

ORIGINAL	
N.H.P.U.C. Case No.	DW 10-141
Exhibit No.	POASI 3
Witness	John Skelton
DO NOT REMOVE FROM FILE	

Lewis Engineering, PLLC
44 Stark Lane
Litchfield, NH 03052
lewis.h2o@comcast.net

E-mail Correspondence

April 28, 2008

Mr. Stephen Roy, P.G.
New Hampshire Department of Environmental Services
Drinking Water and Groundwater Bureau
P.O. Box 95
Concord, NH 03302-0095

Re: Paradise Shores, Moultonborough, NH, EPA # 1612010
Letter of Deficiency # DWBG 08-033 – Responding to Item 2

Dear Stephen:

Subsequent to the above referenced Letter of Deficiency, Lewis Engineering, PLLC was retained by Lakes Region Water Company (LRWC), Tom Mason, Sr., as their water system consultant for Paradise Shores in this matter. We have been retained to keep the NHDES DWGB up to date, through your good office, with ongoing progress as the water system addresses the issues outlined in the LOD.

As a short recapitulation, Lewis Engineering and LRWC have been addressing water supply issues; the first being recommendations to address a possible water shortage during the upcoming summer months. In our first LOD (Item 1) response letter, dated March 31, we addressed steps being undertaken to mitigate potential water shortage issues during the summer of 2008. This included rehabilitation work on Well No. 7, installation of the new 12-inch diameter PVC / HDPE transmission main from the Paradise Shores well field area into the new 325,000 gallon concrete water storage facility, as well as assessing ongoing development of water sources near the tank, consumer education / outreach, and ongoing assessment of water use and continuing leak detection efforts.

Update Summary

We appreciate the time you spent meeting with us at LRWC on April 11. The effort to provide an adequate water supply to the Paradise Shores water system that is comprised of the Balmoral / Suissevale Water Systems continues to move ahead. As discussed on the 11th, existing Well No.7 was cleaned and rehabilitated this spring by Skillings and Sons Well Drilling. This existing LRWC well is permitted at 75 gpm. LRWC has ordered a

new pump which will be installed during the next week. The well will then be step-tested in the immediate future with the oversight of Fred Bickford from Hydro-Source. Work is continuing toward the completion of the water tank and placing it in service. The new transmission main work is being scheduled from the Paradise Shores metering station, along State Route 109, and up into the new tank.

Addressing LOD Item #2

The balance of this correspondence is intended to address Item 2 in the LOD. This part of the LOD response is intended to address an assessment of the present as well as future water demands for the Paradise Shores water system.

Executive Summary Points:

- The Paradise Shores water system is owned and operated by Lakes Region Water Company. There is a master meter at the distribution system entry point. The water system consists of two separate community water systems. The first is Balmoral. This is a 375 residential customer system. All homes have individual water meters. The second is a single wholesale customer, Suissevale. Suissevale has a single master meter. The Suissevale community reports that they have 352 customers currently connected to their water distribution system.
- The projected full buildout consists of Balmoral with 425 customers, Suissevale with 402 connections, and additional future estimated connections of 73 for a total of 900 residential water customers. A schematic layout exhibit is provided.
- LRWC plans to have the new 325,000 gallon water storage facility and transmission main in service on or before June 15.
- Based on an analysis of actual summer month water sales data from Balmoral, plus Master Meter data from Paradise Shores and Suissevale certain conclusions have been drawn. The highest average customer use from summer 2007 data was 124 gallons per customer per day, based on Suissevale water consumption through their master meter. This reflects all water use, including unaccounted for water. The assumed unaccounted for water is 15%.
- Based on available data from LRWC, the high use Paradise Master Meter (all water uses for both systems, including leaks) pumping week during 2007 has been identified as July 30 – August 6, 2007. There was an average 4 day demand of 81,000 gpd, plus the 3 day weekend (Fri., Sat., Sun.) average of 127,580 gpd. Total water pumped was therefore 706,740 gallons, or an average of 101,000 gpd. Assuming that an average pumping time on wells is 16 hours per day an average of 105 gpm of well capacity is required with 140 gpm required at an average of 12 hours of run time. There is a reported total of 145 gpm PPV from the existing Paradise well field. There is also the opportunity to seek an emergency well

connection water use from an existing test well in the vicinity of the new water storage facility. Our conclusion is that the water supply needs for the summer of 2008 may be met with a combination of existing Paradise Well Field wells, and the new water storage facility being in service. This is backed up by having the existing test well near the water storage facility available, if needed, in an emergency.

- In order to address future (10 – 15 years) buildout conditions with 900 customers, additional water supply well capacity will be required. On a direct ratio basis, the customer base will increase by 24%. We would suggest that given the size of this proposed system that a reasonable water supply strategy will be able to supply water needs as described above, in 16 hours, with the largest well (assuming for now 75 gpm) out of service. Based on the above analysis, a total supply of 205 gpm (130 gpm total + 75 gpm out of service) will be the target water supply capacity for the Paradise Shores water system.

Details Relative to Summary Points:

1. Paradise Shores consists of two water distribution systems. LRWC owns and operates the Balmoral CWS with 375 individually metered residential customers. LRWC also sells water to the 352 units in the Suissevale CWS. Suissevale is a wholesale customer that is billed using a single master meter.
2. There is a master water meter at the distribution entry point to the Paradise Shores area. This meter records all water pumped to the total system. By subtracting the Suissevale CWS master water meter reading from the Paradise Shores master meter reading, the total amount of water delivered into the Balmoral CWS distribution system is calculated.
3. Based on the above, it is possible to monitor the percentages of total water use by each of the respective communities.
4. The Balmoral CWS has actual individual residential water meters installed in the units. We have provided an analysis of the average gallons sold per customer per day for Balmoral customers. The time frame used was July 1, 2007 through September 30, 2007. An exhibit is attached. The average day for this high use Q3 period was 94 gpd/customer, as compared to the following Q4 period that averaged 58 gpd/customer.
5. The water usage per customer for Suissevale for the same Q3 period was also calculated. The gross water use per customer, which would include any system leaks, for Suissevale was also calculated at 124 gpd/customer. For Q4 2007 the customer usage was calculated at 51 gpd/customer.

6. Water usage in the two communities was shown to increase by approximately 40 percent during weekend and weekend / holiday periods based on meter readings taken during Q3 2007.
7. We believe that for the most part the two residential water systems are of an equivalent demographic mix, home age, home style, and therefore water use patterns should be similar. We believe that the primary difference between the two calculated readings likely reflects some level of additional lawn irrigation within Suissevale as compared to Balmoral during Q3 along with some unaccounted for water.
8. Under the existing conditions the total gallons sold in Balmoral during Q3 2007, totaled 2,745,160 gallons. This was over a 92 day period thus averaging 29,838 gpd or 94 gallons per customer per day. Actual system water pumped to Balmoral was calculated at 109 gallons per customer per day. The difference between the master meter pumpage and the water sales in Balmoral amounts to 13.9 percent unaccounted for water. The calculated water usage at Suissevale was calculated as 124 gallons per customer per day.
9. In discussions last July at a meeting held in DES offices on July 13, 2007, where Suissevale representatives were present, they indicated that full build out of their area would include no more than 50 additional service connections beyond their 352 units. In Balmoral the estimated maximum additional connections has been estimated at 50 beyond their existing 375 units. In addition, we have added an additional "potential future service connections" of 73. This totals an "at build-out" number of 900 residential customers.
10. Based upon the water usage from Q3 2007 at 124 gallons per customer per day; the calculated future water usage for the potential 900 residential customers would amount to 111,600 gallons per day or 155 gallons per minute based on a 12 hour pumpage period for the wells. For a near future customer count of 750 customers (352 Suissevale + 375 Balmoral + 23 new) the daily demand would amount to 93,000 gallons per day or 129 gallons per day based on a 12 hour maximum pumpage period for the production wells. The production wells would have to pump at 97 gpm for 16 hours to meet the 93,000 gpd system demand. Our long term recommendation, however, is based on a 16 hour run time during a projected high use summer week, with the largest well (assumed to be 75 gpm) out of service.
11. Under the currently reported approved permitted production volume (PPV) of 145 gpm from the Paradise Shores well field (75gpm, 35gpm and 35 gpm), the near future conditions may be met, unless the largest well is out of service. If this were the case, and only 70 gpm were available from the well field, the near future Q3 average day could be met with two wells running 22 hours per day. In keeping within a program of an average of 12 hours of run time on wells, with

the largest well out of service, there is a short fall of $129 \text{ gpm} - 75 \text{ gpm} = 54 \text{ gpm}$. This would be reflective of the minimum additional water that would be required from other (projected to be near the water tank) sources of water.

12. Under the assumption that with "unaccounted for" water, the total maximum week during the summer quarter water use for 900 customers would be $111,000 \pm \text{gpd}$, or 77 gpm . If this number is doubled to reflect a 2.0 safety factor, then 154 gpm would be required. Given this future projected number of customers, we would suggest that the 154 gpm should be able to be supplied with the system's largest well out of service during a 16 hour pumping duration. This would seem to be very reasonable, given the water storage capacity of 325,000 gallons.
13. Under the present estimated water supply capacity, the Paradise Shores well field has 3 existing bedrock wells. Their reported yields are 75 gpm , 35 gpm and 35 gpm . This totals 145 gpm . If the 75 gpm well ultimately happens to be the largest well, then the proposed well field in the vicinity of the tank should be developed in a manner that will provide an additional minimum of 60 gpm in order to meet the future projected build-out numbers under the proposed water use projected in Item 8 at a total of 900 customers and the allowance of 16 hours per day pumping capacity, or a total of 205 gpm , from all sources of well water.

We trust that the information above adequately addresses Item 2 in the LOD. LRWC, Hydro-Source, and Lewis Engineering will continue to evaluate the system's existing sources. This will include all water sources intended to be used as long term sources of water to include the existing wells plus further development and evaluation of existing and proposed test wells. This work is currently under evaluation by LRWC and Hydro-Source.

Your continuing input and assistance on this project is appreciated. Please feel free to contact our office with any questions, comments, or if additional information is required at this time.

Further distribution of this correspondence is left to your discretion.

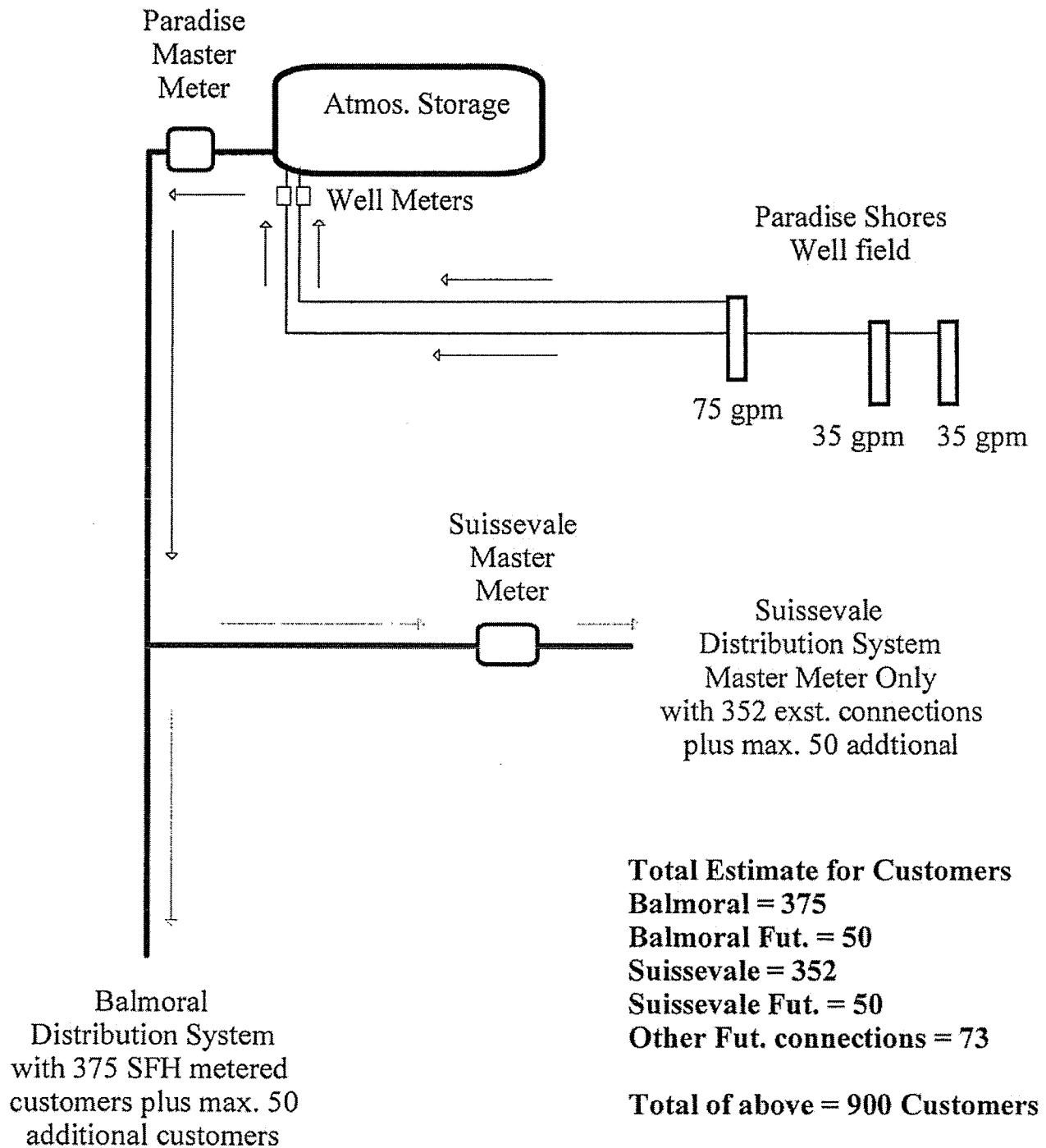
Respectfully,
Lewis Engineering, PLLC

Bruce W. Lewis

Bruce W. Lewis, P.E.

Cc: Tom Mason, Jr., Lake Region Water Co.
Fred Bickford, Hydro-Source
Jim Donison, N.E. Engineering

**LRWC's Paradise Shores Water System Schematic
EPA # 1612010 - Existing Conditions**



Lewis Engineering
Litchfield, NH
April 2008
Ref. 2007.016
\200716DS

Paradise Shores Master Meter Pit					All	Suissevale Eden Lane Meter					Suisse	Percentage of POASI use			Balmoral			
(outgoing to PS & POASI)						Total Usage	(outgoing to POASI only)					Suissevale Gal + PS Master Meter Pit)			Gallons	gpd		
Date	Reading	Cubic Feet	Gallons	gpd			Date	Reading	Cubic Feet	Gallons		gpd	Date	% of Daily Use				Avg per weekend
Wkend	7/13/07	00598131			89,725	Wkend	7/13/07	01159827		49,904	7/13/07							
	7/16/07	00634117	35,986	269,175			7/16/07	01179842	20,015		149,712	7/16/07	55.62%		119,463	39,821	44.38%	
	7/17/07	00644874	10,757	80,462	140%		7/17/07	01185880	6,038	45,164	7/17/07	56.13%						
	7/18/07	00654087	9,213	68,913			7/18/07	01190677	4,797	35,882	7/18/07	52.07%						
	7/19/07	00662842	8,755	65,487	71,565	Wkend	7/19/07	01195076	4,399	32,905	154%	7/19/07	50.25%					
Wkend	7/20/07	00672387	9,545	71,397			7/20/07	01199614	4,538	33,944	36,974	7/20/07	47.54%					
	7/23/07	00712512	40,125	300,135	100,045		7/23/07	01222446	22,832	170,783	56,928	7/23/07	56.90%	52.22%	129,352	43,117	43.10%	
	7/24/07	00722710	10,198	76,281			7/24/07	01228822	6,376	47,692		7/24/07	62.52%					
	7/25/07	00733076	10,366	77,538	121%		7/25/07	01235100	6,278	46,959		7/25/07	60.56%					
	7/26/07	00744941	11,865	88,750			7/26/07	01243202	8,102	60,603	120%	7/26/07	68.28%					
Wkend	7/27/07	00757573	12,632	94,487	84,264	Wkend	7/27/07	01251404	8,202	61,351	54,151	7/27/07	64.93%					
	7/30/07	00798397	40,824	305,364	101,788		7/30/07	01277489	26,095	195,191	65,064	7/30/07	63.92%	64.43%	110,173	36,724	36.08%	
	7/31/07	00807693	9,296	69,534			7/31/07	01283859	6,360	47,573		7/31/07	68.42%					
	8/1/07	00819221	11,528	86,229	158%		8/1/07	001291687	7,828	58,553		8/1/07	67.90%					
	8/2/07	00828995	9,774	73,110			8/2/07	01298834	7,147	53,460	139%	8/2/07	73.12%					
Wkend	8/3/07	00841696	12,701	95,003	80,969	Wkend	8/3/07	01307421	8,587	64,231	55,954	8/3/07	67.61%					
	8/6/07	00892973	51,277	383,552	127,851		8/6/07	01338669	31,248	233,735	77,912	8/6/07	60.94%	64.27%	149,817	49,939	39.05%	
	8/7/07	00901423	8,450	63,206			8/7/07	01345893	7,224	54,036		8/7/07	85.49%					
	8/8/07	00911896	10,473	78,338	132%		8/8/07	01352545	6,652	49,757		8/8/07	63.52%					
	8/9/07	00923265	11,369	85,040			8/9/07		6,652	49,757	126%	8/9/07	58.39%					
Wkend	8/10/07	00935246	11,981	89,618	79,051	Wkend	8/10/07		6,315	47,151	51,440	8/10/07	58.38%	60.36%	117,847	39,282	37.65%	
	8/13/07	00977094	41,848	313,023	104,341		8/13/07		6,176	45,151	65,059	8/13/07	62.35%					
	8/14/07	00989488	12,394	92,707			8/14/07		5,187	38,799	180%	8/14/07	56.25%					
	8/15/07	01001992	12,504	93,530	117%		8/15/07	01404429	5,187	38,799		8/15/07	41.48%					
	8/16/07	01013351	11,359	84,965			8/16/07	01404430	1	7	180%	8/16/07	0.01%					
Wkend	8/17/07	01024942	11,591	86,701	89,476	XXX	8/17/07	01409261	4,831	36,136	31,773	8/17/07	41.68%					
	8/20/07	01057065	42,123	315,080	105,027		8/20/07	01432258	22,997	172,018	57,339	8/20/07	54.59%		143,062	47,687	45.41%	
	8/21/07	01077653	10,588	79,198			8/21/07	01437775	5,517	41,267		8/21/07	52.11%					
	8/22/07	01088022	10,369	77,560	128%		8/22/07	01443489	5,714	42,741		8/22/07	55.11%					
	8/23/07	01097327	9,305	69,601			8/23/07	01448515	5,026	37,594	126%	8/23/07	54.01%					
Wkend	8/24/07	01107523	10,196	76,266	75,656		8/24/07	01454223	5,708	42,696	41,075	8/24/07	55.98%					
	8/27/07	01146229	38,706	289,521	96,507		8/27/07	01474940	20,717	154,963	51,654	8/27/07	53.52%		134,558	44,853	46.48%	
	8/28/07	01155604	9,375	70,125			8/28/07					8/28/07	50.74%					
	8/29/07	01164948	9,344	69,893	159%		8/29/07					8/29/07	51.38%					
	8/30/07	01174803	9,855	73,715			8/30/07		4,754	35,380	177%	8/30/07	48.24%					
Wkend	8/31/07	01185156	10,353	77,440	72,793		8/31/07	01494512	5,260	39,345	36,600	8/31/07	50.81%					
	9/4/07	01246872	61,716	461,636	115,409		9/4/07		773	6,116	64,943	9/4/07	56.27%		201,863	50,466	43.73%	
	9/5/07	01254490	7,618	56,983			9/5/07			616	122%	9/5/07	53.73%					
	9/6/07	01261334	6,844	51,193	123%		9/6/07		439	29,192		9/6/07	55.71%					
Wkend	9/7/07	01268589	7,255	54,267		54,148		9/7/07			66,836	9/7/07	52.41%					
	9/10/07	01295395	28,806	200,509	66,836		9/10/07	01555277	14,328	107,173	35,724	9/10/07	53.45%		93,335	31,112	46.55%	
	9/11/07	01300897	5,502	41,155			9/11/07	01557908	2,631	19,680		9/11/07	47.82%					
	9/12/07	01306523	5,626	42,082	132%		9/12/07	01560773	2,865	21,430		9/12/07	50.92%					
	9/13/07	01312549	6,026	45,074			9/13/07	01563627	2,854	21,348	132%	9/13/07	47.36%					
Wkend	9/14/07	01318899	6,350	47,498	43,952		9/14/07	01566960	3,333	24,931	21,847	9/14/07	52.49%					
	9/17/07	01343393	23,191	173,469	57,823		9/17/07	01578569	11,609	86,835	28,945	9/17/07	50.06%		86,633	28,878	49.94%	
	9/18/07	01347681	5,591	41,821			9/18/07	01581486	2,917	21,819		9/18/07	52.17%					
	9/19/07	01353900	6,219	46,518	140%		9/19/07	01584664	3,178	23,771		9/19/07	51.10%					
	9/20/07	01359973	6,073	45,426			9/20/07	01587588	2,924	21,872	137%	9/20/07	48.15%					
Wkend	9/21/07	01366399	6,426	48,066	45,458		9/21/07	01590962	3,374	25,238	23,175	9/21/07	52.51%					
	9/24/07	01392003	25,604	191,518	63,839		9/24/07	01603689	12,727	95,199	31,733	9/24/07	49.71%		96,320	32,107	50.29%	
	9/26/07	01405843	13,840	103,523			9/26/07	01610984	7,295	54,567		9/26/07	52.71%					
	9/27/07	01412299	6,456	48,291	62,096		9/27/07	01614446	3,462	25,896		9/27/07	53.62%					
	9/28/07	01418723	6,424	48,052			9/28/07	01617643	3,197	23,914		9/28/07	49.77%					
	10/1/07	01443628	24,905	186,289		10/1/07	01630893	13,050	97,614	32,538	10/1/07	52.40%		88,675	29,558	47.60%		
	10/2/07	01450332	6,704	50,146	102/07		10/2/07	01634133	3,440	25,731		10/2/07	51.31%					
	10/3/07	01457118	6,786	50,759			10/3/07	01637483	3,350	25,058		10/3/07	49.37%					
	10/4/07	01463185	6,067	45,381		10/4/07	01640549	3,066	22,934		10/4/07	50.54%						

Paradise Shores Meter Reads

Billing Cycle Period	Previous Date Cycle was Read	Current Date of Cycle Read	No Days in Reading Cycle	Total No. Customers Billed*	Total PS Billed Usage	Total PS Billed Usage less leaks***	Total POASI Billed Usage	Total Usage Billed* (100 ft ³ units)	Total Gallons Sold to PS Only**	Total Gallons Sold to POASI only	Total Gallons Sold*	Total Zero Usage Customers	Total PS Customers Billed for Usage**	Avg. PS Usage per Cust. For Qtr. (100 ft ³ units)***	Avg. PS Usage per Cust. For Qtr. (gallons)***	Avg. PS Daily Usage Per Cust. For Qtr. (gallons)***
07/01/2007 - 09/30/07	6/25/2007	9/25 - 9/26/07	92	376	3670	3467	5629	9299	2,745,160	4,210,492	6,955,652	56	319	11	8,155	89
10/01/2007 - 12/31/2007	9/25 - 9/26/07	12/27 - 12/28/07	92	376	1818	1727	2229	4047	1,359,864	1,667,292	3,027,156	119	256	5	4,062	44
Totals for July - December 07			184	752	5,488		7,858	13,346	4,105,024	5,877,784	9,982,808	175	575	16	12,217	133

* Including POASI (approximately 350 customers)

** Not including POASI

*** Less a customer with excess usage b/c of irrigation system leak in home

**Paradise Shores Water System
Water Use Analysis
"April 2008"**

All Water Pumped Paradise Shores Master Meter Pit (MASTER PUMP STATION METER outgoing to PS & POASI) "100%"					Suissevale Water Pumped Suissevale Eden Lane Meter ONE MASTER METER 352 UNITS						Balmoral Water Pumped 375 UNITS			
Date	Reading	Total Usage		All gpd	POASI Usage		Sulsse gpd	Suissevale % DAILY USE	Date	Balmoral Gallons	Balmoral gpd	Balmoral % DAILY USE		
		Cubic Feet	Gallons		Cubic Feet	Gallons								
Q3 2007	7/1/07	00481875							7/1/07					
	9/30/07	01443628	961,753	7,193,912	79,054	535,610	4,006,363	44,026	55.69%	9/30/07	3,187,550	35,028	44.31%	
Q4 2007	10/1/07	01443628							10/1/07					
	12/31/07	01965100	521,472	3,900,611	42,864	222,660	1,665,497	18,302	42.70%	12/31/07	2,235,114	24,562	57.30%	

Balmoral (Paradise Shores) Meter Reads										
Billing Cycle Period	Current Date of Cycle Read	No Days in Reading Cycle	Total No. Customers Billed*	Total PS Billed Usage	Total Gallons Sold to PS	Total Zero Usage Customers	Number of PS Customers Billed for Usage**	Avg. PS Usage per Cust. For Qtr. (100 n3 units)***	Avg. PS Usage per Cust. For Qtr. (gallons)***	Avg. PS Daily Billed Usage Per Cust. For Qtr. (gallons)***
Q3 2007	9/25 - 9/26/07	92	376	3670	2,745,160	57	319	12	8,606	94
Q4 2007	12/27 - 12/28/07	92	376	1218	1,359,864	118	256	7	5,312	58

Suissevale Metered Water Use				Balmoral (Paradise Shores)							
Master Meter Use Gallons	Gallons per Customer (352)	Metered Suissevale actual GPD (352)	Total Individual Gallons Sold to PS Only**	Calculated Balmoral Master Meter	Total PS Customers Billed for Usage**	Individual Metered Gal / customer	Pumped Gallons per Customer	Metered Gal/Cust /Day	Pumped Gal /Cust / Day	Water loss	
Q3 2007	4,006,363	11,382	124	2,745,160	3,187,550	319	8606	9992	94	109	13.88%
Q4 2007	1,665,497	4,732	51	1,359,864	2,235,114	256	5312	8731	58	95	39.16%

Suissevale Metered Water Use At 13.88% Unaccounted-For Water			Balmoral (Paradise Shores) At 13.88% Unaccounted-For Water			
Estimated Metered Gal/Cust/Day	Pumped/ Metered Suissevale actual GPD (352)		Metered Gal/Cust /Day	Calculated Gal /Cust / Day	Water loss	
Q3 2007	107	124	Q3 2007	94	109	13.88%
Q4 2007	44	51	Q4 2007	58	67	13.88%