



MEMORANDUM

Date: August 12, 2014

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

A handwritten signature in black ink, appearing to read "CHH", is written over the printed name "C.H. Huckelberry".

Re: **Regional Wastewater Reclamation Department Energy Optimization**

I am providing the Board of Supervisors with a report describing upcoming actions the Board will see on the August 18, 2014 meeting agenda relating to optimizing energy requirements and purchases for our Regional Wastewater Reclamation Department. As the Board knows, at the implementation of the Regional Optimization Master Plan (ROMP), the County transitioned from a power plant operation providing electrical energy to operate our regional wastewater treatment facilities.

What is not known is that the methane gas produced in the treatment process only partially met the energy requirements of operating these facilities. The County was also required to purchase natural gas from Southwest Gas Corporation at a cost of approximately \$800,000 per year to supplement methane gas to operate the power plant to provide necessary electrical energy. The cost of energy to treat one million gallons of sewage has fallen from \$450 to \$250 today, a sizeable reduction.

The Board will have on the August 18 agenda an agreement and contract with Anaergia/Grannus to proceed with an effort to clean and market all of the biogas produced at our wastewater treatment facilities, completing the use of this renewable fuel source.

CHH/dr

Attachment

c: John Bernal, Deputy County Administrator for Public Works
Jackson Jenkins, Director, Regional Wastewater Reclamation



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REGIONAL WASTEWATER RECLAMATION DEPARTMENT
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July 15, 2014

TO: C.H. Huckelberry, County Administrator
THRU: John M. Bernal, P.E., Deputy County Administrator – Public Works
FROM: Jackson Jenkins, Director – RWRD
SUBJECT: RWRD Energy Optimization

As a result of the ROMP program and the critical need to provide a safe and reliable electrical distribution system, RWRD has made significant upgrades to the electrical infrastructure at both the Tres Rios and Agua Nueva WRFs. In addition to these upgrades, the RWRD SCADA system has also been enhanced and now is able to provide real-time electrical energy utilization and related data. Staff performs detailed tracking of this data and is able to better pursue efficiency improvements and process optimization of our facilities. RWRD will be submitting two separate TEP electrical contracts to the Board of Supervisors (BOS) for approval in August.

The first contract is to postpone converting to the LLP-14 rate schedule from the LGS-13 rate schedule at the Agua Nueva WRF until next spring. The contract signed two years ago stated that RWRD would move to the LLP-14 rate schedule in September 2014, which, at this time, would increase our costs rather than save us money. The minimum demand of 3MW required to qualify for LLP-14 will not be met until the new lab expansion is brought on-line.

The second contract for the Board's consideration involves switching electrical rate schedules at the Tres Rios WRF from the current LLP-14 rate schedule to the LLP-90 time-of-use rate which would save RWRD approximately \$168,000 per year.

The attached Figure 1 identifies past, current and projected base electrical rates for all rate schedules used by RWRD over the past several years as well as the proposed LLP-90 rate projections.

It should be noted that the largest electrical cost for RWRD comes from the Tres Rios WRF. The attached Tres Rios Rate History summary sheet (Figure 2) indicates that the

overall electrical cost has been consistently and significantly reduced over the past four years, in spite of the TEP rate increases. The Department has successfully switched rate schedules over the years to meet the needs of the Department and minimize the overall energy costs. In Fiscal Year 2013/14, the Department spent approximately \$1 million more than the commercial electrical energy budget, but that was more than offset by the elimination of the O&M costs for the Power Plant (~\$850,000) and the elimination of the cost for natural gas (~\$800,000) required by the Power Plant (see Figure 3).

At the Tres Rios WRF, the Department has reduced the overall energy cost from a high of approximately \$450 per million gallons of sewage treated in Fiscal Year 2012-13 to a low of approximately \$250 per million gallons of sewage treated this fiscal year. (see Figure 4).

RWRD carefully evaluates our energy portfolio to continue to improve energy efficiency and optimize energy costs (see Figure 5 and the associated narrative to view the Tres Rios WRF Energy Sources and their respective proportion of the overall requirements).

All of the Tres Rios thermal energy demands are met by beneficially utilizing our own internal digester biogas, rather than by outside purchases, which saves the Department and our ratepayers approximately \$180,000 per year. In addition, since the Department requires less than 15% of the biogas produced from the digesters, the remaining gas can be sold to produce an additional revenue stream which will further offset the overall energy costs for the Tres Rios WRF.

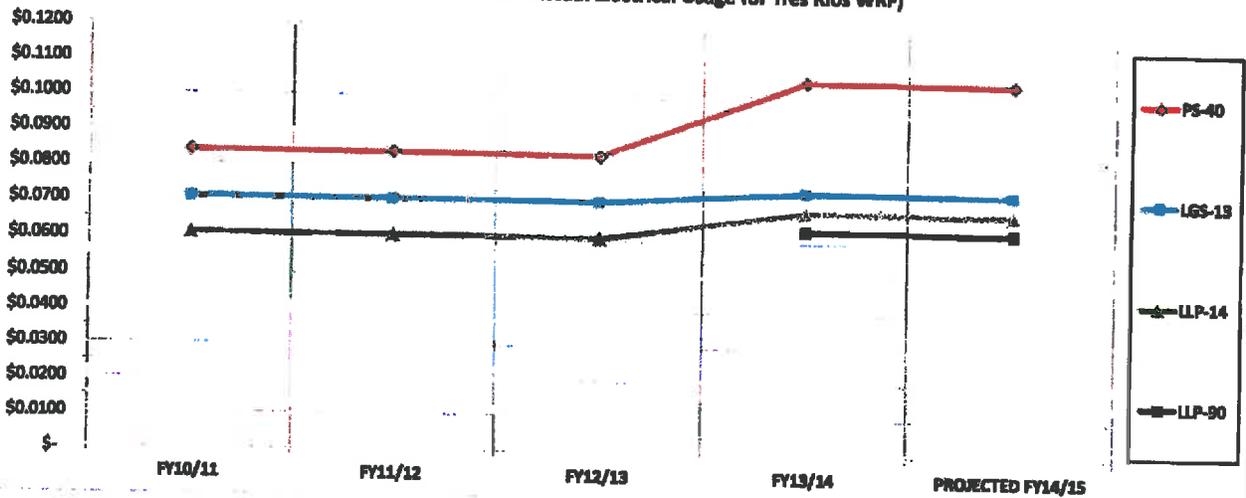
Negotiations for the sale of the biogas to a third party are nearly complete. A contract with Anaergia/Grannus will also go to the Board of Supervisors in August to seek approval to proceed with this project to clean and market the biogas to others willing to pay a premium for this renewable fuel resource.

Please let me know if you have any questions or if you require any additional information.

CC: John Sherlock
Jing Luo
Eric Nelson
Jennifer Coyle

FIGURE 1

TEP BASE RATE COST PER KWH
 (Based on June 2014 Actual Electrical Usage for Tres Rios WRF)



	COST PER KWH				
	FY10/11	FY11/12	FY12/13	FY13/14	PROJECTED FY14/15
PS-40	\$ 0.0838	\$ 0.0838	\$ 0.0838	\$ 0.1054	\$ 0.1054
LGS-13	\$ 0.0707	\$ 0.0707	\$ 0.0707	\$ 0.0740	\$ 0.0740
LLP-14	\$ 0.0608	\$ 0.0608	\$ 0.0608	\$ 0.0687	\$ 0.0687
LLP-90				\$ 0.0634	\$ 0.0634

	AVERAGE MONTHLY BASE RATE COST (Peak Demand = 4,500 KW, Usage = 2,720,000 kWh)				
RATE	FY10/11	FY11/12	FY12/13	FY13/14	PROJECTED FY14/15
PS-40	\$ 227,936	\$ 227,936	\$ 227,936	\$ 286,588	\$ 286,588
LGS-13	\$ 192,376	\$ 192,376	\$ 192,376	\$ 201,361	\$ 201,361
LLP-14	\$ 165,304	\$ 165,304	\$ 165,304	\$ 186,766	\$ 186,766
LLP-90				\$ 172,361	\$ 172,361

Peak Demand 4,500 KW Peak Demand (Actual June 2014)
 Usage 2,720,000 kWh per Month (Actual June 2014)

By changing from LLP-14 to LLP-90 we anticipate saving an average of \$14,000 per month, or approximately \$168,000 per year.

NOTE: Base rate does not include DSM, PPFAC, REST charges or Taxes which typically add approximately 20% to the base rate charges
 DSM = Demand Side Management surcharge, PPFAC = Purchased Power Fuel Adjustment Clause, REST = Renewable Energy Standard Tariff.

FIGURE 2

TRES RIOS RATE HISTORY

January 2010 - Changed from rate PS-40 to LGS-13

FY 10/11	Cost per kWh	kWh	Cost
TEP Electricity	\$ 0.0827	10,984,400	\$ 908,235
SunEdison Electricity	\$ 0.0750	574,201	\$ 43,064
Powerhouse Electricity	\$ 0.1494	16,320,400	\$ 2,439,024
OVERALL TOTAL	\$ 0.1216	27,879,001	\$ 3,390,323
Purchased Electricity Average \$ 0.082			

FY 11/12	Cost per kWh	kWh	Cost
TEP Electricity	\$ 0.0924	7,720,800	\$ 713,680
SunEdison Electricity	\$ 0.0750	2,042,501	\$ 153,188
Powerhouse Electricity	\$ 0.1485	16,837,200	\$ 2,500,000
OVERALL TOTAL	\$ 0.1266	26,600,501	\$ 3,366,867
Purchased Electricity Average \$ 0.089			

February 2013 - Changed from rate LGS-13 to LLP-14

FY 12/13	Cost per kWh	kWh	Cost
TEP Electricity	\$ 0.0945	18,782,848	\$ 1,775,461
SunEdison Electricity	\$ 0.0750	1,981,807	\$ 148,636
Powerhouse Electricity	\$ 0.2888	5,739,600	\$ 1,657,705
OVERALL TOTAL	\$ 0.1351	26,504,255	\$ 3,581,802
Purchased Electricity Average \$ 0.093			

FY 13/14	Cost per kWh	kWh	Cost
TEP Electricity	\$ 0.0834	31,165,093	\$ 2,598,322
SunEdison Electricity	\$ 0.0750	1,946,663	\$ 146,000
Powerhouse Electricity		-	\$ -
TOTAL	\$ 0.0829	33,111,756	\$ 2,744,322
			\$ 315,003 ← transitional natural gas
Overall Total			\$ 3,059,325

Projected 14/15	Cost per kWh	kWh	Cost
TEP Electricity	\$ 0.0810	34,000,000	\$ 2,754,000
SunEdison Electricity	\$ 0.0750	2,000,000	\$ 150,000
Powerhouse Electricity			
OVERALL TOTAL	\$ 0.0807	36,000,000	\$ 2,904,000

FIGURE 3

TRES RIOS ANNUAL ENERGY COSTS
(NOT NORMALIZED FOR FLOW)
FISCAL YEAR 10/11 - 14/15

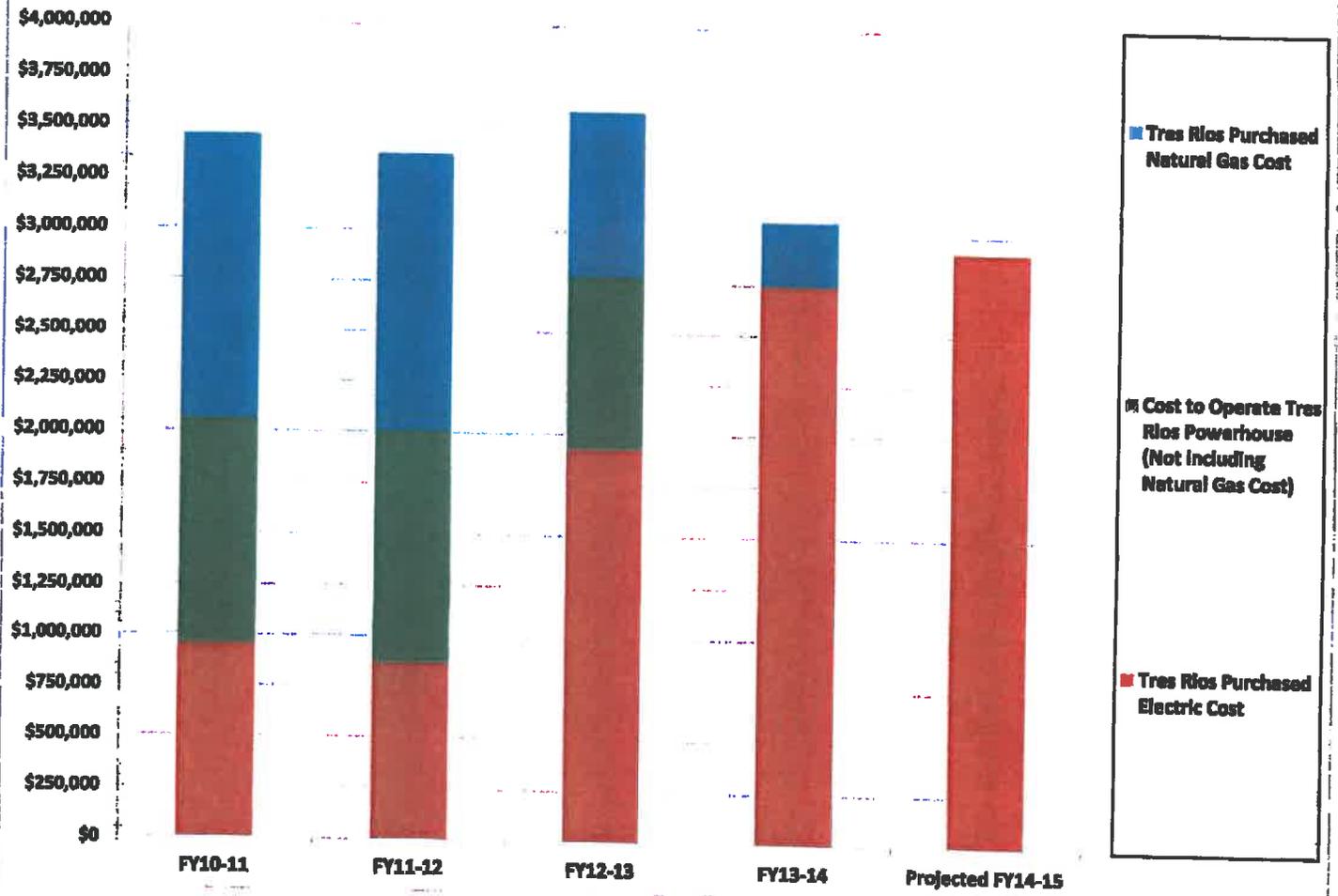


FIGURE 4

**TRES RIOS ANNUAL ENERGY COSTS
(NORMALIZED FOR FLOW)
FISCAL YEAR 10/11 - 14/15**

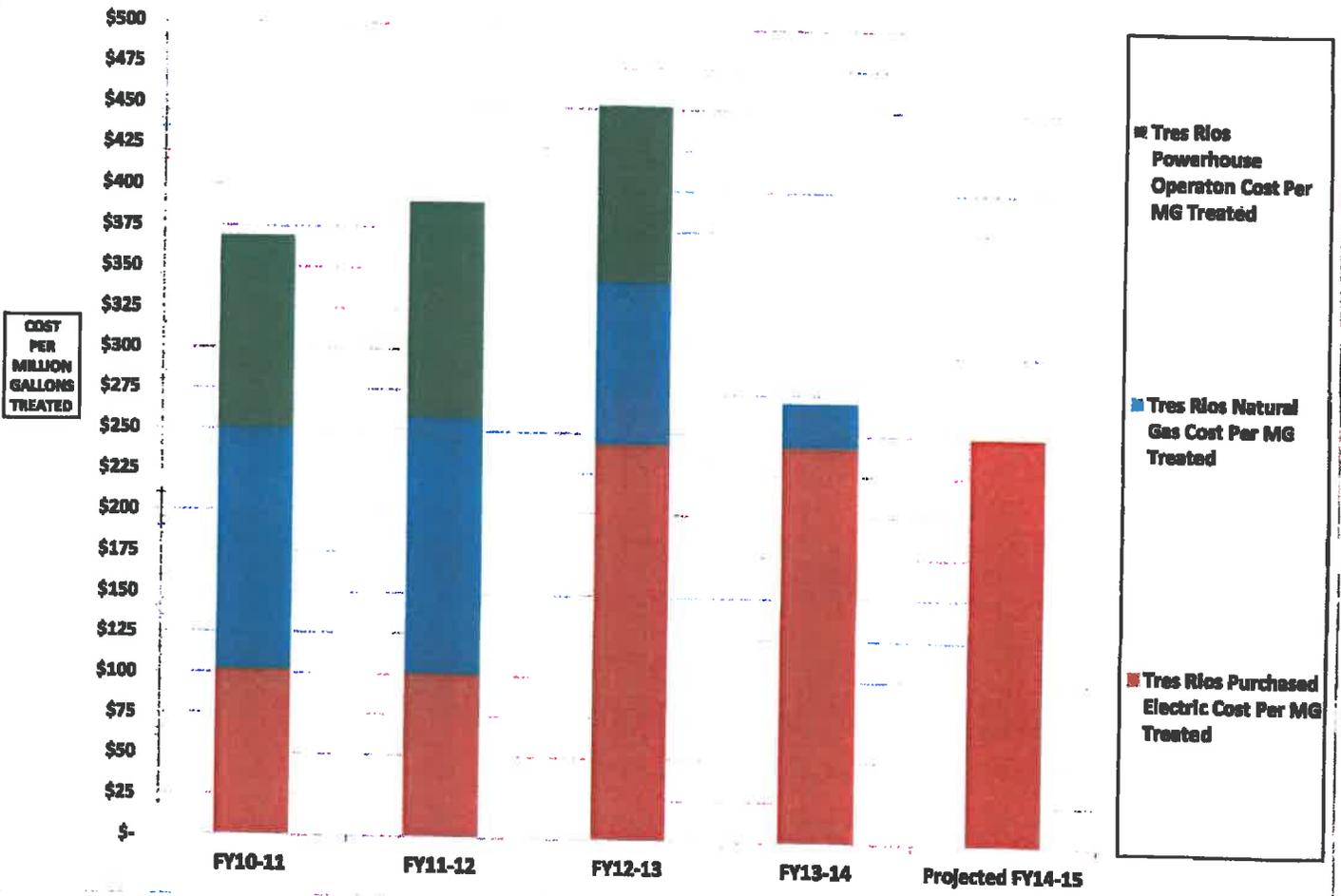
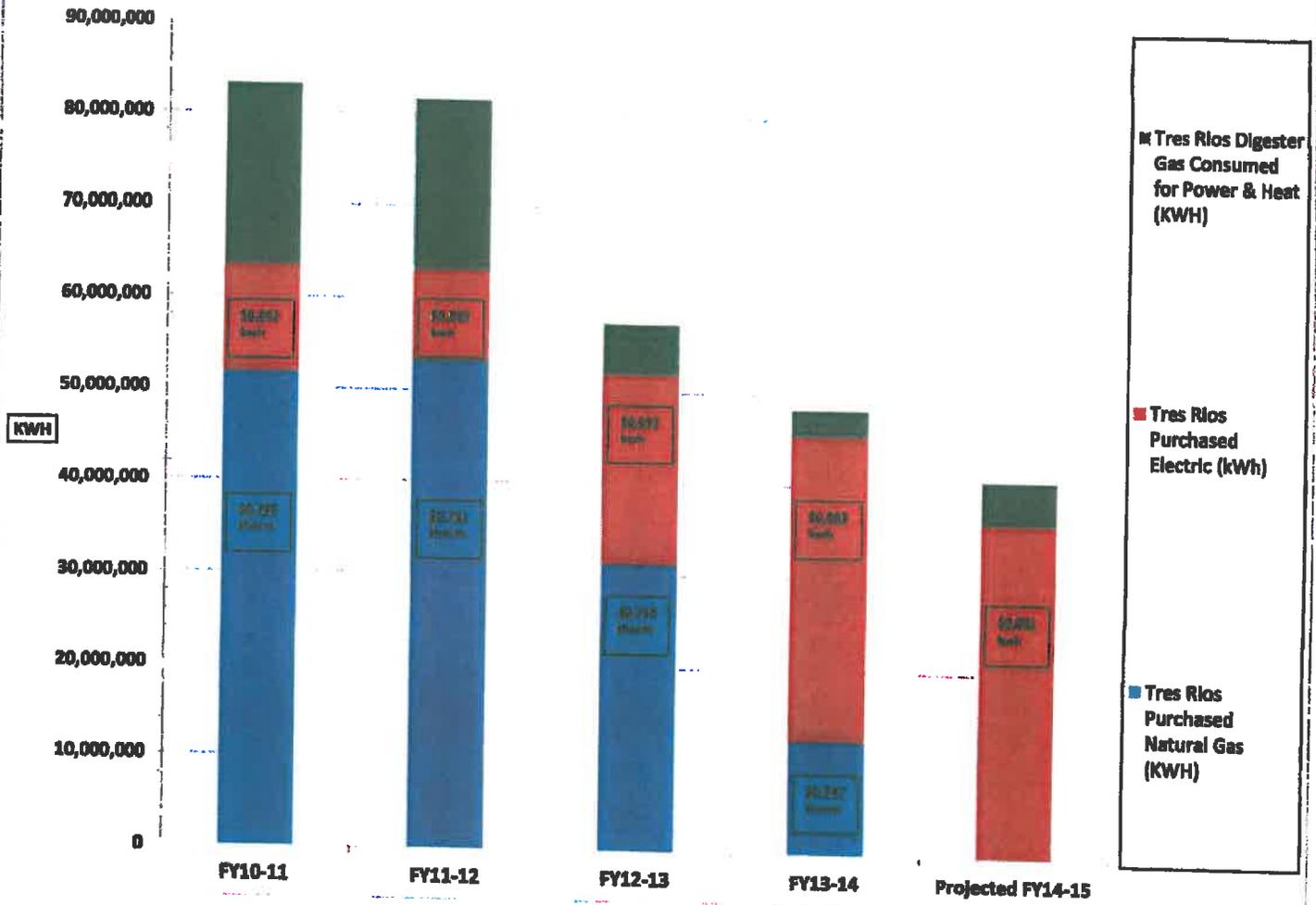


FIGURE 5

**TRES RIOS WRF ENERGY SOURCES
FISCAL YEAR 10/11 - 14/15**



Narrative for Figure 5

FY 10/11 – Base condition. The Ina Road plant was treating an average of 26 MGD running the old HPO facility and the newer East Plant BNRAS. Most of the West Plant was powered by the Powerhouse while the remainder of the plant was powered by purchased electricity from TEP and SunEdison. The SunEdison solar field came online in April of 2011.

FY 11/12 – The Ina Road plant was treating an average 24 MGD during this time period. The East Plant (BNRAS) was shut down from November 2011 through January 2012 for preliminary tie-in's necessary for the main Upgrade work. During this time the old West Plant (HPO) provided the only treatment of Influent.

FY 12-13 – The Ina Road plant was treating an average of 22 MGD during this time period. The new East Bardenpho Plant (Single-train Area 49) came online in August 2012. The Old West HPO Plant was shut down in September of 2012. The Powerhouse gradually began powering down with the shutdown of the HPO and completely ceased making electricity in April of 2013. Between April of 2013 and January of 2014 the Powerhouse then supplied only thermal energy for the chillers and boilers. The Powerhouse quit using digester gas because of the finicky and critical nature of the boilers and natural gas was used in its place. The new multi-train West Area 49 Bardenpho Plant came online in April of 2013.

FY 13-14 – The Ina Road plant treated an average of 31 MGD during this time period. The new East Bardenpho Plant (multi-train Area 35) came online in September 2013. The Powerhouse continued using only natural gas for the chillers and boilers until the completion of the new Central Plant in January 2014. This \$315,003 charge for natural gas is seen on the "Rate History" sheet and was a transitional charge which was not included in the cost per kWh calculation, though it is included as part of the total cost of energy in FY13-14. The new Central Plant started using digester gas once again and began using natural gas only as a back-up power source.

Projected FY 14-15-The Tres Rios Plant will continue to fine-tune its processes and is expected to use only purchased electricity and digester gas as its power sources. Natural gas will be used as a back-up supply only. Approximately 80% of the digester gas produced is available for beneficial reuse and negotiations should be finalized for its use. The flow split between Aqua Nueva and Tres Rios is expected to stabilize during this time period. Tres Rios's plant efficiency is expected to increase with the additional flow from the Randolph Park plant once that plant is closed.