

## **ENGINEER'S REPORT PROPOSED GROUNDWATER CHARGE MARCH 17, 2009**

The following report has been prepared in accordance with Section 75561 of the Water Code.

The March 2009 Report received by the Board of Directors has been revised as follows:

- The groundwater elevation data presented on pages 3 and 4 have been updated to reflect information contained in the San Joaquin County Fall 2008 Report.
- The letters to the SWRCB have been revised by Counsel to comply with form requirements of the SWRCB. The letters and the accompanying 15-Year Budget have been revised to reflect no groundwater charge revenue for '09-'10, and a 15-year time period for construction of facilities required for use of the 20,000 AFA.

### Annual Overdraft

Overdraft of the Eastern San Joaquin County Groundwater Basin has been common knowledge since the early 1900's when falling levels made use of centrifugal pumps impossible unless pits were dug to keep the suction lift under twenty feet. Continuing decline of water levels led to the invention of the vertical turbine pump.

Dangerously low water levels in the Stockton area during the 1970's caused the electorate to vote overwhelming in favor of a Stockton East Water District Treatment Plant to treat surface water from New Hogan Reservoir.

The State formally recognized the problem in 1982 when it designated the Basin as being "critically overdrafted".

A number of studies have been completed over the years, with the first detailed report by Brown and Caldwell, consulting engineers, accepted in 1985. That study estimated the overdraft to be 269,000 acre-feet annually (AFA) for the 600,000 acre area of San Joaquin County lying easterly of the San Joaquin River.

More recent studies have estimated the overdraft to be anywhere from 130,000 to 200,000 AFA. No absolute number is possible, only estimates, at least at this point.

I will use 200,000 AFA as a reasonable estimate of the overdraft. This works out to be about 0.33 AFA for each of the approximate 600,000 acres within the Basin.

At any rate, the 200,000 AFA figure is reasonable for current development. We know that an overdraft of 200,000 AFA causes groundwater levels to fall about 1 foot per year. Some areas see a little more and others a little less. Please see the following table for wells within the District.

**Ground Water Elevation Data**

Location	Water Elevations		Decline Feet/Year		
	Year/Elevation	Year/Elevation			
<b>Source- EBMUD Records</b>					
e/o Clements Rd & n/o Kettleman	1962	17.7	2002	-21.2	1.0
East end of Kettleman	1962	27.2	2002	-25.6	1.3
Kettleman between Tully & Linn	1962	-1.6	2002	-35.8	0.9
Harney at Tully	1962	-3.6	2002	-38.4	0.9
Jack Tone s/o Harney Lane	1962	-10.0	2002	-38.7	0.7
Tully s/o Harney Lane	1962	-3.2	1988	-23.1	0.8
Tully at Live Oak	1962	-11.3	1988	-27.4	0.7
Linn at Sargent	1962	12.9	2002	-27.0	1
Brandt at Tully	1964	2.8	2002	-24.2	0.7
n/o Sargent, e/o Tully	1962	3.2	2002	-29.9	0.8
Kettleman at Linn	1962	5.2	2002	-34.6	1
<b>Source- County Data</b>					
Liberty Road at Mackville Road	1975	20.0	1998	-13.0	1.4
Liberty at Hwy 88	1975	60.0	1998	60.0	0
Clements at Hwy 88	1975	50.0	1998	3.0	2
Clements at Brandt Road	1975	9.0	1998	-22.0	1.3
Clements at Harney Lane	1975	-10.0	1998	-32.0	1
<b>Source - EBMUD Records</b>					
Liberty e/o Bruella	1962	0.6	1978	-40.1	2.5
Liberty e/o Bruella	1973	-19.0	2002	-35.7	0.6
Collier w/o Bruella	1966	-14.4	2002	-33.4	0.5
Collier w/o Mackville	1962	37.8	1999	-4.9	1.2
Collier w/o Hwy 88	1962	52.5	2002	2.9	1.3
Buena Vista Road	1962	73.6	2002	54.8	0.5
n/o Hwy 12 & e/o Hwy 99	1962	61.8	2002	33.3	0.7
Hwy 88 n/o Hwy 12	1962	47.0	2002	8.5	1

**Ground Water Elevation Data**

Location	Water Elevation		Decline Feet/ Year
	Historical High** Year/Elevation	Latest Year/Elevation	
<b>Source – County Data</b>			
Collier & Eunice	1963 -8.0	2002 -18.6	0.3
Collier & Kennefick	1960 -4.8	2002 -34.5	0.7
Hwy 99 & Jahant	1960 -0.1	2002 -19.6	0.5
Peltier & Kennefick	1958 11.9	2002 -29.8	0.9
Acampo e/o Hwy 99	1958 16.5	2002 -10.6	0.6
Hwy 99 & Woodbridge	1958 24.5	2002 4.0	0.5
Locke w/o Hwy 88	1963 11.5	2002 -15.6	0.7
Brandt & Tully	1959 16.6	2002 -27.6	1
Hwy 12 & Locust Tree	1958 19.7	2002 -18.8	0.9
Hwy 12 & Alpine	1958 21.4	2002 -18.6	0.9
Kettleman & Curry	1960 15.0	2002 -19.7	0.8
Kettleman & Hwy 99	1983 -2.6	2002 -24.3	1.1
Harney & Vintage	1965 -0.7	2002 -32.0	0.8
Harney & Hwy 88	1965 -2.4	2002 -31.0	0.8
Alpine & Handel	1980 -30.5	2002 -32.0	0.1
Armstrong & Lower Sacramento	1960 0.6	2002 -34.2	0.8
Jack Tone & Live Oak	1958 8.6	2002 -46.7	1.3
Ham and West Lane	1971 -1.2	2002 -21.9	0.7

\*\* San Joaquin County and Stockton East Water District began monitoring levels in the 1950's

**Additional Ground Water Elevation Data  
From San Joaquin County Hydrographs – March 2009**

Well #	Well Location	Year	Eleva- tion	Year	Eleva- tion	2008 Elevation	'07-'08 Change
3N7E9C	Alpine & Realty	1987	-17	2007	-21 <sup>4</sup>	-25 <sup>2</sup>	-3 <sup>8</sup>
3N7E18D	Kettleman & Hwy. 99	1987	-14	2007	-25 <sup>3</sup>	-28 <sup>5</sup>	-3 <sup>2</sup>
3N7E19Q	Hwy. 99 & Hogan	1991	-45	2007	-42	-41 <sup>1</sup>	+0 <sup>9</sup>
3N7E23C	Harney & Hwy. 88	1987	-18	2007	-35	*	
3N7E25G	Jack Tone & Tokay Colony	1987	-29	2007	-47 <sup>2</sup>	-48 <sup>3</sup>	-1 <sup>1</sup>
3N7E12P	Kettleman c/o Bear Creek	1964	-11	2003	-90	*	
3N7E15C	Kettleman & Locust Tree	1992	-32	2007	-29	-34 <sup>5</sup>	-5 <sup>5</sup>
3N7E17D	Kettleman & CCTRR	1992	-27	2007	-26 <sup>4</sup>	-27 <sup>4</sup>	-1 <sup>0</sup>
3N7E18M	Harney & Curry	1987	-21	2007	-33	-33 <sup>2</sup>	-0 <sup>2</sup>
	Ray & Kingdon	1987	-6	2007	-12	*	
	Flag City	1987	-2	2007	-9	*	
3N6E10D	Sargent & Mills	1990	-16	2007	-13	-10 <sup>4</sup>	+2 <sup>6</sup>
3N6E13R	Harney & Hwy. 99	1967	-5	2003	-38	*	
3N6E7H	Devries n/o Kettleman	1987	-10	2007	-13	-16 <sup>0</sup>	-3 <sup>0</sup>
3N6E17A	Kettleman & Devries	1993	-28	2007	-22	*	
3N6E18M	Devries & WPRR	1993	-14	2007	-21	-17 <sup>1</sup>	-3 <sup>9</sup>
3N6E20D	Harney & Davis	1990	-25	2007	-20	-21 <sup>5</sup>	-1 <sup>5</sup>
3N6E25R	Pixley Creek e/o Hwy. 99	1967	-11	2003	-34	*	
3N6E26P	Mettler & West Lane	1987	-17	2007	-26	-28 <sup>7</sup>	-2 <sup>7</sup>
3N6E27E	Lower Sacramento & Armstrong	1987	-24	2007	-34	-31 <sup>2</sup>	+2 <sup>8</sup>
3N6E29C	Armstrong & WPRR	1957	-13	2003	-27	-33 <sup>3</sup>	-6 <sup>3</sup>
3N6E30R	Thornton n/o Eight Mile	1987	-22	2007	-37	*	
3N6E32R	Davis & Eight Mile	1987	-26	2007	-32	-32 <sup>0</sup>	0
3N8E19C	Harney near Dump	1987	-24	2007	-40 <sup>1</sup>	-42 <sup>3</sup>	-2 <sup>2</sup>
3N8E22A	Harney & Atkins	1987	-20	2007	-41 <sup>7</sup>	-43 <sup>5</sup>	-1 <sup>8</sup>
4N6E29N	Devries & Woodbridge	1987	+8	2007	0	-3 <sup>0</sup>	-3 <sup>0</sup>
4N6E29A	Devries & Acampo	1987	+18	2002	+6	*	
4N7E7A	Collier & Cherokee	1987	-29	2002	-35 <sup>5</sup>	-38 <sup>5</sup>	-3 <sup>0</sup>
4N7E12E	Collier & Elliott	1987	-18	2007	-40	-41 <sup>0</sup>	-1 <sup>0</sup>
4N7E17N	Peltier & Kennefick	1987	-14	2007	-31 <sup>3</sup>	-39 <sup>8</sup>	-8 <sup>5</sup>
4N7E19K	Acampo e/o Hwy. 99	1987	-15	2004	-22	*	
4N7E21F	Peltier & Dustin	1987	-10	2007	-23 <sup>1</sup>	-26 <sup>3</sup>	-3 <sup>2</sup>
4N7E27C	Acampo & Sowles	1990	-20	2007	-36 <sup>5</sup>	-30 <sup>5</sup>	+6 <sup>0</sup>
4N7E28J	Orchard & Dustin	1987	-2	2007	-17 <sup>7</sup>	-18 <sup>7</sup>	-1 <sup>0</sup>
4N7E33H	Schmeidt & Bruella	1987	+25	2007	+24 <sup>9</sup>	+22 <sup>0</sup>	-2 <sup>9</sup>
4N8E6N	Collier & Jack Tone	1987	-18	2007	-33 <sup>6</sup>	-36 <sup>2</sup>	-2 <sup>6</sup>
4N8E14K	Hwy. 88 & Hwy. 12	1987	+20	2007	-0 <sup>9</sup>	-3 <sup>1</sup>	-2 <sup>2</sup>
4N8E17A	Jahant & Tully	1990	-4	2007	-28 <sup>3</sup>	-30 <sup>3</sup>	-2 <sup>0</sup>
4N8E17J	Peltier & Tully	1987	-5	2007	-23 <sup>3</sup>	-24 <sup>5</sup>	-1 <sup>2</sup>
4N8E21M	Hwy. 88 & Atkins	1987	-2	2007	-26	-27 <sup>6</sup>	-1 <sup>6</sup>
4N8E32N	Brandt & Tully	1987	-13	2007	-30	-31 <sup>1</sup>	-1 <sup>1</sup>
4N8E34Q	Brandt & Clements	1991	-12	2003	-23	*	
5N7E31J	Cherokee n/o Liberty	1987	-24	2007	-24	*	
5N7E34G	Sowles n/o Liberty	1987	-33	2007	-38 <sup>1</sup>	-50 <sup>1</sup>	-12 <sup>0</sup>
5N7E34Q	Liberty & Sowles	1993	-25	2007	-40	-47 <sup>4</sup>	-7 <sup>4</sup>

\* No Measurement for Fall 2008

**Additional Ground Water Elevation Data  
From San Joaquin County Fall 2008 Report**

WELL #	LOCATION	ELEVATION		-07 – '08 CHANGE
		2007	2008	
3N7E17K	Vintage & Harney	-32 <sup>L</sup>	-36 <sup>S</sup>	-3 <sup>S</sup>
3N7E19J	Hogan & Furry	-43 <sup>S</sup>	-56 <sup>U</sup>	-12 <sup>S</sup>
4N7E36L	Jack Tone & Kettleman	-17 <sup>S</sup>	-23 <sup>S</sup>	-6 <sup>U</sup>
4N6E24F	Des Moines & Peltier	-25 <sup>U</sup>	-19 <sup>S</sup>	+5 <sup>S</sup>
5N6E36R	Cherokee & Liberty	-24 <sup>S</sup>	-32 <sup>S</sup>	-8 <sup>S</sup>
4N6E12C	Collier & Hwy. 99	-15 <sup>S</sup>	-26 <sup>U</sup>	-10 <sup>L</sup>
4N6E23K	Lower Sacramento & Acampo	-8 <sup>U</sup>	-13 <sup>U</sup>	-5 <sup>U</sup>
4N6E27D	Lower Sacramento & Acampo	14 <sup>S</sup>	13 <sup>L</sup>	-1 <sup>L</sup>
3N6E36N	Golfview & Eight Mile	-29 <sup>L</sup>	-35 <sup>S</sup>	-6 <sup>L</sup>
3N7E32R	Eight Mile east of CTRR	-18 <sup>S</sup>	-33 <sup>S</sup>	-15 <sup>S</sup>
3N7E8E	Realty & Curry	-22 <sup>U</sup>	-24 <sup>S</sup>	-2 <sup>S</sup>

Of the above 44 wells measured all but five show declining levels. The overall, arithmetic average decline is 3.2 feet. The greatest decline is 15.5 feet and the greatest increase is 6.0 feet.

**Groundwater Levels  
District Measured Wells**

Location	November 2005	Depths 2006	2008
Hammer Residence	99' – 6"	96' – 7"	101' – 5"
Hoffman Ag Well	90' – 0"	87' – 0"	92' – 8"
Nakagawa E. Monitoring	12' – 0"	11' – 5"	12' – 8"
Nakagawa N. Monitoring	29' – 0"	26' – 2"	31' – 5"

Based upon the above assumption that the average overdraft is 0.33 AFA per acre, the 150,000 acre North San Joaquin Water Conservation District (District) has a current overdraft of 50,000 AFA. But only 100,000 acres of the District have been developed and now use 173,000 AFA of groundwater. Some 50,000 acres are dry pasture which are and will be developed.

Vineyards and houses are moving into the dry pasture area. A 200 acre vineyard is replacing dry pasture across from my 10 acres of irrigated pasture (formerly dry).

Assuming a new groundwater demand of 1.75 AF/acre, development of the 50,000 acres will increase the District overdraft to 137,500 AFA.

### Accumulated Overdraft

The accumulated overdraft from the time man began pumping groundwater from the Basin probably approaches ten million acre-feet. It would be impractical to try to bring the Basin back to “natural pre-man” conditions. It is generally accepted that the empty, usable space (accumulated overdraft) is somewhere between two and three million acre-feet.

Again, assuming that the accumulated overdraft is spread uniformly throughout the Basin, the District’s share is 500,000 to 750,000 acre-feet.

### Groundwater Production for 2007-2008\*

The following table develops groundwater use by type of development within the District.

Water Code Section 75507 defines water year as July 1<sup>st</sup> to June 30<sup>th</sup>.

<b>Estimated Groundwater Use 2005-2006</b>				
<b>Use Code</b>	<b>Description</b>	<b>Quantity</b>	<b>AFA/Unit</b>	<b>Total AFA</b>
0	Single Family Dwelling	100 each	0.5	50
51	Rural Residential	2428 each	1	2,428
52	Rural Residential, 2+ Residences	250 each	2	500
291	Nursery	716 Acres	4	2,864
352	Large Winery	10 each	4	40
353	Small Winery	6 each	2	12
-	Misc. Commercial	100 each	0.5	50
<b>Use Code</b>	<b>Description</b>	<b>Quantity</b>	<b>AFA/Unit</b>	<b>Total AFA</b>
401	Irrigated Orchard	8,185 acres	2.8	22,918
420	Irrigated Vineyard	45,309 acres	1.5	67,964
450	Irrigated Row Crops	7,204 acres	2.8	20,171
460	Irrigated Pasture	11,070 acres	4	44,280
462	Horse Ranch	40 each	2	80
471	Dairy	27 each	5	135
480	Poultry Ranch	13 each	5	65
-	Ag. Residences	1,028 each	1	1,028
-	Golf Courses	592 acres	4	2,368
-	Cemeteries	83 acres	4	332
-	Lodi Schools*			27
-	City of Lodi	-	-	9,300
-	Lockeford Community SVC District	-	-	520
-	County Service Areas	-	-	232
-	Micke Grove park	62 acres	4	248
-	Micke Grove Golf Course	87 acres	4	348
	<b>Subtotal</b>			<b>175,960</b>
	Less Surface Water			-3000
	<b>TOTAL</b>			<b>172,960</b>
	*Not included in City or Service Areas			

I consider the 2007-2008 groundwater production to be higher than normal. Production increases during dry years and decreases when rainfall is high. It also increases slightly when surface water is not available to the District (drier years).

#### Estimated Overdraft for 2008-2009 and 2009-2010

As stated earlier, the accepted figure for current average annual overdraft is 50,000 AFA for the District. It is greater in dry years and less in wet years and will increase in the future.

By definition, we divide the historical hydrology into five equal classifications; wet, above normal, below normal, dry, and critically dry. This means that overdraft would be greater during roughly 40% of the time, and less during 40% of the time.

We believe that average natural recharge of the Basin is approximately 1 foot per year, from rainfall, irrigation percolation, and streams.

This means that approximately 600,000 AFA are naturally recharged during an average year. Remember that on an average, approximately 800,000 AFA are currently taken from the Basin, causing a 200,000 AFA overdraft. Remember also, that the average water level decline is about 1 foot per year.

2007-2008 was a "below normal year". We can say that the overdraft was greater than average, and probably about 100,000 acre-feet.

And, assuming 2008-2009 will also be below normal, we estimate the overdraft will also be 100,000 acre-feet.

Assuming 2009-2010 will be normal, we estimate the overdraft will be 50,000 acre feet.

#### Surface Water Needed for 2008-2009

As indicated above, 50,000 acre-feet of surface water would be required annually to offset an average overdraft of that amount, but surface water is not currently available every year.

The only realistic way to deal with an average overdraft of 50,000 AFA, is to use 100,000 acre-feet or more during wet years because none is available in dry years.

The District is currently fighting to keep its current, temporary right to 20,000 AFA of Mokelumne River water which has been available about 50% of the time since 1987. The District must not only increase its use from the current 3,000 AFA to 20,000 AFA, but must also acquire another 80,000 AFA for use during wet years, just to cope with the overdraft caused by existing development. Another 175,000 AFA would be required during wet years to replace groundwater used by possible, future development.

### A Catastrophe in the Making

The State decided in November 2006 to deny the District's petition for extension of its 20,000 AFA right to Mokelumne River water because the District has not used the full 20,000 AFA.

The District petitioned the State for reconsideration of the denial and was granted a hearing on June 21, 2007. The State adopted order WR 08-0016 on March 18, 2008, extending the District's water right, because the District has shown due diligence in its efforts to use the water by adopting a groundwater charge.

North San Joaquin Water Conservation District and all other agencies within Eastern San Joaquin County must take immediate action to correct the overdraft. If nothing is done, the State will proceed with "adjudication" of the Basin.

Adjudication means limiting groundwater pumping to natural recharge. It would result in all pumpers being restricted to approximately 75% of what they pump today. It would also eliminate any future development that would need more than 75% of the current groundwater use for a specific location.

Included with, and made a part of this report are the following:

- March 18, 2008: SWRCB order WR 2008-0016
- March 3, 2009: Letter to Victoria Whitney, Chief, Division of Water Rights, SWRCB
- February 10, 2009: Letter to Charles Lindsay, Chief, Hearings Unit, SWRCB
- February 10, 2009: Letter to Victoria Whitney, Chief, Division of Water Rights, SWRCB

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