Introduction

Program Overview

The Agricultural Energy Management Services Program is a program that offers SDG&E customer's & water pumping cost analysis at no charge to the customer. The test includes a detailed analysis of the currant operating conditions of the pump, including overall plant efficiency. For those pump where the test yield an overall plant efficiency below industry standard, an estimated of the pump's operating conditions at the industry standard is provided to the customer. The Industry standard is a plant efficiency minimum that has been agreed to by the California Public Utilities Commission (CPUC). The customer receives a report from the pump test contractor that includes the currant pump operating conditions and an estimate of the current energy use of the pump. If the pump is operating below industry standards, the report contains recommendations of action that could be taken to improve efficiency as well an estimate of the potential annual bill savings if these adjustments/repairs are made.

The program contractor who performs the testing work, tests roughly 400 pumps per years. Of those 400 pumps, generally half (200) pump fall below industry standard and recommendations for improvements are made in the report that is given to the customer. In 1993, the Agricultural Energy Management Services Program accounts for proximally 3% of SDG&E total annual energy conservation effort.

Objective of Report

The main objective of the study is to estimate four load impact parameters for the 1992-1993 program years. The first is the implementation rate. This is the percentage of the program potential kWh savings that may occur due to the patricians implementing changes to the pumps to make the overall pump efficiency increase. This is obtained by determining, of the pumps that were operating below industry standards and recommendations were made for improvement, how often action was actually undertaken to improve the pump's plant efficiency.

The second parameter of interest is the realization rate. This is estimated based on the comparison of the pump retest data and the original pump test data. A sample of participants who have implemented some (or all) of the recommendations made to them had their pumps retested to determine the improved efficiency of the pump. The realization rate can be interpreted as follows: of those customers who took action to implement repairs to their pumps, the realization rate is the percentage of measured saving to potential savings. The measured savings were arrived by comparing the pump's usage at the "improved" efficiency level after repairs were made (date from the pump retest) to the pump's usage at the efficiency at the time of the original pump test. The potential savings which were extracted from the original pump tests were calculated by comparing the actual pump's usage to the pump's estimated usage if the pump's efficiencies were at the industrial standard.

The Third parameter, the net-to-gross ratio, is a projection of the kWh savings that can be credited to the program after taking into account the kWh savings that would have occurred in the absence of the program.

The fourth parameter is the customer cost associated with implementing the recommendation from the pump test. Participants were asked how much they spent on repairs t their pump.

Summary Results

The results of a phone survey conducted on 1992-1993 program participants indicate an implementation rate of 33% and a net-to-gross factor of 64%. Of these customers who did have work performed on their pumps, they realized 87% of the potential savings that were indicated by the pump test contractor (industry standard level). Multiplying the implementation rate and the realization rate results in an overall gross realization rate of 29%. The over net realization rate is 18%. The program participants typically spend between $1,000 and $4,000 for repairs/enhancements. Among the respondents to the telephone survey, pump usage was distributed evenly between irrigation (agriculture, golf courses) and water supply.

Data Analysis and Results

Implementation Rate

One objective of the study was to estimate the percentage of pumps that had repairs/enhancements performed to bring pumps that were operating below industry standard at the time of the test, up to or above the industry efficiency standard. A telephone survey was administered to customers who has pumps tested in the between 1992-1993. There were 83 customers with 389 pumps where recommendations were made to improve pump efficiency. Although a census of customers was attempted, some customers could not be contacted and others did not respond to the phone survey.

Survey Composition		
	Number of Customers	Number of Pumps
Total Attempted	83	389
Actual Reponses used	66	166

In addition, for customer with a large number of pumps (ten or more) that were tested in 1992 or 1993, the highest consumption pumps representing 50% of the customer's total potential savings or ten pumps, whichever was greater, were included in the survey. The result was 66 customers representing 166 pumps who responded to the questions in the survey used to calculate the implementation rate.

Of the 166 pumps in the survey, 55 pumps had work performed on them to improve the pump efficiency. This yields an implementation rate of 33%.

The third parameter, the net-to-gross ratio, is a proportion of the kWh savings that can be credited to the program after taking into account the kWh savings that would have occurred in the absence of the program.

The Fourth parameter is the customer cost associated with implementing the recommendations from the pump test. Participants were asked how much they spent on repairs to their pumps.

Summary of Results

The results of a phone survey conducted on 1992-1993 program participants indicates an implementation rate of 33% and a net-to-gross factor of 64%. Of those customers who did have work performed on their pumps they realized 87% of the potential savings that was estimated by the pump test contractor (Industry standard level). Multiplying the implementation rate and the realization rate results in an overall gross realization rate of 29%. The overall net realization rate is 18%. The program participants typically spent between $1,000 and $4,000 for repairs/enhancements. Among the respondents to the telephone survey, pump usage was distributed evenly between irrigation (agriculture, golf courses) and water supply.

KILOWATT HOUR REPORTING

Total kWh's recommended x 33% = Implementation rate

Implementation rate (33%) x realization rate (87%) = Gross Realization rate

Gross realization rate (29%) x net to gross factor (64%) = Net realization rate (18%)

BOTTOM LINE:

- **29% of kWh recommendations are realized.**
- **64% of that 29% is attributed to the pump test program. The rest is considered to be free readership.**
- **18% of all kWh recommendations are credited toward the kWh reduction goal.**

Introduction

Program Overview

The Agricultural Energy Management Services Program is a program that offers SDG&E customers a water pumping cost analysis at no charge to the customer. The test includes a detailed analysis of the current operating conditions of the pump, including overall plant efficiency. For those pumps where the test yields an overall plant efficiency below industry standard, an estimate of the pump's operating conditions at the industry standard is provided to the customer. The industry standard is a plant efficiency minimum that has been agreed to by the California Public Utilities Commission (CPUC). The customer receives a report from the pump test contractor that includes the current pump operating conditions and an estimate of the current energy use of the pump. If the pump is operating below industry standards, the report contains recommendations of actions that could be taken to improve efficiency as well as an estimate of the potential annual bill savings if these adjustments/repairs are made.

The program contractor who performs the testing work tests roughly 400 pumps per year. Of those 400 pumps, generally half (200) pumps fall below industry standard and recommendations for improvement are made in the report that is given to the customer. In 1992, the Agricultural Energy Management Services Program accounts for approximately 3% of SDG&E's total annual energy conservation effort.

Objectives of Report

The main objective of the study is to estimate four load impact parameters for the 1992-1993 program years. The first is the implementation rate. This is the percentage of the total program potential kWh savings that may occur due to the participants implementing changes to their pumps to make the overall pump efficiency increase. This is obtained by determining, of the pumps that were operating below industry standard and recommendations were made for improvement, how often action was actually undertaken to improve the pump's plant efficiency.

The second parameter of interest is the realization rate. This is estimated based on the comparison of the pump retest data and the original pump test data. A sample of participants who have implemented some (or all) of the recommendations made to them had their pumps retested to determine the improved efficiency of the pump. The realization rate can be interpreted as follows: of those customers who took action to implement repairs to their pumps, the realization rate is the percentage of measured savings to potential savings. The measured savings were derived by comparing the pump's usage at the "improved" efficiency level after repairs were made (data from the pump retest) to the pump's usage at the efficiency at the time of the original pump test. The potential savings, which were extracted from the original pump tests, were calculated by comparing the actual pump's usage to the pump's estimated usage if the pump's efficiencies were at the industry standard.

The third parameter, the net-to-gross ratio, is a proportion of the kWh savings that can be credited to the program after taking into account the kWh savings that would have occurred in the absence of the program.

The fourth parameter is the customer cost associated with implementing the recommendations from the pump test. Participants were asked how much they spent on repairs to their pumps.

Summary of Results

The results of a phone survey conducted on 1992-1993 program participants indicate an implementation rate of 33% and a net-to-gross factor of 64%. Of those customers who did have work performed on their pumps they realized 87% of the potential savings that was estimated by the pump test contractor (industry standard level). Multiplying the implementation rate and the realization rate results in an overall gross realization rate of 29%. The overall net realization rate is 18%. The program participants typically spent between $1,000 and $4,000 for repairs/enhancements. Among the respondents to the telephone survey, pump usage was distributed evenly between irrigation (agriculture, golf courses) and water supply.

Data Analysis and Results

Implamantation Rate

One objective of the study was to estimate the percentage of pumps that had repairs/enhancements performed to bring pumps that were operating below industry standard at the time of the test up to or above the industry efficiency standard. A telephone survey was administered to customers who had pumps tested in the between 1992-1993.[1] There were 83 customers with 389 pumps where recommendations were made to improve pump efficiency. Although a census of customers was attempted, some customers could not be contacted and others did not respond to the phone survey. In addition, for customers with a large number of pumps (ten or more) that were tested in 1992 or 1993, the highest consumption pumps representing 50% of the customer's total potential savings or ten pumps, whichever was greater, were included in the survey. The result was 66 customers representing 166 pumps who responded to the questions in the survey used to calculate the implementation rate.

Survey Composition		
	Number of Customers	Number of Pumps
Total attempted	83	389
Actual responses used	66	166

Of the 166 pumps in the survey, 55 pumps had work performed on them to improve the pump efficiency. This yields an implementation rate of 33%.

[1] A copy of the survey instrument is included as an attachment.

The third parameter, the net-to-gross ratio, is a proportion of the kWh savings that can be credited to the program after taking into account the kWh savings that would have occurred in the absence of the program.

The fourth parameter is the customer cost associated with implementing the recommendations from the pump test. Participants were asked how much they spent on repairs to their pumps.

Summary of Results

The results of a phone survey conducted on 1992-1993 program participants indicate an implementation rate of 33% and a net-to-gross factor of 64%. Of those customers who did have work performed on their pumps they realized 87% of the potential savings that was estimated by the pump test contractor (industry standard level). Multiplying the implementation rate and the realization rate results in an overall gross realization rate of 29%. The overall net realization rate is 18%. The program participants typically spent between $1,000 and $4,000 for repairs/enhancements. Among the respondents to the telephone survey, pump usage was distributed evenly between irrigation (agriculture, golf courses) and water supply.

KILOWATT HOUR REPORTING

Total KWh's recommended x 33% = implementation rate

Implementation rate (33%) x realization rate (87%) = Gross realization rate

Gross realization rate (29%) x net to gross factor (64%) = net realization rate (18%)

BOTTOM LINE:

- 29% of KWh recommendations are realized.
- 64% of that 29% is attributed to the pump test program. The rest is considered to be free ridership.
- 18% of all KWh recommendations are credited toward the KWh reduction goal.

PJTEST3

SOUTHERN CALIFORNIA EDISON COMPANY
PUMPTEST System - Master File & C09 Extract
1994 Pump Tests
Statistics on Numeric Variables, All Regions

13:30 Tuesday, March 21, 1995

Variable	Label	N	Miss	Minimum	Maximum	Sum	Mean
OVERALL1	Overall Plant Efficiency 1	4034	157	0	151	227114	56
IMPREFF	Improved Pump Efficiency	2698	1493	0	76	178401	66
KWINPUT1	KW Input #1	4184	9	1	1845	291927	70
KWH_YR	Annual kWh Usage	3917	274	0	34849996	1910187752	487694
PUMP_KWH	Annual Pump kWh	3797	294	0	3331648	765070056	195720
DIF_KWH	Savings in Total kWh	2611	1582	0	939577	79798948	30563
DIF_KW	Savings in KW Input	2644	1549	0	140	30687	12
DIF_COST	Savings in Total Annual Cost	2631	1562	0	219293	8179741	3109

S.D.G+E. Gross Realization Rate of 29% X Kilowatt Savings Total of 79,798,948 = 23,141,695 KWH.

SOUTHERN CALIFORNIA EDISON COMPANY
PUMPTEST System - Master File & COS Extract
1994 Pump Tests
Count of Tests by District, All Regions

District Number

DISTNO	Frequency	Percent	Cumulative Frequency	Cumulative Percent
22	93	2.2	93	2.2
26	193	4.6	286	6.8
27	173	4.1	459	11.0
29	53	1.3	512	12.2
30	165	3.7	677	15.9
31	321	7.7	998	23.6
32	18	0.4	1016	24.0
33	19	0.5	1035	24.5
34	349	8.3	1384	32.8
35	113	2.7	1497	35.5
36	96	2.3	1593	37.8
39	259	6.2	1852	44.0
40	21	0.5	1873	44.5
43	23	0.5	1896	45.0
44	15	0.4	1911	45.4
46	32	0.8	1943	46.2
47	42	1.0	1985	47.2
48	44	1.1	2029	48.2
49	8	0.2	2037	48.4
51	1286	30.7	3323	79.1
53	9	0.2	3332	79.2
59	93	2.2	3425	81.4
73	203	4.8	3628	86.2
77	262	6.3	3890	92.5
79	241	5.7	4131	98.2
84	8	0.2	4139	98.4
85	14	0.3	4153	98.7
86	12	0.3	4165	99.0
87	8	0.2	4173	99.2
99	12	0.3	4185	99.5

Frequency Missing = 3

ATTACHMENT IV

Pump Test Program

	1992	1991	1990	1989	1988	1987	1986	Total	Averages
# Pumps Tested	2,560	2,282	2,185	2,280	2,260	1,920	1,927	15,430	2,204
Annual kW Usage	140,032	103,812	104,218	109,896	103,421	98,207	82,476	740,062	105,723
Reported kW Reduced	4,630	4,337	3,608	2,910	3,163	3,230	2,709	24,592	3,513
% of total kW	0.033	0.042	0.035	0.026	0.031	0.034	0.033	0.033	0.033
Average kW per test	1.81	1.90	1.65	1.28	1.39	1.68	1.41	1.59	1.59
Average kW input per pump	54.70	45.49	47.70	48.20	45.60	49.90	42.80	47.90	47.95

HYDRAULIC TEST AND INDUSTRIAL TEST ACTIVITIES FOR THE NORTHERN DIVISION
DURING 1991 PLUS VARIOUS YEAR-END TOTALS AND COMPARISONS WITH THE PREVIOUS FIVE YEARS
(O.T. Tests are Excluded)

	1992 / 2568 / 360	ACTUAL 1991	ACTUAL 1990	ACTUAL 1989	ACTUAL 1988	ACTUAL 1987	ACTUAL 1986
Total Pumps Tested		2,282	2,185	2,280	2,268	1,928	1,927
Total Annual KWHs Tested by Pumps Tested	37,160,360	230,034,728	221,724,976	249,401,537	219,372,174	201,764,224	151,640,000
Total Annual KW Input Used by Pumps Tested	140,032	103,812	104,218	109,896	103,421	96,207	82,476
Total KWHs Reduced	12,200,640	10,971,372	9,964,476	9,404,028	9,456,264	10,865,436	9,533,364
Total KW Reduced/Shifted	4636	4,337	3,608	2,910	3,163	3,230	2,708
KWHs Reduced as a % of Total KWHs	5.1%	4.8%	4.5%	3.8%	4.3%	5.4%	6.3%
KW Reduced as a % of Total KW Input	3.3%	4.2%	3.5%	2.6%	3.1%	3.4%	3.3%
Average KWHs Reduced Per Test	4766	4,808	4,560	4,125	4,169	5,635	4,947
Average KW Reduced Per Test	1.8	1.9	1.7	1.3	1.4	1.7	1.4
Average Annual KWH Consumption Per Pump Test	92.89	100,804	101,476	109,390	96,737	104,650	78,692
Average KW Input Per Pump Tested	54.7	48.7	47.7	48.2	45.6	49.9	42.8
Number of Testmen in Field Testing Pumps	6.9	5.3	5.4	5.4	5.4	5	5
F.T.E. Number of Testmen Acting as ESR	1.6	.7	.6	.6	.6	1	1

Test Recap

Pre-O.P.E.	Recommended O.P.E.	Post O.P.E.	% Achieved	Pre-G.P.M.	Post G.P.M.
53.5	63	67.9	107.8	456	723
25.1	51	40.3	79	109	236
53.8	70	60.5	86.4	651	1199
36.8	63	49.1	77.9	505	697
31.8	60	50.2	83.7	195	517
65	70	72	103	1818	1840
55.1	66	57.4	87	716	695
49.2	68	60.6	89.1	876	1037
55.3	68	62.2	91.5	695	841
42.5	64	64.4	100.6	644	1426
53.9	63	67.1	106.5	501	789
42.9	63	63.7	101.1	476	887
25.8	66	59.7	90.5	668	1327
53.9	68	70.5	103.7	817	1395
35.9	60	53	88.3	366	444
35.7	58	53.4	92.1	280	491
55.3	70	70	100	958	1940
64.1	70	68.7	98.1	1104	1157
5.7	70	62.4	88.6	79	719
27.4	55	41	74.5	141	215
31.7	70	53.3	76.1	518	834
50	70	62.7	89.6	518	834
67.1	70	81.9	117	826	1028
48.7	70	63.8	91.1	1032	1170

Totals = 24 Pumps

Average Obtained: 92.6% of Recommended

Increase in G.P.M.: = 7492
= 50.1% Increase

Theoretically Running Hours Could Be Reduced -- Thus Saving Additional Kwh's

Test Recap

Pre-O.P.E.	Recommended O.P.E.	Post O.P.E.	% Achieved
53.5	63	67.9	107.8
25.1	51	40.3	79
53.8	70	60.5	86.4
36.8	63	49.1	77.9
31.8	60	50.2	83.7
65	70	72	103
55.1	66	57.4	87
49.2	68	60.6	89.1
55.3	68	62.2	91.5
42.5	64	64.4	100.6
53.9	63	67.1	106.5
42.9	63	63.7	101.1
25.8	66	59.7	90.5
53.9	68	70.5	103.7
35.9	60	53	88.3
35.7	58	53.4	92.1
55.3	70	70	100
64.1	70	68.7	98.1
5.7	70	62.4	88.6
27.4	55	41	74.5
31.7	70	53.3	76.1
50	70	62.7	89.6
67.1	70	81.9	117
48.7	70	63.8	91.1

Totals = 24 Pumps

Average Obtained: 92.6% of Recommended

TEST RE-CAP

Pre-O.P.E.	Recommended O.P.E.	Post O.P.E.	% Achieved	Pre-G.P.M.	Post G.P.M.
65.8	72.0	72.3	100.4	2071.0	2422.0
55.7	72.0	72.1	100.1	3025.0	2813.0
62.6	72.0	72.0	100.0	1225.0	2897.0
52.4	65.0	61.1	93.8	355.0	1011.0
49.0	72.0	72.8	101.1	1817.0	1890.0
49.8	60.0	61.7	102.8	407.0	481.0
59.7	72.0	75.8	105.3	3438.0	3544.0
64.8	72.0	71.5	99.3	3842.0	4852.0
64.2	72.0	73.0	101.4	4180.0	4208.0
65.5	72.0	73.5	102.1	3346.0	3063.0
66.4	72.0	74.4	103.3	3146.0	3048.0
63.3	72.0	69.7	96.8	3032.0	2081.0
64.7	70.0	70.8	101.1	1069.0	1180.0
63.6	70.0	65.3	93.3	1001.0	1054.0
55.6	67.0	64.6	96.4	483.0	504.0
58.7	67.0	64.7	96.6	533.0	537.0
54.0	72.0	65.6	91.1	1395.0	1564.0
54.2	72.0	64.0	88.9	1777.0	1798.0

Total pumps: 18

Average obtained: 98.5% of Recommended

Increase in G.P.M.: 2805

% Increase: 7.8

Theoretical running hours could be reduced -- thus saving additional KWH's

TEST RE-CAP

Pre-O.P.E.	Recommanded O.P.E.	Post O.P.E.	% Achieved
65.8	72.0	72.3	100.4
55.7	72.0	72.1	100.1
62.6	72.0	72.0	100.0
52.4	65.0	61.1	93.8
49.0	72.0	72.8	101.1
49.8	60.0	61.7	102.8
59.7	72.0	75.8	105.3
64.8	72.0	71.5	99.3
64.2	72.0	73.0	101.4
65.5	72.0	73.5	102.1
66.4	72.0	74.4	103.3
63.3	72.0	69.7	96.8
64.7	70.0	70.8	101.1
63.6	70.0	65.3	93.3
55.6	67.0	64.6	96.4
58.7	67.0	64.7	96.6
54.0	72.0	65.6	91.1
54.2	72.0	64.0	88.9

Total pumps: 18

Average obtained: 98.5% of Recommended