RESPONSE TO QUANTEC'S COMMENTS
ON THE DIVISION'S COMMENTS

Item 1 Response

Quantec:
PacifiCorp did not request that Quantec conduct the study, it was the DPU that requested that the Company "provide a study that establishes a comparison group as a way to properly attribute any benefits that accrue before making a final determination on the success or lack of success of the program. Therefore, the Division believes that the program should continue for another three years and include an evaluation program provided by Quantec." (Year 3 Annual Report, page 4)

Division
The Division agrees with Quantec that it was the Division who requested in its Year 3 HELP evaluation report to the Commission that Quantec "provide a study that establishes a comparison group as a way to properly attribute any benefits that accrue before making any final determination of the success or lack of success of the program."[1] This suggestion has been incorporated into the Division's report.

Item 2 Response

Quantec:
The Division finds our findings "less than compelling" because our analysis "fails to satisfactorily isolate HELP impact from other relevant economic variables." I am not entirely sure why the Division reached such a conclusion. An argument is made later in the memo that we failed to isolate the impact of HELP from HEAT, but nowhere is an explanation given as to why the Division felt that our quasi experimental design failed to isolate the impacts from other relevant economic variables. We believe that our analysis did isolate the impact of HELP from these factors.

Division:
Quantec questions that it did not satisfactorily isolate the effects of HELP from those of HEAT for most, if not all, of their tests, (i.e. energy consumption, arrears, shutoffs, mobility, and collections). Except for the arrears test, the tests Quantec made were simple z-tests of the differences between the means of the various items.[2] In their quasi-experimental design Quantec, in essence, subtracted the comparison group from the participant group with the remainder being the effects of HELP. That is, the participant and comparison groups were composed of people whose circumstances were made up of a number of variables such as family size, age of the head of the household, household

[1] See Page 2 of the Division's Year 3 HELP evaluation report.
[2] Actually the z-statistic is the difference between the mean change in the value of a measure from the pre- to post-period for the participant group and the mean change in the value of the same measure from pre- and post-period for the comparison group divided by the standard error of the difference between the two mean changes.

income from all sources, type of housing, age of housing, number of wage earners, and etc. For simplicity we'll refer to all of these variables as "economic variables." Quantec's study assumes that, on average, the economic variables for the participant group are sufficiently similar to these variables in the comparison group. This assumption is critical. This assumption will be discussed further under Item 6 below.

Quantec sets up the quasi-experimental study groups by choosing participants for whom they have two consecutive years of data. In first year, the "pre-period," the participants have not yet signed up for HELP, then in the second year, the "post-period," they sign up for and receive the HELP credit which is typically $8 per month or $96 per year. These participants were matched with a comparison group selected from those customers who signed up for, and received, HELP at the end of the second year. The pre- and post-periods for the comparison group is the same as those of the participant group.

With this set-up Quantec performs their analysis on the various measures Quantec includes in their report. Table A1.1 below summarizes the possible situations for each group. Based on the design, the participant group in the pre-period is expected to be represented by Line "a." in Table A1.1. That is, in the pre-period the members of the participant group are receiving neither HELP nor HEAT. This is because typically program participants initially apply for HEAT and in the process of applying for HEAT may also apply for HELP. Thus it would seem to be a reasonable assumption that if someone is not receiving HELP, they aren't receiving HEAT and vice versa. In the post-period, by definition the participant group members are receiving HELP, so one would expect that they are also receiving HEAT. This is represented by Line "b" in Table A1.1.

TABLE A1.1

		HELP	No HELP	HEAT	No HEAT
a.	Participant Group, Pre-Period		√		√
b.	Participant Group, Post-Period	√		√	
c.	Participant Group, Pre-Period		√	√	
d.	Participant Group, Post-Period	√			√
e.	Comparison Group, Pre-Period		√		√
f.	Comparison Group, Post-Period		√		√
g.	Comparison Group, Pre-Period		√	√	
h.	Comparison Group, Post-Period		√	√	

By definition the comparison group does not receive HELP in either the pre- or post-periods. Quantec's design works to isolate HELP from HEAT in the following situations: Referring to Table A1.1, if Line "a" is the participant pre-period situation and Line "b" is the participant post-period situation, the difference between participant pre- and post-

periods will include both HELP and HEAT.[3] If simultaneously the comparison group's pre- and post-periods are represented by Lines "e" and "h" then their difference would be HEAT.[4] Then subtracting the comparison group (= HEAT) from the participant group (= HELP + HEAT) should leave you with HELP, which is the desired result. Similarly participant Lines "b" minus "c" or "d" minus "a" will give HELP. Comparison group Lines "f" minus "e" or Lines "h" minus "g" will result in no HELP and no HEAT, so that subtracting this from the participant group result will also give you HELP, again the desired result. However, if the participant group is represented by Lines "a" and "b" together with comparison group Lines "g" and "h" or "e" and "f," then the result is HELP + HEAT, which is not the desired result since HELP is left combined with HEAT.

The question becomes whether Quantec's experiment analyzes the earlier pairings (e.g. "a" and "b" versus "e" and "h") or the latter pairings (e.g. "a" and "b" versus "e" and "f"). To examine this question we need to digress to a discussion of how the HEAT program works and compare it to the HELP program.

When people apply for assistance under the HEAT, they provide information to determine their eligibility for the program. If they do qualify for HEAT, they automatically qualify for HELP. To apply for HELP all they have to do is indicate they want HELP in a check box on the HEAT application form. The HEAT monies can be used to assist recipients with payments for their natural gas utility bills or their electric utility bills, or some combination of the two. The recipients choose what proportion of the HEAT money they want to go for electricity and what proportion for natural gas. With HELP all of the credit is applied towards electricity.

In order to analyze the HELP program the analyst must be aware that HELP and HEAT go together, and that some or all of HEAT could be directed to natural gas.[5] If only information on electric usage is available, then the analyst may have situations where HELP participants are receiving no HEAT or HEAT[6] participants who, for whatever reason, have elected to not receive HELP.

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[3] Mathematically: (part. post minus part. pre) = (HELP + HEAT + Econ – No HELP – No HEAT - Econ) = HELP + HEAT.

[4] Mathematically: (comp. post minus comp. pre) = (No HELP + HEAT + Econ – No HELP – No HEAT - Econ) = HEAT.

[5] The Division has received no indication that Quantec has verified that they have no data on the natural gas portion of the HEAT benefits. Cf. "Utah HELP: Program Evaluation," Quantec, January 27, 2005, Table II.1: Impact Evaluation Data.

[6] If a HELP participant has elected to spend part, or the entire HEAT amount on natural gas, then the impact of HELP relative to HEAT could be overstated if the natural gas portion of HEAT is not also considered. The Division believes that an improvement to the design would be to analyze the total HEAT amounts, i.e. both the natural gas and electric portions, along with the natural gas bills, in order to understand how much of the recipients' own funds are being freed up to pay down arrearages or for some other beneficial use.

Quantec indicates that in the data they collected, "nearly 15% of the HELP recipients did not receive HEAT dollars."[7] Quantec also "found that nearly13% [of the comparison group] had received HEAT dollars, but were not recruited into HELP."[8]

Referring back to Table A1.1 it appears that in Quantec's participant group, approximately 85 percent of the participants are represented by Line "b" and 15 percent by Line "d" for the post-period. For the pre-period it appears, at first blush, that all of the participant group members are represented by Line "a" and none by Line "c." However the situation may not be so clear-cut. Since HELP recipients may direct all of their HEAT money to natural gas, there may be participants who received HEAT but not HELP during the pre-period and subsequently added HELP in the post-period. Thus the participant group in the pre-period may also be represented by Line "c." In other words, every participant possibility on Table A1.1 is represented in the data. Likewise it appears that comparison group Lines "e" through "h" are also represented in the data. The Division and Quantec discussed this issue and Quantec agreed that, with the exception of their arrears analysis, the other measures have HEAT combined with HELP and agreed that it is proper to exclude them from the benefit/cost analysis.

Following the above mentioned discussion the Division had with Quantec, there remains disagreement between the Division and Quantec regarding the efficacy of the regression analysis on the arrears measure. The Division remains concerned that the analysis reflects the combination of HELP and HEAT and possibly other relevant, but omitted variables. Quantec believes that their analysis satisfactorily separates HELP from HEAT and any other possible relevant variables. Both the Division and Quantec have technical arguments and can cite data to support their positions. Some of the technical issues are discussed below under the response to Items 4 and 5.

The Division has requested that Quantec supply the raw data for our review along with the steps they took in their regression analysis. The Division will examine the data to see whether it further supports our position or if further support to Quantec's position can be determined.

Item 3 Response

Quantec:
The Division states that the analysis did not provide any evidence of the changes in any of the performance measures. Again, we are at a loss. We do not feel that the change in arrears (at minimum) is questionable. The evidence was statistically sound that the program did have an impact on arrears accumulation. Later in the memo (page 10), the Division states that where we failed was primarily in the energy consumption, shutoffs, mobility and collections. While numerous, they are small in impacts. An extreme position maybe that the program has had no impact at all on these indicators. If removed from the analysis for lack of evidence (as suggested by the memo), the benefit cost ratios of the various tests will be: 0.80 for the HELP Only, 1.03 for the HEAT&HELP. Under these

[7] "Utah HELP: Program Evaluation," Quantec, January 27, 2005, p. 26.
[8] Ibid., p. 26.

conditions, there is no distinction between the Ratepayers and the Societal tests. However, lack of evidence does not mean that the impact is zero. Our studies for other programs have revealed evidence for impacts in these performance indicators. For HELP, we estimated the benefits of reduction in notices and mobility from a societal perspective to be $2,230,246. What is needed to make the HELP only option cost-effective is only $950,384 (over three period of the evaluation). In other words, if only 43% of our estimate turned to be accurate, the program is rendered cost effective. Put another way, we could be off by 57% and still have a cost effective program. If anything, we feel that our societal estimates of the cost of mobility are very conservative. Furthermore, our model does not take into account many other societal benefits (e.g., reduced homelessness, improved health, and decreased stress) for lack on monetized values.

Division:
The Division does not fully understand the distinction between Quantec's comments for Items 2 and 3. However we believe that our discussion of Items 2, 4, and 5 should shed light on the issues raised in Item 3. Except for one comment here, the mobility issue, to the extent it was not dealt with in Item 2 above, will be discussed further in Item 6.

A comment on the mobility measure that appears best placed here relates to their use in the societal tests performed by Quantec. In those tests, mobility was a major contributor to the societal benefit/cost ratios. Quantec valued reduced mobility towards the high end of the range of values presented in their report. If approximately the mid-point of the value range were used, the benefit contribution by mobility would be reduced by approximately half. As discussed in Item 2 this question is somewhat moot since Quantec has agreed that dropping this measure would not be inappropriate at this time.

Items 4 and 5 Response

Quantec:
The Division criticizes our coefficient of determination R^2 estimated at 56%. Assuming that maximizing this value is equivalent to maximizing the quality of the model is dangerous. While overall fit is important, other factors are equally important (e.g., plausibility of the results, concurrency with economic theory, and statistical significance of the important explanatory variables). For example, in our own model, if the dependent variable were changed to "change in arrears" and the pre arrears term was not included as an explanatory variable, the coefficients of all the independent variables would have remained virtually intact and our estimate of the impact of HELP would have been almost identical. The R^2 value would have dropped from 56% to 18%. This does not mean that the second model is less reliable than the first, especially if you are more interested in specific estimated coefficients. Furthermore, the 56% value indicates that there are other components that impact arrears that are not in the model. As long as these components are not correlated with the ones that are in the model, including them would only increase the R^2, but will not alter the conclusions. We are not accustomed to seeing R^2 values much over 60% using these types of cross sectional/time series data. The only time we see higher values is in pure time series analysis we utilize for our

forecasting clients. In those cases, the variables are likely autocorrelated causing the R^2 values to be high.

Another criticism is related to the coefficient of variation (CV). The fact is that the average dependent value reported in the model is an aggregation of two "population" estimates. The $96 average post arrears is composed of an average of $147 for the comparison and $47 for the treatment group. The CV then is an estimate of a pooled SD divided by a pooled mean. We are not certain this is a useful estimate. The CVs within each of the groups are likely to be smaller. Additionally, in the model rerun suggested in 4 above (i.e., making the dependent variable the change in arrears and removing the pre arrears from the model), the CV would have increased to 693% with still near identical results. More importantly, we feel, is the individual coefficients that make up the estimated $78 contribution to HELP. Those are the coefficients of the delta credit, DetlatAgPay, and the interaction terms. Those coefficients have t values of 55.05, -19.43, and 31.51. All t-values are statistically significant at the 99% level. We do not view these to be low confidence/precision values. However, the truth is that model building is more of an art than a science. Two econometricians can argue endlessly over many academic as well as practical matters. In the case of our model, our level of confidence increased significantly when we compared its findings to those based on simple averages. Using simple averages, we estimated the changes in arrears for participants that received HELP only to nonparticipants that received neither HELP nor HEAT and got nearly identical results. On average, participants with HELP only had a difference in arrears from the pre period to the post period equal to $22 while the non participants who received neither HELP nor HEAT had a difference of –$49, yielding a net difference in arrears of $71 (compared to $78 from our regression model).

Division:
Because the data Quantec used in its regression analysis has a relatively large number of cross sections and relatively small time periods, the Division does not disagree Quantec's general discussion regarding the coefficient of determination and coefficient of variance. This agreement will be reflected in the Division's comments of Quantec's final report. However, The Division believes that the underlying data, as is described in the Division's answer number 2 above, do not properly control for households receiving HEAT assistance.

Regarding the model specification, the regression model used by Quantec to isolate the impact of HELP is as follows:

(1) $Post\ Arrears = \alpha + \beta_1 \Pr e\ Period\ Arreas + \beta_2 \Delta HELP + \beta_3 \Delta HEAT + \beta_4 \Delta HEAT * Participation$.

This means that the average post arrears of a participant who is receiving both HELP and HEAT (Table 1.1, Line b) is

(2) $Post\ Arrears = \alpha + \beta_1 \Pr e\ Period\ Arreas + \beta_2 \Delta HELP + (\beta_3 + \beta_4) \Delta HEAT$.

The mean post-arrears of a non-participant who is receiving HEAT assistance (Table 1.1, Line h) is

(3) $Post\ Arrears = \alpha + \beta_1 \Pr e\ Period\ Arreas + \beta_3 \Delta HEAT$.

Finally, the mean post-arrears of a non-participant who is receiving nothing (Table 1.1, Line f) is

(4) $Post\ Arrears = \alpha + \beta_1 \Pr e\ Period\ Arreas$.

Assuming that, during the pre-program period, neither the participant nor the comparison group received HELP nor HEAT, a model that properly isolates the impact of HELP from that of HEAT must show that the mean post-arrears of a participant who is receiving both HEAT and HELP is different from that of a non-participant who is receiving HEAT by $\beta_2 \Delta HELP$ (the change in the mean post-arrears resulting from the change in HELP). If we compare equations 2 and 3, we see that the mean post-arrears for the participant is different from that of the non-participant by $\beta_2 \Delta HELP$. We also see that the proportion of the HEAT money used to pay electric bill is higher for the participant than a non-participant by an amount equal to β_4 . This could be interpreted as that HELP does not only directly impact the mean post-arrears, but also has some impact on how the HEAT money is used. That is, once a customer receives HELP, the customer will allocate more of her HEAT money to pay her electric bill. This effect of HELP on HEAT is a consequence of the inclusion of the interaction variable ($\Delta HEAT * Participation$) into the model. Therefore, the Division agrees that the regression model adequately separates the effect of HELP from that of HEAT. However, the Division needs to examine the underlying data. If the underlying data is good, then the Division will incorporate this position into its comments on Quantec's report.

Item 6 Response

Quantec:
Our biggest concern is with the Division's belief that our treatment and comparison group do not match. As we explained in the proposal and in the report, year 2 participants were used as treatment group for year 2 and comparison for year 1. Year 3 participants act as participants in year 3, but as comparison in years 1 and 2. In other words, the comparison and treatment groups are, more or less, the same customers in different time periods. Changes within households do occur across time, but our main goal was to ensure that the comparison group customers were low income. We matched each individual participant to at least one nonparticipant from future program years based on pre arrears. The Division compared them based on pre invoice and declared them dissimilar. If one has ten different measures describing a population, one does not have the luxury of matching on them all, not even two or three most relevant. We chose to match them based on pre arrears and did so very successfully (treatment pre arrears average was $79 and comparison was $81). While pre invoice is important, it was not

our variable of choice. We opted for pre arrears because we felt it was most important in describing the households' level of ability to pay and to some degree level of burden.

Division:
In order for Quantec's analyses attributing benefits to HELP to be valid, HELP must be isolated from other relevant variables. This was discussed at some length under Item 2 with respect to the HEAT variable. As detailed under Items 2 and 4 & 5, the Division believes that Quantec did not sufficiently isolate HELP from HEAT in its analyses. A larger, general question is whether or not Quantec was able to isolate HELP from general variables we called "economic variables." Quantec's analyses assume that the economic variables of their participant and comparison groups are "sufficiently similar" that by subtraction they cancel each other out.[9] A rough definition of what is meant by "sufficiently similar" was given in footnote 2. The Division understands that if a population is described by, say, 10 attributes, a comparison between two samples of reasonable size from that population may result in one or two of the attributes in one sample being "statistically different" from the same attributes of the other sample, i.e. the means of the attributes from the two samples are statistically too far apart for the assumption that they are equal to be accepted. If we "know" that they are, or should be the same, then repeated sampling would show that. However, it was of concern to the Division that the one attribute for which we had data to test for "sufficient similarity," analyzed to be much more than a little different between the two samples. This gives us concern that while there may be many points of similarity between the participant groups and the comparison groups at the time they begin receiving HELP, the similarity breaks down when you compare these attributes one or two years before HELP with the time of HELP. (Even if, as Quantec suggests, that it is the differences in these variables that is the correct issue, this only shifts the question to whether or not the data of the participant and comparison groups changes in a direct linear fashion. This question of linearity will be discussed further below.) If this is the case then HELP is not, and perhaps cannot be, sufficiently isolated. The Division does not claim to have proved that these economic variables are not sufficiently similar. Rather we raise the issue because there are indications that they may not be sufficiently similar or that there are other significant data problems which impact the validity of the analyses.

Because in our original report we elected to focus on general issues and on the arrears measure that figures prominently in all of Quantec's benefit/cost analyses, we did not discuss any issues with the other measures. In particular, based upon data Quantec provided to us that apparently set forth the calculations used to derive a HELP benefit from mobility, we constructed the following Table A1.2:

[9] In our discussion with Quantec after a draft of this document was submitted for their review, Quantec pointed out that actually what is at issue here should be that the pre- and post-period differences in these economic variables are sufficiently similar, not necessarily the absolute amounts. Quantec has arguments for its belief that this is the case. The Division has analyzed the "difference in the differences" of the arrears data and found that this difference too was statistically highly significant.

Table A1.2

Summary of Quantec's Mobility Data

		Number of Moves		
	Number	Pre-HELP Period	Post-HELP Period	Percent Change
Participant Group	66,325	77	4,598	5871.43%
Comparison Group	43,094	45	4,319	9497.78%
Total	109,419	122	8,917	7209.02%

The Division pointed out to Quantec that it was difficult to believe that there would be only 122 moves in the Pre-Period and 8,917 moves in the Post-Period. Quantec agreed that this result is, at a minimum, anomalous and admitted that this is what their data shows. This appears to have contributed to Quantec's agreement to drop the mobility results from the Benefit/Cost analyses. While this also raises a concern that there might be other significant data problems that are not so obvious, Quantec maintains that the problem in the mobility data does not affect their other analyses.

The question linearity in the changes in the arrears data is illustrated in Table A1.3. This is data compiled by the U.S. Department of Labor for the United States as a whole. As indicated in the Table, changes in income levels, especially at the lower end of the income range do not result in the same rate of change in the consumption of electricity. Of note as well is that the total expenditures of the low income categories significantly exceed income. This indicates that people in these categories have other sources to cover their expenditures, e.g. savings, loans, and welfare. With respect to arrears in this matter, there is the suggestion from this data that the "difference in the differences" may not be linear. Charts A1.1 and A1.2 graphically summarize the data.

Table A1.3

Average U.S Consumer Expenditures on Electricity by Income Category 2003

Income Range (Before Tax)	Average Income	Percent Change	Average Expenditures	Percent Change	Electricity	Electricity Percent Change	Electricity Percent of Income	Electri Percen Expenditu
Less than $5,000	1,200		19,272		557		46.42%	2.8
$5,000 to $9,999	7,799	549.92 %	16,013	-16.91%	655	17.59%	8.40%	4.0
$10,000 to $14,999	12,455	59.70%	20,061	25.28%	749	14.35%	6.01%	3.7
$15,000 to $19,999	17,410	39.78%	23,715	18.21%	833	11.21%	4.78%	3.5

$20,000 to $29,999	24,655	41.61%	29,034	22.43%	901	8.16%	3.65%	3.1
$30,000 to $39,999	34,485	39.87%	34,931	20.31%	1,001	11.10%	2.90%	2.8
$40,000 to $49,999	44,294	28.44%	39,757	13.82%	1,068	6.69%	2.41%	2.6
$50,000 to $69,999	58,900	32.98%	49,789	25.23%	1,153	7.96%	1.96%	2.3
$70,000 to 79,999	74,560	26.59%	57,128	14.74%	1,186	2.86%	1.59%	2.0
$80,000 to $99,999	88,832	19.14%	65,957	15.45%	1,335	12.56%	1.50%	2.0
$100,000 to $119,999	108,087	21.68%	75,601	14.62%	1,300	-2.62%	1.20%	1.7
$120,000 to $149,999	131,885	22.02%	86,451	14.35%	1,349	3.77%	1.02%	1.5
$150,000 and Over	223,634	69.57%	118,674	37.27%	1,667	23.57%	0.75%	1.4

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey, 2003."

Chart A1.1

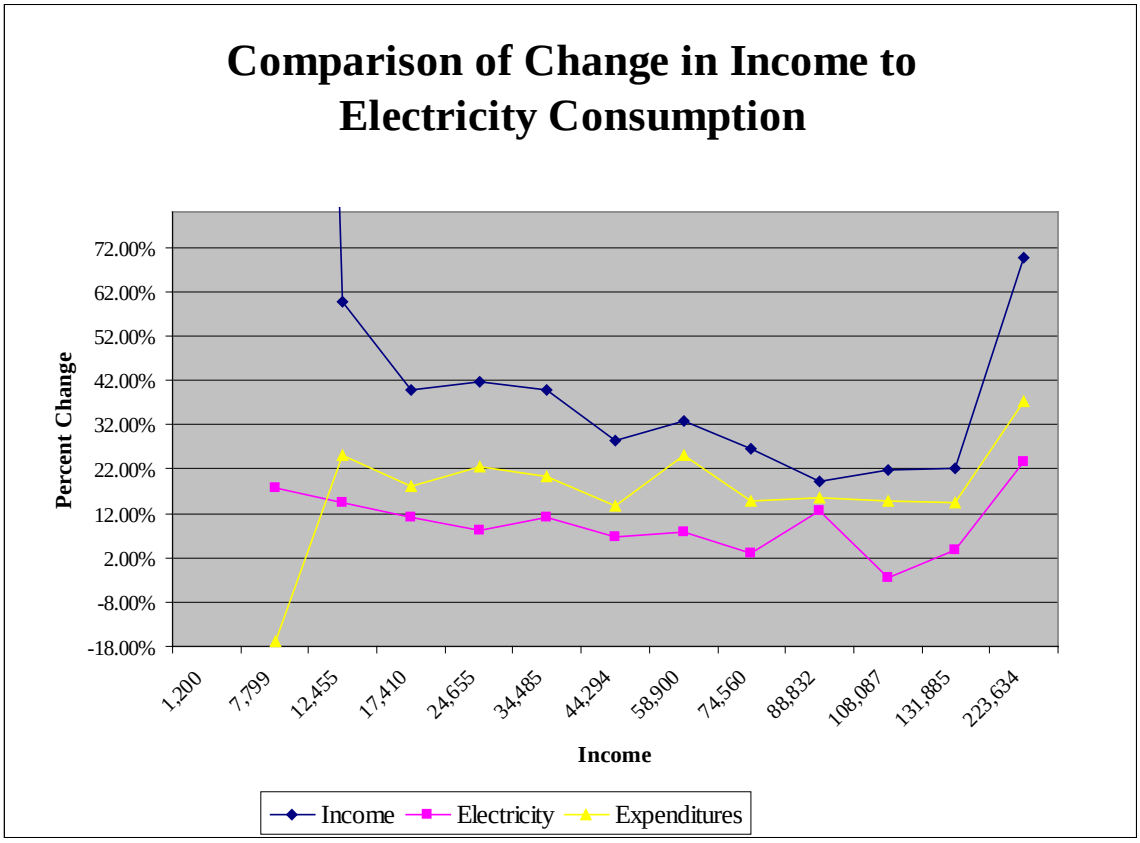
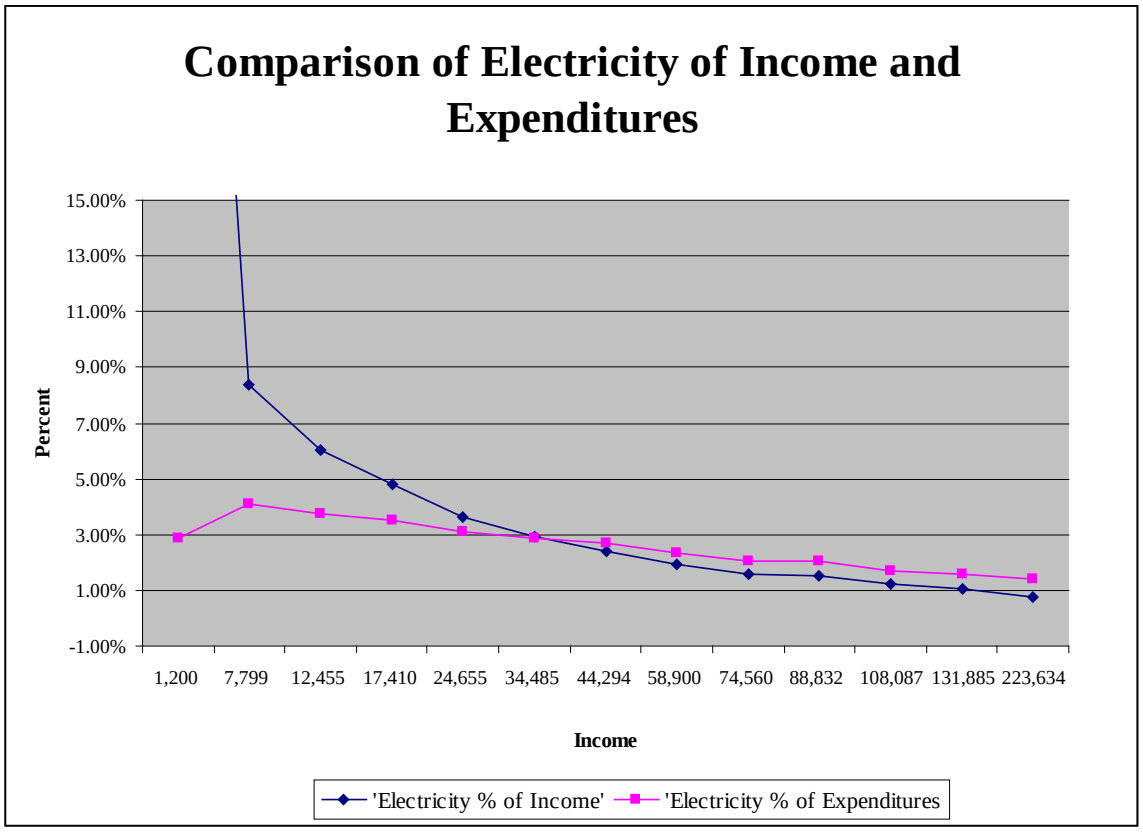


Chart A1.2



Item 7 Response

Quantec:
We believe that the DPU should also provide the commission with firm and specific recommendations as to what the program goals need to be and how to best measures them.

Division:
In an interview with the stakeholders, Quantec identified that there is disparity among the stakeholders as to what the primary goal of the Program is. This prompted Quantec to suggest that the goals of the Program are not well defined. The Division, in its Year 1 HELP evaluation report, clearly stated the goals of the program as it understood it based on its review of the Commission's orders in Dockets 97-035-01, 99-035-10, and 00-035-T07[10]. In this same report, the Division identified the measures and standards against which the achievement of these goals are evaluated.

[10] Division's Year 1 HELP evaluation report. Pages 15 to 16.

Therefore, The Division would like the Commission to refocus the primary goals of the program and determine the measures and standards that will be used to evaluate it.