the topographic divide, generally located along the ridgeline of the mountains, where surface water on the interior of the divide would flow downhill towards the groundwater basin. There are two issues related to using the watershed divide as the proposed adjudication boundary. One, northern and northwestern portions of the Antelope Valley watershed, as mapped by the USGS (e.g., Duell 1987, Leighton and Phillips 2003), are excluded because percolating surface water in this area will not recharge the Antelope Valley groundwater basin. Two, the southeast corner of the Antelope Valley groundwater basin does not have a defined hydrogeologic boundary. Therefore, no recommendation for the location of the adjudication boundary is proposed for this area.

The boundary of the Antelope Valley groundwater basin was discussed and approved by a majority of the experts present at the May 15, 2006 meeting held in Glendale, California. A preliminary draft figure of the proposed boundary was compiled and distributed by Timothy M. Ross of the California Department of Water Resources (DWR) under the title "Antelope Valley Adjudication Area Boundary."

The federal defendant's proposed adjudication boundary is shown on the map provided as Attachment A accompanying the Declaration of Ric Williams. The map includes the boundary of the Antelope Valley groundwater basin as a red line, and the federal defendant's proposed adjudication boundary (the Antelope Valley Watershed Contributory to the Antelope Valley Groundwater Basin) as a green line.

Boundaries of the Groundwater Basin

The boundary of the groundwater basin was provided in the map drafted by DWR. This boundary consists primarily of the outer edge of the permeable, basin-fill, alluvial materials. Two areas that are potentially in contention are discussed below.

Willow Springs Subbasin

The majority-approved groundwater basin boundary is set to the north of the Willow Springs subbasin, thus including that subbasin and portions of the Oak Creek and Gloster subbasins in the Antelope Valley groundwater basin, as delineated by DWR, because:

- The northwest trending groundwater divide that bisects the Oak Creek subbasin separates the groundwater to the southwest of the divide which flows toward Antelope Valley, and the groundwater to the northeast of the divide which flows away from Antelope Valley;
- North to south leakage through the Rosamond/Willow Springs fault provides water input to the adjacent Neenach subbasin;
- Groundwater flows from the Willow Springs subbasin to the southeast through the alluviated pass and enters the Lancaster subbasin near the city of Rosamond; and
- Potentially significant recharge by Oak Creek as it flows south across the alluvial fan should be taken into account in the water budget for the groundwater basin.

The Willow Springs subbasin (or subunit, as it is referred to in some studies) has been identified in most of the U.S. Geological Survey (USGS) literature on the area. This subbasin was excluded from the Antelope Valley groundwater basin and included in the Fremont Valley groundwater basin by Bloyd (1967). Many subsequent USGS researchers (e.g., Durbin 1978, Carlson and others 1998, Leighton and Phillips 2003) also did not include it in the Antelope Valley groundwater basin, although the area has been included within the Antelope Valley (based on surface water drainage boundaries) by Duell (1987) and Templin and others (1995). On the other hand, DWR (2003) includes the area of the Willow Springs subbasin and portions of the Oak Creek subbasin and of the Gloster subbasin to the north as part of the Antelope Valley groundwater basin.

The groundwater basin boundary in the Willow Springs area, as drafted by DWR following the May 15, 2006 meeting, is in part based on the northwest trending groundwater divide that bisects the Oak Creek subbasin as well as bedrock outcrops. This groundwater divide is likely influenced by groundwater recharge from the surface runoff from Oak Creek. Groundwater in the Willow Springs subbasin flows to the southeast, towards the town of Rosamond, based on water levels from wells in this area. Duell (1987) provides one of the most detailed descriptions in the USGS literature of the groundwater subdivisions in the Willow Springs area, indicating the Willow Springs subbasin as one of the groundwater subunits of Antelope Valley. According to Duell, 1) the southern boundary of the Willow Springs subbasin is the Rosamond fault (also known as the Willow Springs fault in some investigations) and bedrock hills, 2) the northern boundary is a northwest-southeast-trending groundwater divide and bedrock hills, and 3) groundwater flows to the southeast through the alluviated gap near Rosamond to where it crosses the Rosamond fault and enters the Lancaster subbasin. Historic groundwater elevations obtained from the USGS and DWR online databases (http://nwis.waterdata.usgs.gov/ca/nwis/gw and http://wdl.water.ca.gov/gw/, respectively) are consistent with this interpretation.

In their modeling of the Antelope Valley groundwater basin, Leighton and Phillips (2003) included natural recharge by seepage across the Rosamond/Willow Springs fault. A significant water level difference across the fault (on the order of 300 feet) indicates that it is a barrier to flow, although it is probably a leaky barrier. It is likely that seepage occurs across this low-permeability fault zone, particularly with such a significant difference in hydraulic head to provide a driving force for flow. This seepage across the fault plus the interpreted flow from the Willow Springs subbasin to the Lancaster subbasin means that the Willow Springs subbasin

should be included within the Antelope Valley groundwater basin rather than being excluded. Recharge provided by seepage from Oak Creek is a potentially significant contribution to the water budget for the groundwater basin, and this input should not be omitted by excluding this area.

Southeast Corner at Los Angeles – San Bernardino County Line

The Antelope Valley groundwater basin boundary in the southeast corner of the DWR-drafted map was located along the Los Angeles – San Bernardino County line to be coincident with the western edge of the previously adjudicated Mojave groundwater basin. That proposed north-south boundary does not represent a hydrogeologic boundary to the Antelope Valley groundwater basin. Pumping on one side of this county line could have a significant effect on the groundwater resources on the other side of the line. Specifically, pumping in San Bernardino County just east of this county line could have significant negative impacts on the groundwater resources in the Los Angeles county portion of the Antelope Valley groundwater basin. A number of USGS investigations (e.g., Duell 1987, Templin and others 1995, Leighton and Phillips 2003) have drawn the southeastern boundary of the basin to the east of the county line, within San Bernardino County. Bloyd (1967) referred to a groundwater divide located outside of the Antelope Valley-East Kern Water Agency (AVEK) area as being the boundary of the Buttes subunit, although he specifically did not draw that boundary on his maps. That groundwater divide, according to Bloyd, separates the Antelope Valley and the El Mirage basins. Similarly, DWR (2003) drew the boundary between the Antelope Valley and the El Mirage basins within San Bernardino County, east of the county line. Rather than using the county line, the boundary of the groundwater basin needs to be established in this area based on hydrogeologic considerations. The groundwater basin boundary has not been identified in this area on the map in Attachment A accompanying the Declaration of Ric Williams.

Boundaries of the Watershed

The watershed that encompasses streams (ephemeral, intermittent, and perennial) that flow into the area defined by the Antelope Valley groundwater basin, as described in the preceding section, is included within the proposed adjudicated area to protect the groundwater resource. These streams provide recharge to the Antelope Valley groundwater basin. Potential diversions of surface water could diminish the amount of water recharging the groundwater of the basin, thus having a negative impact on the quantity of the groundwater resource.

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