

MEMORANDUM

Date: May 22, 2013
To: Water Right File 2-7375
From: Michele Edl
Re: data supporting beneficial use

The attached documents were provided to me by Jon Bowling, an Idaho Power Company engineer, during our meeting this afternoon. The information confirms the maximum flow utilized for generation by the Twin Falls project.

Index test data

Index tests on Unit #2 were performed on July 21, 1995. The graph and supporting spreadsheet shows that during the test the turbine passed 4036.7 cfs at 144 ft of effective head. The turbine efficiency at that flowrate is slightly less than the efficiency at optimum flow (approximately 4000 cfs).

Generation data

1998 was a good water year. Monthly average generation (MW-hr) for that year is available and confirms beneficial use of water for power occurred during the year nearest the date that the Proof of Beneficial Use statement was submitted. No electronic data acquisition system was available at that time. The generation data are summaries of hand written generation records which were maintained by the plant operators or dispatchers.

SCADA system data

2011 was also a good water year and comparable to 1998. In the years since the development period ended, a SCADA (supervisory control and data acquisition) system has been installed at the Twin Falls project. The system allows the project to be monitored and controlled by dispatchers located in Idaho Power Company headquarters in Boise.

Two screen shots of SCADA system displays are included in the attachments. Both show line graphs of data queried from the same three data feeds. (The units scale on the graphs has been compressed for easier comparison of cfs and MW.) One display shows more than a year's worth of data (369.07 days beginning 12/29/2010). The other display is a subset of the year and begins in October 2011. The three plots are labeled with the following tags:

TFPR_PLNT_MW is the total MW generated from the Twin Falls project. It includes generation from both unit 1 and unit 2.

TFPR_GAFL_CFSfs is the flow recorded at the USGS Kimberly gage and includes both turbine discharge and spill over the dam.

TFPR_TOT_CFS is the sum of the turbine discharge from both units and represents a calculation of flow from effective head elevation and MW generated.

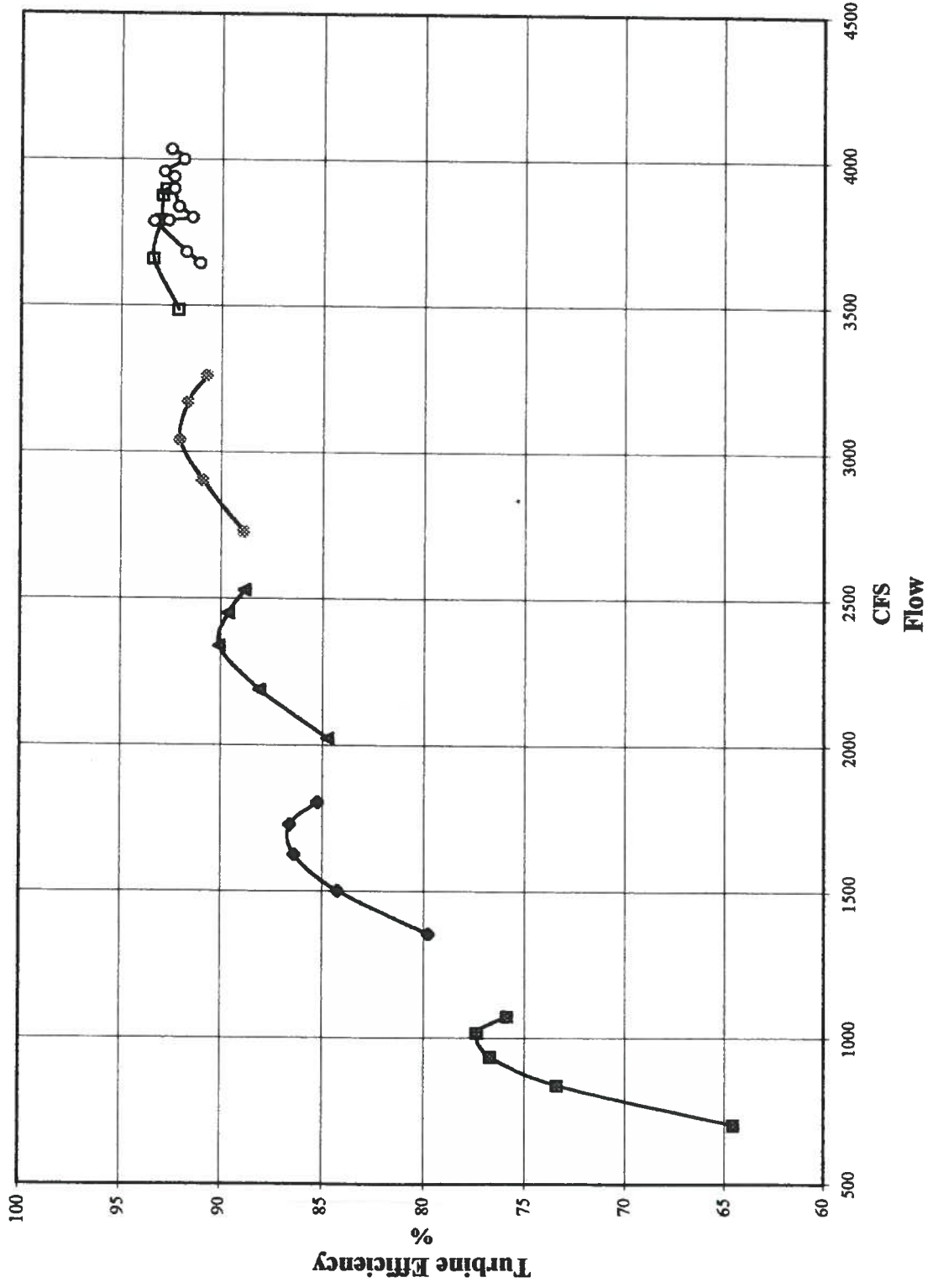
A few instantaneous readings from these graphs are shown in call-out boxes appearing above the graphs. The maximum instantaneous turbine discharge reading is 5007 cfs which occurred at 3:45:29 AM on 11/9/2011. Decreed right 2-2056 authorizes 1050 cfs. The maximum additional beneficial use demonstrated by these displays is 3957 cfs. ($5007 \text{ cfs} - 1050 \text{ cfs} = 3957 \text{ cfs}$) The turbine discharge data is a calculation and is presented without decimal places. The precision of the data acquisition behind the calculation was not provided.

The granularity of the data from 2011 is an order of magnitude smaller than the data available from 1998, but the bounding conditions for the water use have not changed. The intake, penstock, turbine, head elevation, and tailrace are essentially the same as was installed or cast in concrete in 1995. Therefore, I am recommending a license flow rate based on the 2011 data provided. I recommend 3960 cfs for 2-7375.

Twin Falls Flow and Index Tests

The Twin Falls Unit #2 hydraulic capacity test was performed on July 21, 1995. The maximum flow for unit 2 was measured with the plant differential flow meter and was determined to be approximately 4,000 cfs. The maximum flow for unit #1 is estimated to be 960 cfs based on historical operations and the nameplate data. Total plant flow is estimated to be 4,960 cfs.

Twin Falls Unit #2 Index Tests



TWIN FALLS #2 INDEX TEST SUMMARY

TEST #	SCASE ELV FT	SC VEL HD FT	AV TW EL FT	TURB HEAD FT	DIFF PRESS IN H2O	FLOW CFS	SPEC HEAD FT	SPEC PWR KW	SPEC FLOW CFS	GEN EFF %	TURB EFF %	TEST #
"1-3"	3510.729486	0	3365.792295	144.9371906	2.963116124	705.2650606	144	5529.604933	702.98277244	97	64.55141937	"1-3"
"1-2"	3510.753191	0	3365.847113	144.7260786	4.216996282	841.3737879	144	7505.286141	839.2640201	97	73.38455193	"1-2"
"1-1"	3510.493017	0	3365.884888	144.6081297	5.241098791	938.0222677	144	8749.231863	936.0308672	97	76.69692345	"1-1"
"1-4"	3510.507871	0	3366.05019	144.4576808	6.18994152	1019.411686	144	9595.661154	1017.796638	97	77.3598361	"1-4"
"1-5"	3510.473438	0	3366.355633	144.1178051	6.886883678	1075.256332	144	9936.774137	1074.816737	97	75.86162037	"1-5"
"2-3"	3510.108545	0	3366.828485	143.2806602	10.89259939	1352.328975	144	13181.03378	1355.731476	97	79.7731983	"2-3"
"2-2"	3509.907463	0	3367.007135	142.9003276	13.22395705	1495.660087	144	15415.65825	1501.406181	97	84.24528464	"2-2"
"2-1"	3509.774938	0	3366.881976	142.8929622	15.62815626	1619.879129	144	17120.90369	1626.092446	97	86.39019124	"2-1"
"2-4"	3509.542111	0	3366.995756	142.5463629	17.6301909	1720.154991	144	18246.17587	1728.900836	97	86.1629603	"2-4"
"2-5"	3509.446299	0	3367.247119	142.1991795	19.18148702	1794.561719	144	18756.62326	1805.889246	97	85.22010321	"2-5"
"3-3"	3508.82443	0	3367.22543	141.5990002	24.00291849	2007.474648	144	20900.59735	2024.443219	97	84.70928324	"3-3"
"3-2"	3508.468046	0	3367.48224	140.985806	27.96775297	2166.935326	144	23511.21464	2189.979447	97	88.08750341	"3-2"
"3-1"	3508.319194	0	3367.647349	140.6718456	31.8554081	2312.644562	144	25686.30272	2339.84163	97	90.07284145	"3-1"
"3-4"	3507.885207	0	3367.503916	140.3812908	34.90450978	2420.802137	144	26782.08	2451.805101	97	89.62614818	"3-4"
"3-5"	3507.605037	0	3367.667059	139.9379781	37.04898493	2494.053892	144	27385.06881	2529.993109	97	88.81213763	"3-5"
"4-3"	3507.131072	0	3367.851764	139.2793081	42.89224419	2683.53844	144	29553.00872	2728.650739	97	90.94346112	"4-3"
"4-2"	3506.636394	0	3367.946086	138.6903084	48.38982093	2850.33835	144	32192.29323	2904.38811	97	90.72633502	"4-2"
"4-1"	3506.371187	0	3367.085202	139.2859849	53.41438472	2994.669877	144	34167.69436	3044.924216	97	92.06886453	"4-1"
"4-5"	3505.801039	0	3368.073176	137.7278628	57.32845681	3102.449289	144	35434.61932	3172.307637	97	91.64881726	"4-4"
"5-3"	3505.534026	0	3368.192543	137.3414826	60.53039236	3187.912308	144	36094.94558	3264.276465	97	90.72633502	"4-5"
"5-2"	3504.384438	0	3368.485648	135.8997898	68.36616213	3387.978239	144	39163.79787	3487.488057	97	92.13936633	"5-3"
"5-1"	3503.948957	0	3368.661849	135.2871087	75.00652422	3548.698663	144	41680.36005	3661.190655	97	93.40783305	"5-2"
"5-4"	3503.587181	0	3368.54528	135.0419004	80.36523522	3673.274618	144	43027.45145	3793.154171	97	93.07213373	"5-1"
"5-5"	3502.929896	0	3368.47461	134.4552859	83.6170691	3746.863743	144	43926.81939	3877.579031	97	92.94830276	"5-4"
"6-3"	3503.075773	0	3368.579642	134.2396708	84.44924352	3765.462952	144	44087.62888	3899.955861	97	92.75329048	"5-5"
"6-9"	3503.383024	0	3366.463116	136.6126569	75.12943522	3551.607345	144	40481.16891	3646.378382	97	91.08848933	"6-3"
"6-11"	3502.556845	0	3368.332115	135.0529087	75.83138405	3568.160321	144	41209.98104	3684.459713	97	91.770242	"6-9"
"6-8"	3503.064073	0	3368.39176	134.1650848	79.71457575	3658.373869	144	43134.3449	3790.092742	97	93.37870528	"6-11"
"6-2"	3503.061241	0	3366.734409	135.865348	81.275762	3694.030104	144	42817.59377	3791.385927	97	92.66091293	"6-2"
"6-7"	3503.061241	0	3368.391251	134.6699899	82.10878571	3712.916728	144	42397.92245	3803.027858	97	91.47134087	"6-7"
"6-6"	3502.717857	0	3367.988736	134.7291209	84.86424286	3774.698166	144	43120.44709	3839.380946	97	92.14983429	"6-6"
"6-1"	3502.182832	0	3367.08164	135.1011922	86.8699196	3819.04615	144	43941.6379	3902.449915	97	92.38613563	"6-1"
"6-5"	3502.660963	0	3368.001498	134.6594653	87.32791429	3829.101575	144	44394.2057	3942.828027	97	92.38259176	"6-5"
"6-4"	3501.722317	0	3367.032111	134.6902066	89.25513367	3871.123342	144	44838.88729	4002.686217	97	92.85829388	"6-4"
"6-10"	3501.971897	0	3368.3352	133.6366965	90.0696485	3888.743905	144	45514.08114	4036.715697	97	91.91241727	"6-10"

Idaho Power Hydro Generation 1998

1997

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
American Falls	48,298	68,623	73,167	68,953	77,649	77,184	69,963	69,460	64,976	45,394	30,520	39,070	733,257
Bliss	51,141	46,676	50,561	48,942	47,735	47,157	35,327	39,928	50,105	52,842	45,640	51,983	568,037
Brownlee	445,354	387,111	307,000	217,094	173,410	411,532	275,033	258,024	301,226	213,659	133,386	217,768	3,340,597
Cascade	7,299	6,950	7,986	5,091	5,912	7,218	4,968	5,028	3,516	1,506	568	4,142	60,184
Clear Lakes	1,334	1,119	1,260	1,237	1,287	502	930	1,364	1,262	1,276	1,299	1,375	14,245
Hells Canyon	277,939	279,104	311,830	302,081	318,364	305,438	212,332	211,915	246,236	182,949	124,858	177,500	2,950,546
Lower Salmon	35,858	33,106	39,373	44,677	42,926	41,595	27,025	30,531	39,385	41,388	35,796	41,561	453,221
Malad-Upper	5,667	5,251	5,591	4,998	5,740	5,792	5,770	5,433	5,362	5,757	5,559	5,474	66,394
Malad-Lower	9,582	9,741	10,226	10,246	1,480	(6)	10,471	9,989	9,001	9,774	10,146	9,737	100,387
Milner	41,731	36,295	39,639	36,630	42,054	33,665	15,924	29,162	42,142	43,699	37,511	42,770	441,222
Oxbow	146,010	128,047	144,777	140,392	145,566	136,966	104,568	109,664	103,779	102,884	66,551	91,780	1,420,984
Shoshone Falls	9,702	8,578	8,374	9,315	9,802	8,936	9,923	10,107	9,698	9,959	9,642	9,888	113,924
C J Strike	64,202	39,991	42,411	52,103	44,012	51,982	43,351	47,182	61,050	64,296	60,201	66,074	636,855
Swan Falls	16,092	11,183	12,913	14,631	17,449	10,537	12,666	14,173	17,605	16,735	16,163	18,477	179,524
Thousand Springs	5,248	4,737	4,619	4,912	4,899	4,770	4,953	5,107	5,095	5,434	5,276	5,361	53,611
Twin Falls	37,203	31,505	34,874	34,559	37,035	32,646	17,641	27,275	35,438	37,408	34,511	39,147	399,242
Upper Salmon "A"	13,350	11,931	13,365	12,659	13,110	12,601	11,871	-	-	10,516	12,209	12,840	124,452
Upper Salmon "B"	12,400	11,095	12,042	11,906	12,198	11,304	12,524	12,291	11,861	12,607	12,217	12,570	145,015
Total Hydro	1,228,410	1,121,043	1,120,008	1,020,426	1,000,628	1,199,819	875,240	886,633	1,007,737	858,083	642,053	847,517	11,807,597

NET GENERATION LEDGER

TWIN FALLS

1998

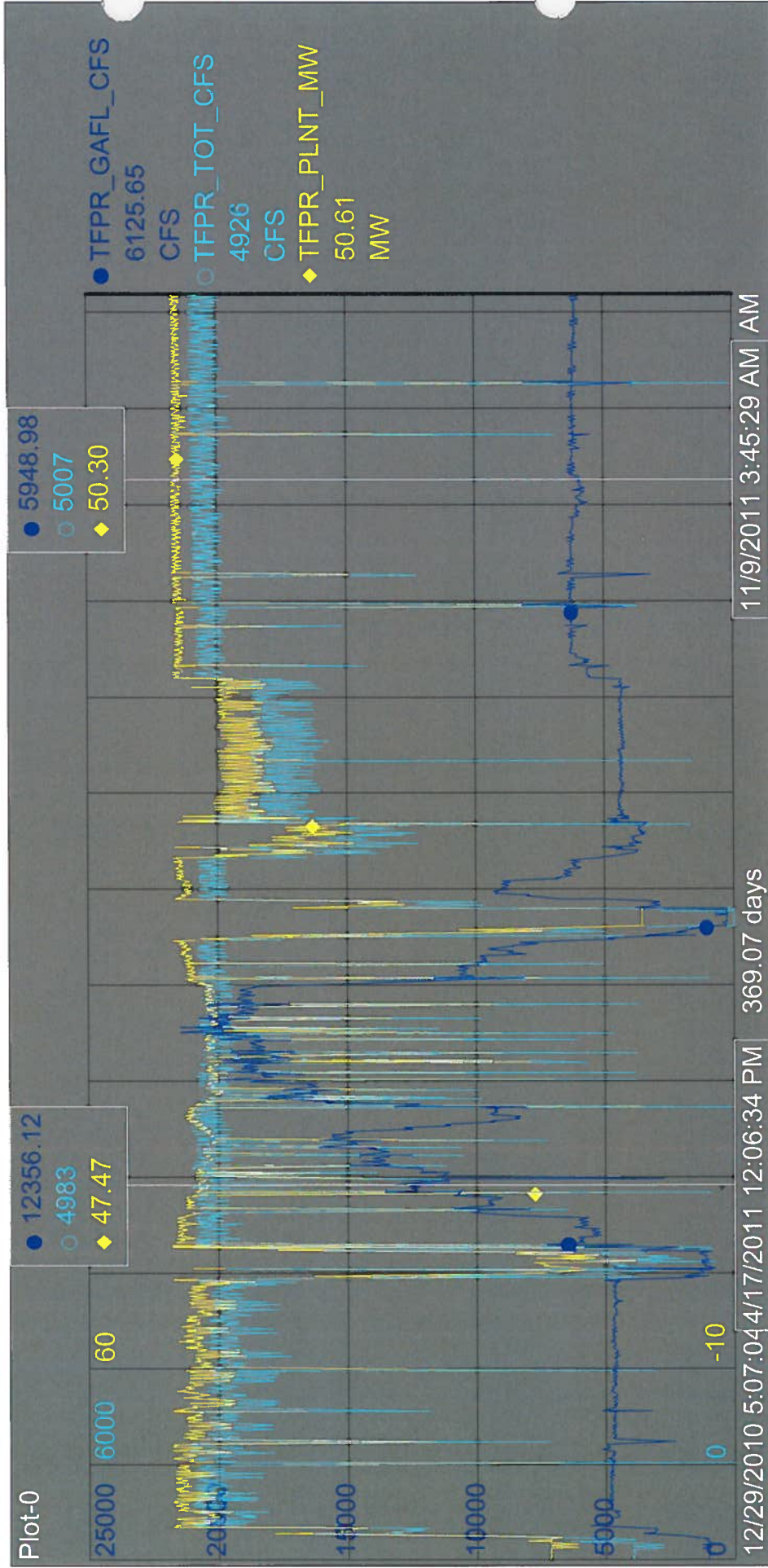
	Generation #1		Generation #2		Total Gross Gen (MWH)	
	Reading	MWH	Reading	MWH	Month	YTD
Beg. Rdg.	91,133		53,351			
Jan	97,951	6,818	85,759	32,408	39,226	39,226
Feb	104,082	6,131	115,233	29,474	35,605	74,831
Mar	9,766	5,684	45,931	30,698	36,382	111,213
Apr	16,274	6,508	76,696	30,765	37,273	148,486
May	21,141	4,867	105,933	29,237	34,104	182,590
June	26,935	5,794	35,683	29,750	35,544	218,134
July	28,176	1,241	52,399	16,716	17,957	236,091
Aug	28,244	68	66,093	13,694	13,762	249,853
Sept	28,298	54	80,343	14,250	14,304	264,157
Oct	28,325	27	96,873	16,530	16,557	280,714
Nov	31,057	2,732	124,141	27,268	30,000	310,714
Dec	37,809	6,752	56,368	32,227	38,979	349,693

37 SWAN FALLS MONTHLY MEAN FLOW (SNAKE R. NR MURPHY, USGS #13172500)											
<i>Provisional SWAI</i>											
YEAR	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER
											DECEMBER
											ANNUAL CFS
											ANNUAL VOLUME, KAF
1960	8,713	8,780	9,268	9,467	7,317	7,540	7,043	7,541	8,208	8,845	8,936
1961	7,944	8,103	7,645	7,383	6,592	6,572	6,219	6,838	7,778	8,335	8,391
1962	7,730	9,477	11,150	11,780	12,680	9,558	7,082	7,821	8,436	10,410	9,697
1963	8,853	9,985	8,436	8,744	9,935	19,600	7,235	7,604	8,700	9,037	9,698
1964	9,308	8,879	8,970	13,160	15,390	17,620	7,620	7,450	8,565	9,919	11,600
1965	13,410	19,200	18,380	17,880	15,930	11,180	8,672	8,705	9,441	11,190	12,930
1966	16,330	15,079	12,000	8,446	6,611	6,731	6,701	7,387	8,421	9,375	8,955
1967	8,475	8,088	8,010	7,509	7,810	13,310	8,304	7,277	8,260	10,210	11,490
1968	11,890	12,480	8,713	7,329	6,518	9,109	6,748	8,897	8,743	10,540	12,240
1969	17,410	16,550	17,140	17,320	12,720	9,024	7,427	7,292	9,804	9,585	9,814
1970	12,570	11,500	8,379	11,710	17,530	14,220	8,859	7,154	9,327	11,420	12,110
1971	18,340	17,300	14,330	28,949	27,130	18,990	11,000	7,395	9,008	18,500	19,960
1972	18,260	18,520	22,500	25,380	16,480	17,120	7,739	7,884	9,779	16,680	18,200
1973	17,140	16,690	15,850	14,230	8,213	7,114	6,370	6,694	8,472	9,318	10,570
1974	12,150	15,260	21,700	25,350	20,010	14,779	8,830	6,855	8,037	10,430	11,980
1975	14,499	14,979	17,690	22,700	23,750	15,129	6,861	7,662	10,100	14,010	18,610
1976	15,930	16,560	18,730	26,900	24,310	14,829	5,756	7,815	9,574	12,190	13,469
1977	11,830	10,950	10,190	7,046	6,848	6,495	5,657	6,107	6,835	7,702	7,963
1978	8,579	8,566	10,670	13,440	12,120	6,997	5,870	6,574	9,295	9,813	12,150
1979	14,260	14,360	15,930	14,410	7,821	6,595	5,417	7,724	7,955	8,621	8,681
1980	8,743	8,128	8,127	9,715	14,490	17,020	6,109	6,421	8,171	8,668	10,170
1981	9,842	8,401	7,882	10,540	7,735	12,650	5,293	5,915	8,318	9,646	9,227
1982	8,696	13,780	12,830	23,580	23,060	13,020	9,328	7,662	10,100	14,010	18,610
1983	18,350	16,270	15,020	18,990	26,300	22,100	13,270	8,952	9,722	16,950	20,620
1984	23,260	15,750	13,880	25,419	31,250	30,750	11,360	9,763	10,260	18,460	21,370
1985	18,720	17,600	15,370	19,930	12,850	8,133	6,489	7,400	10,260	10,170	11,630
1986	12,950	18,470	24,490	26,129	24,790	20,810	7,603	7,648	10,600	18,050	18,270
1987	15,359	9,807	8,580	8,046	7,092	6,470	6,827	6,972	8,486	9,557	8,479
1988	8,045	8,065	7,667	7,438	6,801	6,428	5,916	6,312	7,937	7,929	8,479
1989	7,735	8,433	9,775	8,683	7,165	6,568	6,331	7,405	8,351	9,020	9,097
1990	7,997	7,751	7,591	6,840	6,780	7,310	6,032	6,724	7,604	8,297	8,357
1991	8,362	7,943	7,005	6,579	6,885	6,600	5,866	6,209	7,721	8,177	8,177
1992	8,283	7,912	7,171	6,092	5,285	4,971	5,274	5,266	6,177	7,086	7,579
1993	7,581	7,352	10,300	8,339	8,336	12,780	7,074	7,577	7,442	8,735	9,255
1994	9,966	8,761	8,962	8,047	8,341	7,004	6,565	6,220	6,801	8,182	7,836
1995	7,982	7,910	7,561	6,669	14,950	17,500	8,415	7,400	8,413	8,416	9,920
1996	11,700	15,359	28,349	22,830	14,299	14,960	7,915	7,765	8,002	8,545	10,170
1997	18,110	26,540	28,349	23,210	18,650	31,979	10,780	10,480	14,870	15,770	14,299
1998	14,470	14,720	15,670	17,910	21,070	18,980	9,090	7,578	9,162	10,310	12,390
1999	16,150	15,899	16,700	18,270	19,150	20,080	7,233	7,725	8,547	10,180	11,630
2000	13,990	10,970	10,350	12,430	7,625	5,977	6,824	7,287	8,224	9,124	8,522
2001	7,733	7,764	7,755	6,971	6,879	5,649	5,633	5,709	6,537	7,459	7,574
2002	7,261	7,281	7,828	6,738	6,165	5,464	4,981	5,280	6,099	7,025	7,057
2003	6,780	6,801	6,701	5,987	6,334	5,063	4,447	5,202	6,333	6,747	6,878
2004	6,656	7,000	7,649	6,221	6,329	5,241	4,704	5,084	6,029	6,820	6,910
2005	6,829	6,685	6,735	6,165	8,809	6,751	6,258	5,452	6,226	7,336	7,032
2006	7,824	8,556	9,694	19,980	16,710	6,905	7,555	6,604	6,995	7,711	6,975
2007	9,208	8,401	7,659	6,799	6,116	5,473	6,018	5,887	6,464	7,093	6,816
2008	6,905	6,916	7,021	6,417	6,563	6,220	6,548	7,357	6,538	7,345	7,312
2009	7,150	6,950	7,310	14,500	12,600	13,100	10,800	6,450	6,850	8,800	7,810
2010	9,060	8,530	7,700	7,070	9,860	7,600	5,800	6,440	6,720	7,400	7,740
2011	10,934	19,774	10,648	18,762	25,344	23,039	9,677	9,489	11,711	14,125	12,421
2012	11,400	10,820	11,312	12,565	6,999	7,221	6,562	6,095	6,532	7,505	7,111
AVE	11,518	11,639	11,952	13,530	12,885	11,821	7,240	7,114	8,306	10,129	10,703
Median	9,842	9,807	9,775	11,710	9,860	9,024	6,748	7,292	8,318	9,124	9,585
MAX	23,260	26,540	28,349	28,949	31,250	31,979	13,270	10,480	14,870	18,500	21,370
MIN	6,656	6,685	6,701	5,987	5,285	4,971	4,447	5,084	6,029	6,747	6,816
05 SRPM	10,248	11,558	11,463	12,796	10,944	10,198	7,299	7,488	8,321	9,257	10,374
05 Hist Calif	9,757	10,750	10,975	10,301	9,992	10,511	6,618	6,705	7,780	8,620	8,953
09 SRPM	11,112	11,163	10,923	12,592	10,679	9,446	7,117	6,382	8,268	9,659	10,645
09 Hist Calif	9,917	10,518	11,384	11,384	10,778	6,995	6,685	6,685	7,545	8,482	8,665
IRP	10,646	11,209	9,983	11,027	10,063	6,294	6,294	6,603	7,003	7,986	9,813
Median 32-01	7,903	7,911	7,792	7,509	8,339	6,828	6,595	6,527	6,826	7,947	7,708

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