

JUN 01 2009

DEPARTMENT OF
WATER RESOURCES

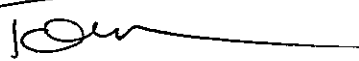
05/29/2009

Michele Edl,
Associate Engineer
Water Rights Section
Idaho Department of Water Resources
322 East Front Street
Boise, ID 83720-0098

Dear Michele,

I am enclosing the data we spoke about. I am a little confused as to why some of it applies. Since the hydro project is a non-consumptive use do we really need to verify the total water usage in any given year? As I understand it if we had 150 CFS year round we could use it all continuously. I hope the data I have enclosed is sufficient. If not just give me a call.

Thank you,



Tom McCauley

*Carol
check w/ Orlin
on letter
1-14-87*

INGERSOLL-RAND
PUMPS

*John
write letter
Dave H sign
1/20 - Jim - Orlin is
doing this today.
Carol*

Engineered Pump Division

Ingersoll-Rand Company
942 Memorial Park
Phillipsburg, NJ 08865



November 23, 1987

Bonneville Pacific Corporation
834 Falls Ave., Suite 1020L
Twin Falls, ID. 83301

Attention: Mr. Orlin Clements

Subject: Crystal Springs Hydroelectric Project
Turbine Performance

Re: Results of recent (19 OC 87) Field Testing

Dear Mr. Clements:

The data collected by I-R and B.P.C. personnel during the recent (19 OC 87) field test was analyzed, and has been arranged in a tabular form on the enclosed tables.

The procedure utilized for the field testing was essentially as described in I-R specification TLM-19, being attachment #7 in the original purchase agreement.

Table #1 contains the collected performance data, and resulting performance calculations, with all four of the units running simultaneously.

Table #2 contains relevant performance parameters for the rated conditions of the four (4) units, to be used for comparative purposes.

Table #3 contains the collected performance data, and resulting performance calculations for each of the four units running alone.

Based on the data collected on 19 OC 87, the four (4) turbine units are performing where I-R would have predicted. In both instances, with the units running simultaneously and with the units run individually, the turbine efficiencies and power outputs are within and fulfill the contractual guarantees.

Please review the enclosed information and advise if you have any questions.

Sincerely yours,

Kenneth M. Garside

Kenneth M. Garside, P.E.
Field Service Engineer Cust.Rel.Dept.
Engineered Pump Division

*copy Dave H
12/10
Done - Carol*

ALL AGREEMENTS CONTINGENT UPON STRIKES, ACCIDENTS AND OTHER CONDITIONS BEYOND OUR CONTROL.
ALL CONTRACTS ARE SUBJECT TO APPROVAL BY AN OFFICER OF THE COMPANY. QUOTATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

KMG:kab Attach.
(GARSIDE-1)

FIELD PERFORMANCE DATA

(ALL (4) UNITS RUNNING SIMULTANEOUSLY)

24

23

	Unit #1	Unit #2	Unit #3	Unit #4	Combined
	16X23ST S/N 1084-113 (1)	16X23ST S/N 1084-114 (2)	20ALVT S/N 1084-89 (2)	16X23SLVT S/N 0885-44 (2)	Tested Expected
P Static (psig)	103	100	101	100	-- --
Static (ft)	238	231	233.31	231	-- --
H Elevation (ft)	7.50	7.45	7.51	7.41	-- --
H Velocity (ft)	5.56	8.46	6.27	11.06	-- --
H Net (ft)	251.1	246.9	247.1	251.8	-- --
Q Curve (gpm)	11,850	15,100	20800	17,000	-- 64750
Q Curve (CFS)	26.4	33.64	46.3	37.9	-- 144.2
SHP Turbine (HP)	705.1	844.3	805.0	945.3	3600 3467
Generator (KW)	500	600	572.1	670	2555 2461
Electrical Output)					
Efficiency (Generator)	.951	.953	.953	.950	.952
Efficiency (Turbine)	.938	.860	.896	.855	.851 .860 .875 .832 .885 .852
Efficiency (Water to Wire)	.892	.818	.854	.815	.811 .820 .831 .790 .842 .811
Actual Power/Expected Pow.	1.09	1.03	.99	1.05	1.04
- Deviation (%)	+9	+3	-1	+5	+4

NOTES: (1) Expected Performance is Basis Developed Performance Curve
(2) Expected Performance is Basis Original As Tested Curve
(3) P Static - Taken adjacent to turbine inlets (16"D. - 20"D - pipe cross sections)

CEDAR DRAW BASIN

13093550 CEDAR DRAW NEAR FILER, ID

LOCATION.—Lat 42°39'10", long 114°39'16", in SE $\frac{1}{4}$, SE $\frac{1}{4}$, SE $\frac{1}{4}$, sec.11, T.9 S., R.15 E., Twin Falls County, Hydrologic Unit 17040212, on left bank 0.05 mi southwest from county road, 0.9 mile upstream from mouth, and 6.5 mi northwest of Filer.

PERIOD OF RECORD.—April 1985 to current year. Records for July 1955 to July 1958 and October 1979 to September 1981 at site 2.75 mi upstream (sta 13093500) are not equivalent due to inflow between sites.

GAGE.—Water-stage recorder. Elevation of gage is 3,035 ft above National Geodetic Vertical Datum of 1929, from topographic map, April 1985 to Mar. 21, 1986, at site 600 ft upstream at different datum.

REMARKS.—Records good except for estimated daily discharges, which are poor. Numerous regulations by powerplant upstream.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 494 ft³/s May 7, 1988, gage height, 6.62 ft; minimum, 11 ft³/s Mar. 28, 1988, gage height, 4.62 ft.

EXTREMES FOR CURRENT YEAR.—Maximum discharge, 359 ft³/s Sept. 29, gage height, 6.19 ft; minimum daily, 34 ft³/s Feb. 6, 16, 30, Apr. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	193	70	56	49	e45	40	36	158	137	80	154	e245
2	191	70	56	49	e43	49	36	132	e145	87	145	e230
3	189	71	54	48	e41	41	35	75	e155	87	141	e215
4	185	66	53	49	e39	40	34	78	e160	84	140	e225
5	181	66	54	49	e37	37	55	132	e150	84	130	e260
6	162	68	54	48	e34	46	130	125	e130	75	123	253
7	159	68	54	48	e35	44	52	130	e135	74	131	250
8	159	68	53	45	e35	41	37	128	e130	78	130	257
9	160	66	54	47	e36	41	36	108	e120	81	e155	281
10	159	68	54	55	e36	39	36	143	e120	86	e145	272
11	158	72	53	46	e37	38	36	150	e115	79	e150	243
12	163	71	54	43	e37	37	64	154	e105	85	e160	240
13	164	73	54	44	e38	37	112	169	e105	94	e175	251
14	171	72	54	44	e37	36	116	174	e115	102	e170	246
15	190	67	51	42	e35	36	133	179	e105	115	e170	265
16	192	68	51	43	e34	37	148	175	e100	127	e210	273
17	192	69	51	41	e35	37	154	165	e110	128	e195	289
18	190	66	54	41	e45	36	146	156	e110	126	e190	293
19	197	65	54	40	e74	37	126	153	e100	113	e170	248
20	214	66	53	41	e60	35	89	121	e110	102	e185	208
21	214	64	54	43	e45	36	116	117	e100	94	e200	184
22	182	68	53	43	e43	35	173	120	104	97	e205	188
23	127	70	51	41	44	36	188	94	141	106	e220	214
24	74	65	52	39	42	36	176	87	139	106	e240	242
25	73	66	52	e38	41	37	130	83	122	106	e230	250
26	71	62	50	e38	40	38	108	100	114	123	e225	249
27	69	59	e49	e38	39	37	90	140	95	155	e250	252
28	70	63	e49	e38	40	37	94	145	84	151	e245	271
29	70	58	e48	e37	---	35	112	147	85	164	e240	295
30	68	56	e49	e37	---	34	151	138	84	157	e235	303
31	69	---	50	e40	---	36	---	128	---	163	e230	---
TOTAL	4656	2001	1628	1344	1147	1181	2949	4104	3525	3309	3689	7492
MEAN	150	66.7	52.5	43.4	41.0	38.1	98.3	132	117	107	184	250
MAX	214	73	56	55	74	49	188	179	160	164	250	303
MIN	68	56	48	37	34	34	34	75	84	74	123	184
AC-FT	9240	3970	3230	2670	2280	2340	5850	8140	6990	6560	11280	14860

CAL YR 1988 TOTAL 29824 MEAN 81.5 MAX 329 MIN 31 AC-FT 59160
WTR YR 1989 TOTAL 39025 MEAN 107 MAX 303 MIN 34 AC-FT 77410

e Estimated

CEDAR DRAW BASIN

13093550 CEDAR DRAW NEAR FILER, ID

LOCATION: 42°39'10", long 114°39'16", in SE 1/4 SE 1/4 SE 1/4 sec.11, T.9 S., R.15 E., Twin Falls County, Hydrologic Unit 174, on left bank 0.05 mi southwest from county road, 0.9 mile upstream from mouth, and 6.5 mi northwest of Filer.

PERIOD OF RECORD: April 1985 to current year. Records for July 1955 to July 1958 and October 1979 to September 1981 at site upstream (sta 13093500) are not equivalent due to inflow between sites.

STAGE RECORDER: Datum of gage is 3,032.48 ft above National Geodetic Vertical Datum of 1929. April 1985 to Mar. at site 600 ft upstream at different datum.

REMARKS: Records good except for estimated daily discharges, which are fair. Numerous regulations by powerplant upstream.

PERIOD OF RECORD: -5 years (1986-90), 108 ft³/s, 78,250 acre-ft/yr.

PERIOD OF RECORD: -Maximum discharge, 494 ft³/s May 7, 1988, gage height, 6.62 ft; minimum, 11 ft³/s Mar. 28, gage height, 4.62 ft.

CURRENT YEAR: -Maximum discharge, 433 ft³/s May 31, gage height, 6.50 ft; minimum daily, 31 ft³/s Apr. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	299	203	e53	51	45	38	32	329	355	82	99	108
2	298	205	e52	52	43	38	32	222	316	88	96	112
3	308	e200	e51	49	43	39	31	172	300	94	96	119
4	295	e150	e51	49	44	39	32	183	286	94	94	119
5	277	e100	e52	49	43	42	42	180	266	98	92	132
6	255	e75	e50	49	44	38	81	176	257	86	93	166
7	252	e85	e49	50	43	37	63	151	229	89	90	171
8	257	e85	49	51	44	38	59	137	215	97	87	168
9	253	e74	50	49	44	37	54	132	192	98	84	174
10	247	e70	48	48	48	38	58	143	173	92	81	165
11	242	e68	47	48	45	38	74	126	178	85	83	160
12	246	e68	48	49	44	37	118	105	178	82	88	159
13	242	e66	48	50	44	36	161	128	196	82	93	166
14	250	e65	48	51	42	36	143	127	242	81	94	160
15	258	e64	49	50	42	35	112	126	272	82	96	145
16	261	e65	49	49	42	34	86	113	266	93	96	167
17	238	e65	50	48	42	34	110	88	267	91	97	195
18	254	e63	50	48	40	34	93	83	258	94	102	204
19	259	e61	49	48	39	34	74	79	235	97	109	210
20	256	e61	49	47	39	33	85	94	179	104	118	203
21	229	e60	49	46	39	33	171	84	150	110	119	203
22	217	e59	48	47	38	34	178	76	155	114	116	199
23	222	e60	47	46	38	33	246	75	158	114	112	210
24	225	e70	48	44	37	33	212	87	157	109	113	219
25	271	e68	48	45	37	33	228	92	163	108	122	216
26	229	e70	48	46	38	33	266	87	149	109	126	228
27	191	e60	50	44	37	33	294	105	106	114	131	232
28	192	e57	50	45	37	36	278	142	105	110	127	213
29	197	e55	49	45	---	33	356	222	159	103	126	211
30	201	e55	50	47	---	33	383	272	89	104	123	212
31	195	---	50	45	---	33	---	362	---	104	111	---
TOTAL	7636	2507	1529	1485	1161	1102	4152	4498	6251	3008	3214	5354
MEAN	246	83.6	49.3	47.9	41.5	35.5	138	145	208	97.0	104	178
MAX	308	205	53	52	48	42	383	362	355	114	131	232
MIN	191	55	47	44	37	33	31	75	89	81	81	108
AC-FT	15150	4970	3030	2950	2300	2190	8240	8920	12400	5970	6370	10620

CAL YR 1989 TOTAL 42412 MEAN 116 MAX 308 MIN 34 AC-FT 84120
WTR YR 1990 TOTAL 41897 MEAN 115 MAX 383 MIN 31 AC-FT 83100

e Estimated

CEDAR DRAW BASIN

13093550 CEDAR DRAW NEAR FILER, ID

LOCATION.--Lat 42°39'10", long 114°39'16", in SE¹/₄SE¹/₄SE¹/₄ sec.11, T.9 S., R.15 E., Twin Falls County, Hydrologic Unit 17040212, on left bank 0.05 mi southwest from county road, 0.9 mile upstream from mouth, and 6.5 mi northwest of Filer.

PERIOD OF RECORD.--April 1985 to October 1991 (discontinued). Records for July 1955 to July 1958 and October 1979 to September 1981 at site 2.75 mi upstream (sta 13093500) are not equivalent due to inflow between sites.

GAGE.--Water-stage recorder. Datum of gage is 3,032.48 ft above National Geodetic Vertical Datum of 1929. April 1985 to Mar. 21, 1986, at site 600 ft upstream at different datum.

REMARKS.--Records fair except for estimated daily discharges, which are poor. Numerous regulations by powerplant upstream.

AVERAGE DISCHARGE.--6 years (1986-91), 111 ft³/s, 80,420 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 494 ft³/s May 7, 1988, gage height, 6.62 ft; minimum, 11 ft³/s Mar. 28, 1988, gage height, 4.62 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge during period Oct. 1990 to Oct. 1991, 340 ft³/s Sept. 11; minimum daily discharge, 30 ft³/s Apr. 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1990 TO SEPTEMBER 1991
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	212	207	66	48	41	39	32	239	135	212	125	216
2	209	204	63	49	41	36	32	182	159	211	131	211
3	216	201	63	48	41	36	33	180	189	182	132	199
4	218	202	63	47	42	38	31	180	199	138	149	190
5	218	206	60	47	43	37	31	158	205	105	204	177
6	221	217	60	46	43	35	32	176	218	100	196	161
7	238	177	60	48	42	36	31	189	216	105	195	167
8	242	174	60	50	41	35	30	175	212	114	164	197
9	233	229	60	49	41	36	31	173	217	110	142	212
10	238	105	60	47	40	37	32	203	216	112	128	294
11	242	104	59	48	39	37	33	208	182	105	129	340
12	239	104	58	49	40	35	37	205	169	104	128	338
13	237	96	58	50	39	36	98	209	209	107	121	310
14	230	97	56	52	39	36	147	216	206	110	120	279
15	224	86	57	63	39	36	144	204	206	121	114	251
16	214	78	56	47	40	35	114	191	222	110	118	247
17	212	78	56	48	39	34	67	182	266	112	122	239
18	243	76	58	50	37	34	80	186	262	114	136	227
19	244	77	58	53	36	36	86	186	265	117	136	205
20	246	76	47	49	36	35	107	176	253	132	124	199
21	247	73	45	47	36	33	160	183	219	139	174	210
22	246	70	42	45	37	32	155	165	171	131	163	212
23	242	71	42	44	36	34	107	114	154	102	159	213
24	238	72	43	44	36	34	78	105	124	126	151	220
25	247	72	45	43	36	35	108	96	119	137	159	211
26	253	68	45	41	36	34	173	97	128	133	183	189
27	250	67	47	42	37	33	193	96	164	149	173	173
28	232	65	48	43	38	32	221	114	204	171	170	176
29	211	67	48	44	---	32	260	132	209	174	205	181
30	196	65	45	41	---	34	275	140	215	164	239	184
31	181	---	47	41	---	32	---	137	---	129	222	---
TOTAL	7119	3484	1675	1463	1091	1084	2958	5197	5913	4076	4812	6628
MEAN	230	116	54.0	47.2	39.0	35.0	98.6	168	197	131	155	221
MAX	253	229	66	63	43	39	275	239	266	212	239	340
MIN	181	65	42	41	36	32	30	96	119	100	114	161
AC-FT	14120	6910	3320	2900	2160	2150	5870	10310	11730	8080	9540	13150

CAL YR 1990 TOTAL 42503 MEAN 116 MAX 383 MIN 31 AC-FT 84300
WTR YR 1991 TOTAL 45500 MEAN 125 MAX 340 MIN 30 AC-FT 90250

e Estimated

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1991 TO SEPTEMBER 1992
DAILY MEAN VALUES

October 1.....	185	October 3.....	198	October 5.....	216	October 7.....	225
2.....	189	4.....	215	6.....	219		

Tom McQuay

Po 175

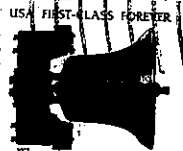
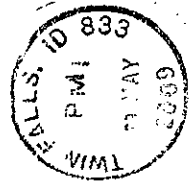
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JUN 01 2009

DEPARTMENT OF
WATER RESOURCES



Michele Eol
Idaho Department of Water Resources
322 East Front Street
Boise Idaho 83720-0098

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