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Direct Testimony of Daniel Easton, P.E.

State Water Resources Control Board
Hearing on Petition to Revise the
Declaration of Fully Appropriated Stream System
of the Kern River

October 2009

Joint Exhibit 80

SUMMARY OF ENGINEERING METHODOLOGY

BACKGROUND INVESTIGATION

- Reviewed State Water Board Decision D1196 and subsequent orders of the State Water Board related to the Kern River
- Reviewed the determination of forfeiture in the *North Kern* judgment
- Reviewed the official records of the hydrology, flow, diversion and use of the Kern River system
- Toured the Kern River and its major water measurement, diversion and conveyance facilities
- Considered the Key Issues identified by the State Water Board

SUMMARY OF ENGINEERING METHODOLOGY

EVALUATION

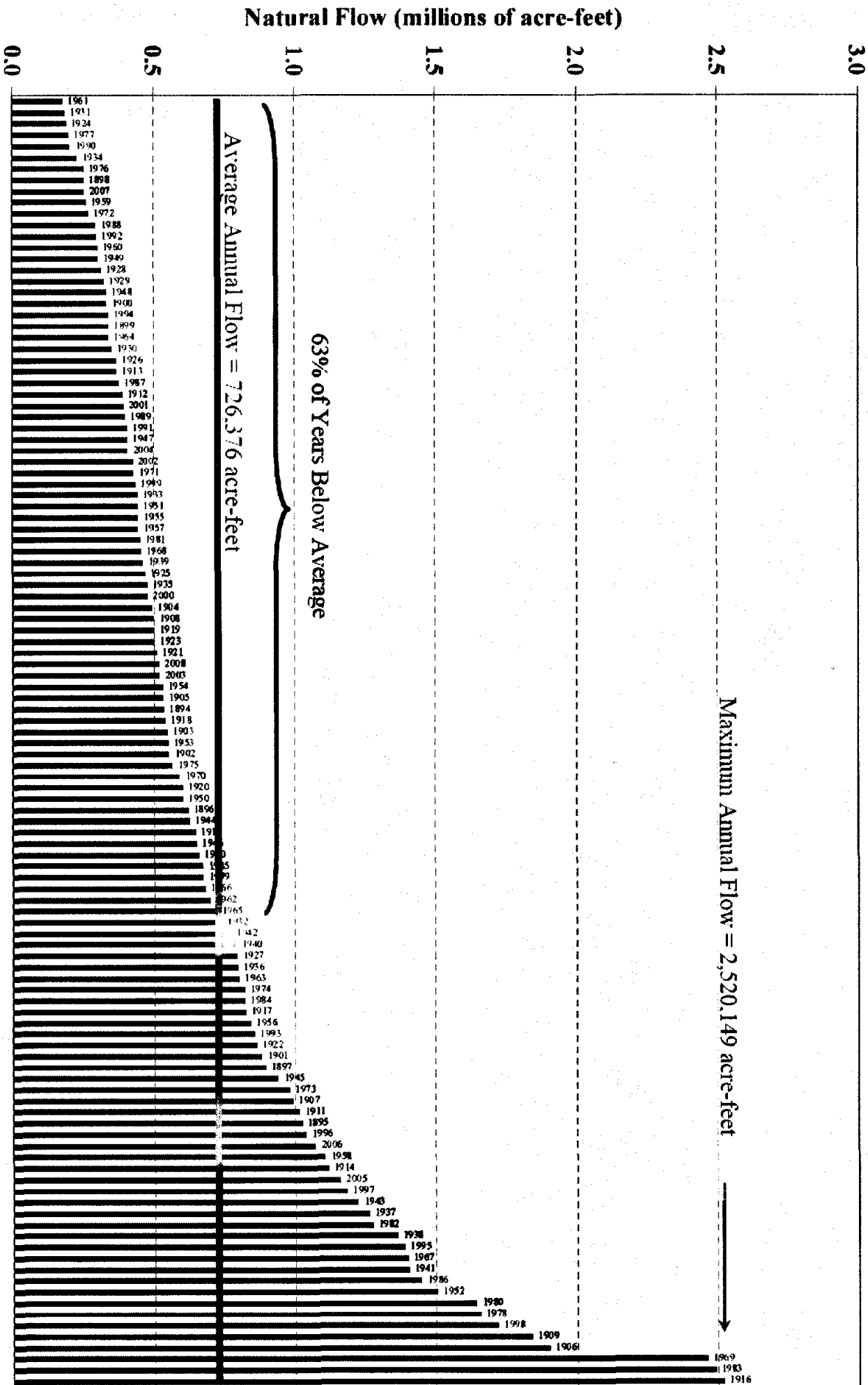
- Assessed the water supply characteristics of the Kern River through a review of the historical records
- Considered whether the *North Kern* judgment created any new supply of water not considered in Decision D1196
- Employed three-step methodology to determine whether the Kern River remains fully appropriated under the *North Kern* judgment
 - Step 1: Analyzed baseline water supply conditions on the Kern River (January and August-December, 1964-2008) – Table 1
 - Step 2: Quantified decreases in water use by Restricted Rights under the *North Kern* judgment – Table 2
 - Step 3: Assessed whether the *North Kern* judgment changed baseline water supply conditions on the Kern River – Table 3

SUMMARY OF ENGINEERING METHODOLOGY

SUMMATION OF RESULTS

- Preparation of written testimony and exhibits
- Statement of conclusions

Annual Kern River Natural Flow at First Point of Measurement in Ascending Order of Magnitude (1894-2008)



Source: 2008 Annual Hydrographic Report (pp 1-6).

Month of December
Table 1

Analysis of the Baseline: Assessing the Historical State of the Kern River through Observation of the Records

(Values in acre-feet)

Calendar Year	Recorded Entitlement			First Point Diverters			Second Point and Lower-River Diverters			Total Entitlement	Total Use	Historical State of Stream System	Calendar Year	
	Unpaired Diverters at First Point	First Point Diverters	Second Point Diverters	Lower-River Diverters	Recorded Entitlement	Recorded Use	Residual Response to Second Point	Entitlement Plus Release to Second Point	Use					Kern River Water Served or Interfered
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1964	48919	43158	3761	0	43158	43158	0	3761	3761	0	48919	48919	Deficit	1964
1965	30551	30551	0	0	30551	30551	0	0	0	0	30551	30551	Deficit	1965
1966	313811	238253	75558	0	238253	222357	15896	91454	91454	0	313811	313811	Deficit	1966
1967	35746	35746	0	0	35746	35746	0	0	0	0	35746	35746	Deficit	1967
1968	19585	19585	0	0	19585	19585	0	0	0	0	19585	19585	Deficit	1968
1969	34132	34132	0	0	34132	34132	0	0	0	0	34132	34132	Deficit	1969
1970	28814	28814	0	0	28814	28814	0	0	0	0	28814	28814	Deficit	1970
1971	19109	19109	0	0	19109	19109	0	0	0	0	19109	19109	Deficit	1971
1972	20410	20410	0	0	20410	20410	0	0	0	0	20410	20410	Deficit	1972
1973	27788	27788	0	0	27788	27788	0	0	0	0	27788	27788	Deficit	1973
1974	23603	23603	0	0	23603	23603	0	0	0	0	23603	23603	Deficit	1974
1975	16310	16310	0	0	16310	16310	0	0	0	0	16310	16310	Deficit	1975
1976	11191	11191	0	0	11191	11191	0	0	0	0	11191	11191	Deficit	1976
1977	24028	23609	419	0	23609	23609	0	419	419	0	24028	24028	Deficit	1977
1978	28485	28485	0	0	28485	28485	0	0	0	0	28485	28485	Deficit	1978
1979	19230	19230	0	0	19230	19230	0	0	0	0	19230	19230	Deficit	1979
1980	29708	29708	0	0	29708	29708	0	0	0	0	29708	29708	Deficit	1980
1981	23189	23189	0	0	23189	23189	0	0	0	0	23189	23189	Deficit	1981
1982	77849	74318	3531	0	74318	54489	19829	23360	13020	10340	77849	67609	U. Release	1982
1983	103019	103019	7474	0	95545	60321	35224	42698	11637	31061	103019	71958	U. Release	1983
1984	39495	39495	0	0	39495	39410	85	85	85	0	39495	39495	Deficit	1984
1985	33945	33945	0	0	33945	33945	0	0	0	0	33945	33945	Deficit	1985
1986	23458	23458	0	0	23458	23458	0	0	0	0	23458	23458	Deficit	1986
1987	16215	16215	0	0	16215	16215	0	0	0	0	16215	16215	Deficit	1987
1988	15515	15515	0	0	15515	15515	0	0	0	0	15515	15515	Deficit	1988
1989	10949	10949	0	0	10949	10949	0	0	0	0	10949	10949	Deficit	1989
1990	9148	9148	0	0	9148	9148	0	0	0	0	9148	9148	Deficit	1990
1991	13067	13067	0	0	13067	13067	0	0	0	0	13067	13067	Deficit	1991
1992	14577	14577	0	0	14577	14577	0	0	0	0	14577	14577	Deficit	1992
1993	18163	18163	0	0	18163	18163	0	0	0	0	18163	18163	Deficit	1993
1994	15507	15507	0	0	15507	15507	0	0	0	0	15507	15507	Deficit	1994
1995	28820	28820	5578	0	28820	28820	0	5578	5578	0	28820	28820	Deficit	1995
1996	86438	80860	0	0	80860	80860	0	0	0	0	86438	86438	Deficit	1996
1997	30532	30532	0	0	30532	30532	0	0	0	0	30532	30532	Deficit	1997
1998	33219	33219	0	0	33219	33219	0	0	0	0	33219	33219	Deficit	1998
1999	13057	13057	0	0	13057	13057	0	0	0	0	13057	13057	Deficit	1999
2001	24869	24750	119	0	24750	24750	0	119	119	0	24869	24869	Deficit	2001
2003	18301	18301	0	0	18301	18301	0	0	0	0	18301	18301	Deficit	2003
2004	17143	17143	0	0	17143	17143	0	0	0	0	17143	17143	Deficit	2004
2005	33614	33614	0	0	33614	33614	0	0	0	0	33614	33614	Deficit	2005
2006	20604	20604	0	0	20604	20604	0	0	0	0	20604	20604	Deficit	2006
2007	13065	13065	0	0	13065	13065	0	0	0	0	13065	13065	Deficit	2007
2008	16937	16937	0	0	16937	16937	0	0	0	0	16937	16937	Deficit	2008

CITY OF KERSFIELD
KERN RIVER FIRST POINT FLOW AND DIVERSION RECORD

Date: December 2001 Recap

COMPUTED NATURAL FLOW AT FIRST POINT...
LESS NON-CONTRIBUTING CANALS...
FOR OTHERS AND FIRST POINT CANALS...
TO BE CONTRIBUTED BY OTHER CANALS...
TO BE USED BY OTHER CANALS...
EACH OTHER CANAL TO RECEIVE...

24889
17815
7254
807
6453
N/A

QUANTITIES IN: ACRE-FEET
% OF ITS DIVERSION RIGHT

K.C.L. CO. ENTITLEMENT AT SECOND POINT (4.583%)...
B.V.W.S.D. ENTITLEMENT...
SERPAGE LOSS...
KERN RIVER CONDUIT ENTITLEMENT AT FIRST POINT...
HACIENDA W.D. ENTITLEMENT AT FIRST POINT...
TOTAL...

6
676
0
807

RIVER	AMT.	NAME OF CANAL	GROSS DIVN	GROSS ENTTL	RELEASES				ENTITLEMENT LESS RELEASES				EXCHANGES SALES OR PURCHASES				NET DIVERSIONS				WATER TRANS. LOSS		ISABELLA RESERVOIR		CURRENT BALANCE		
					To River	Distri	Prp	Other	On Pwysd	On Kccaw Co.	On Kowd	Other	On Pwysd	On Kccaw Co.	On Kowd	Other	On Pwysd	On Kccaw Co.	On Kowd	Other	In	Out	Balance				
200.0	300	KERN RIVER CO	6	6																							
300.0	20	CASTRO																									
300.0	10.5	SOUTH FORK																									
410.5	80	RISMA VISTA																									
530.5	180	JAMES																									
500.5	20	ANDERSON																									
700.5	180	STONE																									
720.5	30	MEDCHAM																									
800.5	150	FARLENS																									
800.5	40	PLUMMET																									
1000.5	40	JOHNSON																									
1190.5	150	PONREH																									
1190.5	60	BERNOSLEY																									
1300.5	10	LEBDO (MKW)																									
1300.5	40	ANDERSON																									
1300.5	40	JAMES & DIX																									
1320.5	10	WALSON																									
1320.5	26	McCARTNEY																									
1320.5	100	GALLOPWAY																									
2290.5	800	RAIL ROAD																									
2480.5	200	BIJELA VISTA																									
2476.5	180	JAMES																									
2580.5	170	POWERS																									
3100.5	340	BERNOSLEY																									
3100.5	51	KERN RIVER																									
		ROSEDALE BRWSD																									
		TRAYLON LAKES																									
		LARGE MING																									
		KERN VALLEY GOLF C																									
		CALIFORNIA WATER S																									
		OLDFIELD																									
		OLDFIELD																									
		BRWSD TRANSFER TO																									
		BRWSD VIA PIONEER																									
		KNWSD FOR I&A																									

Month of December

Table 1

Baseline

(values in acre-feet)

Calendar Year	Recorded Entitlement	Recorded Use	Recorded Release to Second Point	Recorded Entitlement Plus Release to Second Point	Recorded Kern River Water Discharged to Intertie
2001	(1)	(6)	(7)	(8)	(10)
	24750	24750	0	119	119

TOTALS	66	13687	24074	10942	10942	9921	1554	12541	259	4781	2766	1637	469	8828	73	4419	0	4419
LOSS	56	18793	24750															

River Lost: KNWSD for I&A
Transfer Lake: KNWSD for I&A
BRWSD Transfer to 1st Pt. Can.: KNWSD (6); CIV (6)

CITY OF KERSFIELD
KERN RIVER FIRST POINT FLOW AND DIVERSION RECORD

Date: December 2001 Recap

COMPUTED NATURAL FLOW AT FIRST POINT..... 24869
LESS NON-CONTRIBUTING CANALS..... 17615
FOR OTHERS AND FIRST POINT CANALS..... 7254
TO BE CONTRIBUTED BY OTHER CANALS..... 501
EACH OTHER CANAL TO RECEIVE..... 6452
N/A

QUANTITIES IN: ACRE-FEET
% OF ITS DIVERSION RIGHT

K.C.L. CO. ENTITLEMENT AT SECOND POINT (4.563%)..... 6
R.I.V.S.D. ENTITLEMENT..... 115
SEWAGE LOSS..... 678
KERN RIVER CONDUIT ENTITLEMENT..... 0
KERN RIVER CONDUIT ENTITLEMENT AT FIRST POINT..... 0
HACIENDA W.D. ENTITLEMENT..... 807
TOTAL.....

Month of December

Table 1

Baseline

(values in acre-feet)

JE 63

Calendar Year	"Computed Natural" Flow at First Point	Total Recorded Entitlement	Total Use	Historical State of Stream System Deficit	Calendar Year
(1)	(2)	(42)	(13)	(14)	(15)
2001	24869	24869	24869	2001	2001

BIVS/D VIA POWER PROJECT					
66	13597	34074	10682	10682	0
67	3096	676	0	9821	1854
68	18793	24750	1654	12541	12541
69			258	258	4701
70					2768
71					1627
72					489
73					8828
74					73
75					4419
76					0

WATER ANS. LOSS		SABIELLA RESERVOIR		CURRENT BALANCE	
IN	OUT	PREVIOUS BALANCE	LOSS	OUT	BALANCE
22	2500	22	0	0	2500
0	0	0	0	0	0
423	4828	46	4	4	5311
0	600	0	0	0	500
528	528	6	0	0	1065
752	516	4	0	0	1284
752	297	2	0	0	1047
185	0	0	0	0	185
3715	26822	226	460	29851	
6384	35209	305	484	41823	

TOTAL CHANGE IN STORAGE = 5814

NOTES:

- Lemo (KRWSD) - Other: KRC&I ENT= 73
- River Loss: City to RRWSD (KRC)- 73
- Turbin Lake: City to RRWSD (KRC)- 14
- Lemo (KRWSD): City to CMD (KRC)- 251
- City, Exch. Loss: KRWSD for RRWSD 258
- River Loss: KRWSD for RRWSD 1977
- Turbin Lake: KRWSD for RRWSD 197
- BIVS/D Transfer to 1st Pt. Grp.: KRWSD (KRC) City (69)

CITY OF KERSFIELD
KERN RIVER FIRST POINT FLOW AND DIVERSION RECORD

QUANTITIES IN: ACRE-FEET

COMPUTED NATURAL FLOW AT FIRST POINT...
LESS NON-CONTRIBUTING CANALS...
FOR OTHERS AND FIRST POINT CANALS...
TO BE CONTRIBUTED BY OTHER CANALS...
TO BE USED BY OTHER CANALS...
EACH OTHER CANAL TO RECEIVE...

24889
17915
7234
801
6453
N/A

% OF ITS DIVERSION RIGHT

K.C.L. CO. ENTITLEMENT AT SECOND POINT (4.653%)...
B.Y.W.S.D. ENTITLEMENT...
SERPAGUE LOSS...
KERN RIVER CONDUIIT ENTITLEMENT...
HACIENDA W.D. ENTITLEMENT AT FIRST POINT...
TOTAL

Date: December 2007 Recap

DIVERION RIGHT	GROSS DIVYR	GROSS ENT'L	RELEASES		ENTITLEMENT LESS RELEASES		EXCHANGES, SALES OR PURCHASES		NET DIVERSIONS		WATER TRANS. LOSS PRO	ISABELLA RESERVOIR				
			To River	Direct Dis	KERN ISLAND	OTHER	INC'D	NET	INC'D	NET		PREVIOUS BALANCE	LOSS	CURT	CURRENT BALANCE	
300.0	36	7144	10449		0	7166			7144			22	2500	22	0	2500
300.0	20	103	204									0	0	0	0	0
300.0	20	279	825					6				423	4832	46	4	5311
300.0	20	159	3207			3871		0				0	600	6	0	600
300.0	20	654	4013			732						535	535	6	0	1065
300.0	20	117	294			732						732	316	4	0	1264
300.0	20	117	328			732						732	297	2	0	1047
300.0	20	230	182			412						0	0	0	0	182
300.0	20	317	317			317						226	460	2	0	20651
300.0	20	230	249			249						0	0	0	0	182

JE 4

Preserved Entitlements

(values in acre-feet)

Month	Kern Island (1 st)			Buena Vista (1 st)		Stine		Farmers	
	Forfeiture	Entitlement	Released	Entitlement	Released	Entitlement	Released	Entitlement	Released
January	8,493			347		--		--	
August	--			--		--		610	
September	--			--		583		268	
October	6,989			--		1,380		--	
November	3,375			236		22		--	
December	2,050			191		12		207	

Diversion Right

Diversion Right	Entitlement	Released	Balance
Kern Island (1 st)	8,493	2,050	6,443
Buena Vista (1 st)	347	191	156
Stine	--	12	--
Farmers	--	207	--
TOTALS	8,840	2,460	6,380

Diversion Right	Entitlement	Released	Balance
Kern Island (1 st)	8,493	2,050	6,443
Buena Vista (1 st)	347	191	156
Stine	--	12	--
Farmers	--	207	--
TOTALS	8,840	2,460	6,380

FLOW AT FIRST POINT

5996	676
18793	24750
LOSS	

SD for 12/4-
ID#-
07/04-
P. G. - ANVSD (4), CIV (0)

CITY OF KERSFIELD
 KERN RIVER FIRST POINT FLOW AND DIVERSION RECORD

Date: December 2001 Recap

COMPUTED NATURAL FLOW AT FIRST POINT.....
 LESS NON-CONTRIBUTING CANALS.....
 FOR OTHERS AND FIRST POINT CANALS.....
 TO BE CONTRIBUTED BY OTHER CANALS.....
 TO BE USED BY OTHER CANALS.....
 EACH OTHER CANAL TO RECEIVE.....

24689
17816
7254
801
6453
N/A

% OF ITS DIVERSION RIGHT

QUANTITIES IN: ACRE-FEET

K.C.L. CO. ENTITLEMENT AT SECOND POINT (4.563%).....	6
B.W.S.D. ENTITLEMENT.....	119
SEWAGE LOSS.....	676
KERN RIVER CONDUIT ENTITLEMENT.....	0
HACIENDA W.D. ENTITLEMENT AT FIRST POINT.....	0
TOTAL.....	801

RIVER	STAGE	AMT.	DIVERSION RIGHT	NAME OF CANAL	GROSS DIV.	GROSS ENT.	RELIESES		ENTITLEMENT LESS RELEASES OR PLUS DISTRIBUTED RELEASES		EXCHANGES, SALES OR PURCHASES		NET DIVERSIONS		WATER TRANS. LOSS		SABELLA RESERVOIR		CURRENT BALANCE	
							To River	Distribution	IRKASD	IRKCALW CO.	KOWN	OTHER	PLUS	LESS	IRKASD	IRKCALW CO.	KOWN	OTHER		IN
300.0		300		K.C.L. CO. ENT. @ 2ND PT.	7144	6														2500
300.0		300		KERN ISLAND (1-91)																
300.0		300		EASTSIDE																
300.0		300		KERN RIVER CONDUIT																
300.0		300		CASTRO																
300.0		300		KCCAW CO.																
300.5		10.5		SOUTH FORK	159	159														
300.5		80		BUENA VISTA (1-57)	1884	684														
300.5		180		JAMES (1-57)		437														
300.5		20		ANDERSON (1-57)		117														
300.5		150		STAR		650														
300.5		35		FARMERS		659														
300.5		40		JOYCE		117														
300.5		40		JOHNSON		117														
300.5		130		POLSER		270														
300.5		60		BEARDSLEY		159														
300.5		10		LENO (IRKASD)		684														
300.5		40		JAMES & DIXON		437														
300.5		10		WALSON		117														
300.5		25		KCCAW CO.		294														
300.5		25		McCAFFREY		117														
300.5		100		LEER		659														
300.5		100		BEA		117														
300.5		60		CALLOWAY CEN.		270														
300.5		60		RAIRROAD		159														
300.5		200		IRKASD		684														
300.5		60		QUEMA VISTA		207														
300.5		140		JAMES		411														
300.5		340		POWER		659														
300.5		340		BEARDSLEY		117														
300.5		54		KERN ISLAND		659														
300.5		100		ROSSDALE RIVERS		117														
300.5		100		TRIXTON LAKES		117														
300.5		100		LAKE MING		117														
300.5		100		KERN VALLEY GOLF COUR.		117														
300.5		100		CALIFORNIA WATER SERV.		117														
300.5		100		OLIGESE W.D.		117														
300.5		100		GLEN GRANGES		117														
300.5		100		BIVASD TRANSFER TO TE		117														
300.5		100		BIVASD VIA PROMENAR PR		117														
300.5		100		ANVISO FOR BX		117														
300.5		100		IRKASD		684														
300.5		100		IRKCALW CO.		294														
300.5		100		KOWN		117														
300.5		100		OTHER		659														
300.5		100		TOTAL		662														

JE 64

Month of December
 Table 2
 Restricted Rights Analysis
 (values in acre-feet)

Calendar Year	Gross Entitlement	Actual Use	Preserved Entitlement	Projected Use	Forfeiture Release	Decreased Use
2001	869	752	207	207	662	545

Farmers
 Under North Kern Judgment

JE 65

Month of December

Table 3

Assessment of Changes

(values in acre-feet)

		First Point Diversers					
Calendar Year	Increase in Release Available to Other Rights	Recorded Release to Second Point	Historical Constraint on First Point Use	Proven Use Capacity as limited by The NKJ (1966)	Recorded Entitlement	Recorded Use of Entitlement	Projected Use of Entitlement
2001			Supply	220806	24750	24750	24750

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Month of December
Table 2
Restricted Rights Analysis

(values in acre-feet)

Calendar Year	Totals		
	Forfeiture Release	Decreased Use	Increase in Release Available to Other Rights
(1)	(27)	(28)	(30)
2001	17557	10081	10081

JE 63
Month of December
Table 1
Baseline

(values in acre-feet)

Calendar Year	First Point Diversers		Second Point and Lower-River Diversers				
	Recorded Entitlement	Recorded Use	Recorded Entitlement	Recorded Use	Recorded Release to Second Point	Plus Release to Second Point	Use
(1)							(10)
2001	24750	24750	24750	24750	0	119	119

JE 65

Month of December

Table 3

Assessment of Changes

(values in acre-feet)

		First Point Diversers					
Calendar Year	Recorded Release to Second Point	Recorded Use of Entitlement	Projected Use of Entitlement	Projected Increase in Release to Second Point	Projected Release to Second Point	Projected Constraint on First Point Use	
(1) 2001	(8) 0	(9) 24750	(9) 24750	(10) 0	(11) 0	(12) Supply	

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Month of December

Table 3

Assessment of Changes

(values in acre-feet)

Calendar Year	Second Point and Lower-River Diverter						Calendar Year	
	Recorded Entitlement + Recorded Release to Second Point	Use	Historical Constraint on Second Point and Lower-River Use	Projected Constraint on Second Point and Lower-River Use	Historical State of Stream System	Projected State of Stream System		Change in State of Stream System
(1) 2001	(18)	(14)	(15) Supply	(19) Supply	(20) Deficit	(21) Deficit	(22) None	(23) 2001

Summary of Changes (1964-2008)

Forfeiture Month (1)	Number of Years with <u>NO</u> Increase in Release by Restricted Rights (2)	Number of Years with Increase in Release by Restricted Rights (3)	Minimum Increase in Release by Restricted Rights (acre-feet) (4)	Maximum Increase In Release by Restricted Rights (acre-feet) (5)	Forfeiture Month (12)
January	16	29	13	5,496	January
August	36	9	211	1,519	August
September	34	11	180	3,459	September
October	37	8	399	5,636	October
November	10	35	71	4,846	November
December	8	37	111	10,081	December

Summary of Changes (1964-2008)

	Number of Years Increase in Release Used by First Point Diversers (6)	Number of Years Increase in Release Used by Second Point and/or Lower-River Diversers (7)	Total Number of Years Increase in Release Used by Existing Entitlements (8)	Number of Years Increase in Release Undistributed to Existing Entitlements (9)	Years Increase in Release Undistributed to Existing Entitlements (10)	Change in State of Stream System from Historical State (1964-2008) (11)	Forfeiture Month (12)
Forfeiture Month (1)							
January	26	2	28	1	1984	None	January
August	8	0	8	1	1983	None	August
September	7	3	10	1	1983	None	September
October	8	0	8	0	--	None	October
November	30	4	34	1	1983	None	November
December	33	2	35	2	1982, 1983	None	December

STATEMENT OF PRINCIPAL CONCLUSIONS

KERN RIVER HYDROLOGY

- The records of Kern River hydrology from the period 1894-2008 indicate that in nearly two-thirds of the years, the total annual natural flow at the First Point of Measurement is below average
- There exists an overall water deficiency in meeting existing water rights and water demands on the Kern River system

STATEMENT OF PRINCIPAL CONCLUSIONS

NORTH KERN JUDGMENT

- The *North Kern* judgment cannot create any new supply for existing rights holders not previously measured and considered in Decision D1196
- The baseline hydrologic conditions for the historical period 1964 through 2008 indicates that the Kern River system was in "Deficit" during 262 months out of the 270 forfeiture months analyzed
- The water released due to the *North Kern* judgment will, in all but flood control operations, be fully distributed to and used by the First Point, Second Point and Lower-River diverters under existing water right entitlements
- There are only three (3) years (1982, 1983 and 1984) out of 45 years where water released due to the *North Kern* judgment is not fully distributed to First Point, Second Point and Lower-River diverters under existing water right entitlements, and those years were when releases coincided with flood control operations

STATEMENT OF PRINCIPAL CONCLUSIONS

NORTH KERN JUDGMENT

- The projected state of the Kern River stream system following the *North Kern* judgment remains in a “Deficit” condition
- The 2007 and 2008 Flow and Diversion Records substantiate the conclusion that water released to the Kern River due to the *North Kern* judgment will be used by First Point, Second Point and Lower-River diverters under existing water right entitlements
- The *North Kern* judgment does not support a finding that there is water available for appropriation from the Kern River