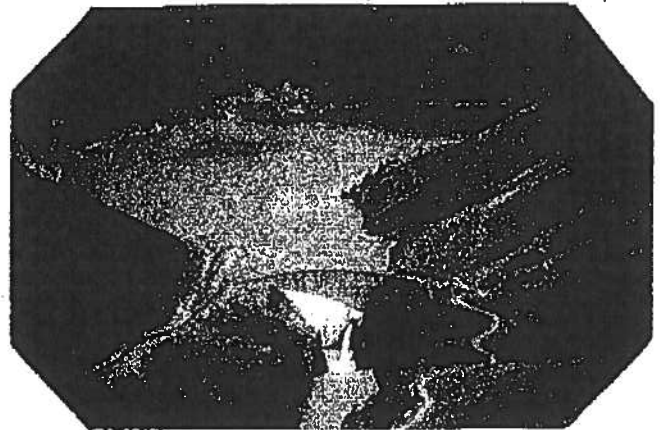


SOUTH BOARD of CONTROL
P O Box 67
Homedale ID 83628

Gem Irrigation District Ridgeview Irrigation District

Phone: 208-337-3760
FAX: 208-337-5107



Owyhee Reservoir

DATE 11/7/13 **Number of Pages** 14
Including Cover Sheet

TO Michael Cusell

COMPANY _____

FAX 287-6700

FROM THE DESK OF _____

COMMENTS _____

If you have received this fax in error, please fax this back to 208-337-5107. This fax is intended only for the person named above. Thank you!!



IDAHO POWER COMPANY
P.O. BOX 70
BOISE, IDAHO 83707

Quentin Nesbitt
Agricultural Engineer PE
(208) 388-2519

January 29, 1996

South Board of Control, Owyhee Project
Gem Pumping Plant
P. O. Box 67
Homedale, ID 83628

4 1997

Gentlemen:

Enclosed you will find the measurements and results from the pump tests conducted October 9, 1996 on your river station. I hope this information will provide you some information that you need to operate and maintain your pumping plant. The first page summarizes the information. The pumps were tested individually, and in various combinations as listed. Also, a separate sheet is enclosed to show the results for each individual pump. The last sheet shows all of the measurements collected.

Based on conversations with Leroy Breshears, some of the data is contradictory with what he is finding when he tears into a pump. This needs to be explored further, but it is certainly possible that the flow measurements were not accurate. Therefore, I would critically look at all of this data before I used it to make decisions on.

If you have any questions concerning these test results please call at 388-2519 and I will discuss them further with you.

A handwritten signature in cursive script that reads "Quentin E. Nesbitt".

Quentin E Nesbitt

enclosures

Gem Pumping Plant

10/9/1996

	Motor		Discharge	Actual	Wire to	Estimated	Potential**
	Nameplate	Flow	Pressure	Load	Water Eff.	Pump Eff.	Savings
<u>Pump #</u>	<u>(hp)</u>	<u>(cfs)</u>	<u>(psi)</u>	<u>(hp)</u>	<u>(%)</u>	<u>(%) ^</u>	<u>(\$)**</u>
A1	1025	57.95	70.5	1,593	71.0%	77.4%	\$2,405
A2	1025	61.46	71.5	1,776	68.5%	74.6%	\$7,379
A3	1025	50.71	69.5	1,368	71.4%	78.9%	\$641
A4	1025	55.27	70.5	1,280	84.4%	77.9%	-\$8,769
A1,A2	2050	110.56	72	3,176	69.4%		
A1,A2,A3	3075	143.97	72	4,372	65.6%		
A1,A2,A3,A4	4100	193.74	73	5,528	70.7%		
B1	700	41.34	43.75	934	55.5%	61.2%	\$12,784
B2	700	56.04	43.8	977	71.9%	79.6%	\$1,155
B3	600	36.75	43.5	836	54.8%	60.4%	\$11,693
B1,B2,B3	2000	107.07	47.5	2,458	58.9%		
C1	330	35.08	25.5	649	42.1%	47.0%	\$14,870
C2	330	51.96	27	626	67.6%	75.4%	\$3,302
C1,C2	660	63.52	28.5	1,124	48.2%		

^ Based on an assumed motor efficiency.

***** These savings are only if all of the data collected is correct which some of the data is highly suspected to be incorrect. Based on operating each pump 2500 hrs in the future. Also based on the ability to make the new pump 82% efficient and the motor 92% efficient. Also based on an average cost, including demand of \$.03/kWh, which may be higher than what you are paying. Assumes that the new design flow and head of the pump would equal the measured number. Anything less than \$3,000 in savings is probably not worth looking at do the potential inaccuracy of the data. The negative \$ 8,769 is not possible and shows the potential error in the data that was collected.

193.74
107.07

PUMP ANALYSIS

Pump #: A 1

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	1025
Rated Volts	2200
Rated Amps	232
RPM	870

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	36.35 sec
kW Metered	1188.6 kW

Pump Panel Input Data

	Average
Line Voltage	2260.0
Amperage	239.0
Power Factor	0.899

kW Measured 841.0 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	57.9 cfs = 26008 gpm
Average Velocity in Pipe	4.61 fps
Discharge Pressure	70.5 psi

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	172.4 ft
Flow	26008 gpm
Water HP	1132.0 WHP
Input HP	1593.3 EHP
Est Motor HP	1485.8 SHP
Wire to Water Efficiency	71.0%

Pump Information

Make	Allis-Chalmers
	Centrifugal
Model #	Size 24 Type HS
Hd/Serial #	5530
Rated Head	180.0 ft
Rated Flow	17000 gpm
Impeller Dia	? in
Rated RPM	865

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 4.00

SHP - Shaft Loss = BHP 1461.8

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	92.0%
Est Isolated Pump Efficiency	77.4%
Percent of Motor Load	143.0%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: A 2

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	1025
Rated Volts	2200
Rated Amps	232
RPM	865

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	32.61 sec
kW Metered	1325.0 kW

Pump Panel Input Data

	Average
Line Voltage	2240.0
Amperage	248.0
Power Factor	0.900

kW Measured 865.9 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	61.46 cfs 27583 gpm
Average Velocity in Pipe	4.89 fps
Discharge Pressure	71.5 psi

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	174.7 ft
Flow	27583 gpm
Water HP	1216.6 WHP
Input HP	1776.1 EHP
Est Motor HP	1634.0 SHP
Wire to Water Efficiency	68.5%

Pump Information

Make	Allis-Chalmers
	Centrifugal
Model #	Size 24 Type HS
Hd/Serial #	5549
Rated Head	180.0 ft
Rated Flow	17000 gpm
Impeller Dia	? in
Rated RPM	865

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 4.00

SHP - Shaft Loss = BHP 1630.0

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	92.0%
Est Isolated Pump Efficiency	74.6%
Percent of Motor Load	159.4%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: A 3

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	1025
Rated Volts	2200
Rated Amps	232
RPM	865

Pump Information

Make	Patterson Pump
	Centrifugal
Model #	Size 30X24 MAC
Hd/Serial #	5549
Rated Head	180.0 ft
Rated Flow	19000 gpm
Impeller Dia	2 in
Rated RPM	865

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	42.33 sec
kW Metered	1020.6 kW

Pump Panel Input Data

	Average
Line Voltage	2240.0
Amperage	208.0
Power Factor	0.882

kW Measured 711.8 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	50.71 cfs 22757 gpm
Average Velocity in Pipe	4.04 fps
Discharge Pressure	70.5 psi

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 4.00

SHP - Shaft Loss = BHP 1254.6

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	172.4 ft
Flow	22757 gpm
Water HP	990.5 WHP
Input HP	1368.0 EHP
Est Motor HP	1258.6 SHP
Wire to Water Efficiency	72.4%

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency 92.0%

Est Isolated Pump Efficiency 78.9%

Percent of Motor Load 122.8%

Motor Shaft OUTPUT is SHP

Pump Shaft INPUT is BHP

Pump Water OUTPUT is WHP

PUMP ANALYSIS

Pump #: A 3

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	1025
Rated Volts	2200
Rated Amps	232
RPM	865

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	42.33 sec
kW Metered	1020.6 kW

Pump Panel Input Data

	Average
Line Voltage	2240.0
Amperage	208.0
Power Factor	0.882
kW Measured	711.8 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	50.71 cfs
Average Velocity in Pipe	4.04 fps
Discharge Pressure	69.5 psi

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	170.0 ft
Flow	22757 gpm
Water HP	977.2 WHP
Input HP	1368.0 EHP
Est Motor HP	1258.6 SHP
Wire to Water Efficiency	71.4%

Pump Information

Make	Patterson Pump
	Centrifugal
Model #	Size 30X24 MAC
Hd/Serial #	5549
Rated Head	180.0 ft
Rated Flow	19000 gpm
Impeller Dia	? in
Rated RPM	865

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~	4.00
SHP - Shaft Loss = BHP	1254.6

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	92.0%
Est Isolated Pump Efficiency	77.9%
Percent of Motor Load	122.8%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: A 4

Motor Information

Make	<u>Westinghouse</u>
Frame #	<u>CCL</u>
Rated HP	<u>1025</u>
Rated Volts	<u>2200</u>
Rated Amps	<u>232</u>
RPM	<u>865</u>

kWh Meter Input Data

Meter #	<u>?</u>
Meter Constant Kh	<u>1.2</u>
PTR/Multiplier	<u>10000</u>
Disc Revolutions	<u>1</u>
Time	<u>45.25</u> sec
kW Metered	<u>954.7</u> kW

Pump Panel Input Data

	<u>Average</u>
Line Voltage	<u>2260.0</u>
Amperage	<u>200.0</u>
Power Factor	<u>0.764</u>

kW Measured 598.1 kW

Measured Flow and Pressure

Measurement Device	<u>USGS Sensor</u>
Pipe Inside Dia	<u>48.0</u> in
Flow Reading	<u>55.27</u> cfs <u>24805</u> gpm
Average Velocity in Pipe	<u>4.40</u> fps
Discharge Pressure	<u>70.5</u> psi

Pump Information

Make	<u>Patterson Pump</u>
	<u>Centrifugal</u>
Model #	<u>Size 30X24 MAC</u>
Hd/Serial #	<u>5549</u>
Rated Head	<u>180.0</u> ft
Rated Flow	<u>19000</u> gpm
Impeller Dia	<u>?</u> in
Rated RPM	<u>865</u>

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 4.00

SHP - Shaft Loss = BHP 1173.4

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

Water Level and Friction Losses

Pumping Lift	<u>9.0</u> ft
Misc Friction Loss	<u>0.5</u> ft

Pumping Plant Conditions

Total Dynamic Head	<u>172.4</u> ft
Flow	<u>24805</u> gpm
Water HP	<u>1079.6</u> WHP
Input HP	<u>1279.8</u> EHP
Est Motor HP	<u>1177.4</u> SHP
Wire to Water Efficiency	<u>84.4%</u> *

COMMENTS

Motor Supply Voltage OK

Motor Current Within Rating

Power Factor Level is ... OK

Est Full-Load Motor Efficiency 92.0%

Est Isolated Pump Efficiency 92.0%

Percent of Motor Load 114.9%

Motor Shaft OUTPUT is SHP

Pump Shaft INPUT is BHP

Pump Water OUTPUT is WHP

*Efficiency is higher than theoretically poss.

PUMP ANALYSIS

Pump #: B 1

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	700
Rated Volts	2200
Rated Amps	160
RPM	700

Pump Information

Make	Patterson Pump
	Centrifugal
Model #	Size 30X24 MAD
Hd/Serial #	A24-17842
Rated Head	110.0 ft
Rated Flow	19700 gpm
Impeller Dia	2 in
Rated RPM	700

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	62.01 sec
kW Metered	696.7 kW

Pump Panel Input Data

	Average
Line Voltage	2255.0
Amperage	139.0
Power Factor	0.880

kW Measured 477.7 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	41.34 cfs
	18553 gpm
Average Velocity in Pipe	3.29 fps
Discharge Pressure	43.8 psi

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 3.00

SHP - Shaft Loss = BHP 846.9

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Pumping Plant Conditions

Total Dynamic Head	110.6 ft
Flow	18553 gpm
Water HP	518.0 WHP
Input HP	933.9 EHP
Est Motor HP	849.9 SHP
Wire to Water Efficiency	55.5%

Est Full-Load Motor Efficiency	91.0%
Est Isolated Pump Efficiency	61.2%
Percent of Motor Load	121.4%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: B 2

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	700
Rated Volts	2200
Rated Amps	160
RPM	700

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	59.47 sec
kW Metered	726.4 kW

Pump Panel Input Data

	Average
Line Voltage	2275.0
Amperage	142.0
Power Factor	0.840

kW Measured 470.0 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	56.04 cfs 25150 gpm
Average Velocity In Pipe	4.46 fps
Discharge Pressure	43.8 psi

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	110.7 ft
Flow	25150 gpm
Water HP	702.9 WHP
Input HP	973.7 EHP
Est Motor HP	886.1 SHP
Wire to Water Efficiency	72.2%

Pump Information

Make	Patterson Pump
	Centrifugal
Model #	Size 30X24 MAD
Hd/Serial #	A2417842
Rated Head	110.0 ft
Rated Flow	19700 gpm
Impeller Dia	? in
Rated RPM	700

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~	3.00
SHP - Shaft Loss = BHP	883.1

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	91.0%
Est Isolated Pump Efficiency	79.6%
Percent of Motor Load	126.6%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: B 3

Motor Information

Make	Westinghouse
Frame #	1234C1--CSP
Rated HP	600
Rated Volts	2200
Rated Amps	150
RPM	900

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	69.26 sec
kW Metered	623.7 kW

Pump Panel Input Data

	Average
Line Voltage	2250.0
Amperage	133.0
Power Factor	0.780

kW Measured 404.3 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	36.75 cfs 16493 gpm
Average Velocity in Pipe	2.92 fps
Discharge Pressure	43.5 psi

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	110.0 ft
Flow	16493 gpm
Water HP	458.1 WHP
Input HP	836.1 EHP
Est Motor HP	760.9 SHP
Wire to Water Efficiency	54.8%

Pump Information

Make	Allis-Chalmers
	Centrifugal
Model #	Size 20 Type S
Hd/Serial #	2144
Rated Head	120.0 ft
Rated Flow	13500 gpm
Impeller Dia	? in
Rated RPM	885

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~	3.00
SHP - Shaft Loss = BHP	757.9

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	91.0%
Est Isolated Pump Efficiency	60.4%
Percent of Motor Load	126.8%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: C 1

Motor Information

Make	<u>Westinghouse</u>
Frame #	<u>CCL</u>
Rated HP	<u>330</u>
Rated Volts	<u>2200</u>
Rated Amps	<u>83</u>
RPM	<u>495</u>

Pump Information

Make	<u>Worthington</u>
	<u>Centrifugal</u>
Model #	<u>Size 20</u>
Hd/Serial #	<u>506554</u>
Rated Head	<u>70.0</u> ft
Rated Flow	<u>?</u> gpm
Impeller Dia	<u>?</u> in
Rated RPM	<u>?</u>

kWh Meter Input Data

Meter #	<u>?</u>
Meter Constant Kh	<u>1.2</u>
PTR/Multiplier	<u>10000</u>
Disc Revolutions	<u>1</u>
Time	<u>89.28</u> sec
kW Metered	<u>483.9</u> kW

Pump Panel Input Data

	<u>Average</u>
Line Voltage	<u>2240.0</u>
Amperage	<u>97.0</u>
Power Factor	<u>0.795</u>

kW Measured 299.2 kW

Measured Flow and Pressure

Measurement Device	<u>USGS Sensor</u>
Pipe Inside Dia	<u>48.0</u> in
Flow Reading	<u>35.24</u> cfs <u>15817</u> gpm
Average Velocity in Pipe	<u>2.80</u> fps
Discharge Pressure	<u>25.5</u> psi

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 2.00

SHP - Shaft Loss = BHP 581.8

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

Water Level and Friction Losses

Pumping Lift	<u>9.0</u> ft
Misc Friction Loss	<u>0.5</u> ft

Pumping Plant Conditions

Total Dynamic Head	<u>68.4</u> ft
Flow	<u>15817</u> gpm
Water HP	<u>273.2</u> WHP
Input HP	<u>648.7</u> EHP
Est Motor HP	<u>583.8</u> SHP
Wire to Water Efficiency	<u>42.1%</u>

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	<u>90.0%</u>
Est Isolated Pump Efficiency	<u>47.0%</u>
Percent of Motor Load	<u>176.9%</u>
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	

PUMP ANALYSIS

Pump #: C 2

Motor Information

Make	Westinghouse
Frame #	CCL
Rated HP	330
Rated Volts	2200
Rated Amps	83
RPM	495

kWh Meter Input Data

Meter #	?
Meter Constant Kh	1.2
PTR/Multiplier	10000
Disc Revolutions	1
Time	92.47 sec
kW Metered	467.2 kW

Pump Panel Input Data

	Average
Line Voltage	2328.0
Amperage	96.0
Power Factor	0.795

kW Measured 307.7 kW

Measured Flow and Pressure

Measurement Device	USGS Sensor
Pipe Inside Dia	48.0 in
Flow Reading	51.96 cfs 23321 gpm
Average Velocity in Pipe	4.14 fps
Discharge Pressure	27.0 psi

Water Level and Friction Losses

Pumping Lift	9.0 ft
Misc Friction Loss	0.5 ft

Pumping Plant Conditions

Total Dynamic Head	71.9 ft
Flow	23321 gpm
Water HP	423.3 WHP
Input HP	626.2 EHP
Est Motor HP	563.6 SHP
Wire to Water Efficiency	67.6%

Pump Information

Make	Worthington
	Centrifugal
Model #	Size 20
Hd/Serial #	506553
Rated Head	70.0 ft
Rated Flow	? gpm
Impeller Dia	? in
Rated RPM	?

Miscellaneous

Meter kW does not = Panel kW ???^

Est Total Shaft HP Loss~ 2.00

SHP - Shaft Loss = BHP 561.6

^kWh Meter used for EHP measurement.

~Estimated from manufacturer's specs.????

COMMENTS

Motor Supply Voltage OK
 Motor Current Within Rating
 Power Factor Level is ... OK

Est Full-Load Motor Efficiency	90.0%
Est Isolated Pump Efficiency	75.4%
Percent of Motor Load	170.8%
Motor Shaft OUTPUT is SHP	
Pump Shaft INPUT is BHP	
Pump Water OUTPUT is WHP	