

To: Ed Crouse
Improvements Committee

From: R. Lee Lawrence

Date: October 16, 1998

Subject: Laguna Joaquin Water Quality

Laguna Joaquin was constructed in 1970 by the Operating Engineers to have a place to store water for irrigation of the north golf course areas that were not covered under riparian water rights.

To build the lake and use the Cosumnes Irrigation Association Ditch to move the water from the Granlee's Dams to the lake it was agreed that the ranches within the District could store irrigation water for 30 days at a time during the summer months. A water right was obtained to do that.

The lake was used to store drainage runoff water and to store water from the river for golf course irrigation, as time went on more and more water was being passed through the lake from the drainage system. In 1988 the RMCC rebuilt the north course and turned the pump station on Laguna Joaquin over to RMA for common area irrigation.

In 1987 RMCS D and RMA developed an agreement on the lakes where the water users at Laguna Joaquin would pay all RMCS D cost to maintain the water quality or do any cleanup of the lakes, copy of that matrix is attached. RMA is the only user of water out of Laguna Joaquin so they would pay the cost for any water quality improvements.

Some questions have been raised as to why something cannot be done to improve the water quality in Laguna Joaquin. There have been several suggestions on how to clear up the lake and how to improve the water quality in the lake. Some of the suggestion put forth to do this are:

Alternative #1 ADD MORE FOUNTAINS

The fountains were add to Laguna Joaquin in 1987 by RMCS D to help improve the water quality and avoid a major fish kill as had happen in the past. The fountains were installed at a cost of \$36,000 and were to be operated to maintain the oxygen level in the water. As time went on the residences got use to the fountains and complained when they were not operating. RMA paid for the cost of the fountains and the electrical cost to operate them.

The fountains do a good job of adding oxygen to the lake water and in doing so give the algae in the bottom of the lake part of the food it needs to grow, so adding more fountains contributes to the algae and odor problem.

Alternative # 2 DIG IT DEEPER:

Laguna Joaquin is about 25 acres and 6 feet deep to dig it to 12 feet deep it would be necessary to move 200,000 cubic yards at a estimated cost of \$10 to \$12 per yard for a estimated total cost of \$2.0 to \$2.5 million dollars.

Some of the main problems are:

- Complete a full EIR for the soil to be removed.
- Where will the soil being dug out be disposed of.
- How to handle the constant inflow of water into Laguna Joaquin.
- Could the work be completed in one season by the Training Center.
- How would RMA irrigate their area during the time the lake was empty.
- The last 4 feet of water would have to be pumped out, there is no drain.

Alternative #3 FILTER ALL WATER INTO THE LAKE:

All water running into Laguna Joaquin is drainage water or raw river water that is full of nutrients that feed the alga already in the lake. Laguna Joaquin has the worst of all conditions when it comes to alga growth it is shallow, plenty of sunlight, plenty of air from the fountains and a large supply of nutrients in the water.

To clean up the water before it gets into the lake would require a filter plant of some kind that could work with a small amount of water passing over it because of the elevations of the ditches as they flow into the lake.

Laguna Joaquin is a drainage lake that can be cleaned up to pristine water quality, all it takes is money. We must remember that it is a drainage lake that is designed to accept and let settle out the materials in the drainage system before the water passes into the river.

Some of the questions that come to mind are:

- Where do we build it, on what land.
 - Do we build more than one plant or pipe all inlet water to the one plant.
 - Who will operate and maintain this plant, RMCSO or RMA.
- Where will the funding for construction come from. Estimate of \$6/gal/day.

Alternative #4 RAISE THE DAM TO DEEPEN THE LAKE:

The lake has a freeboard of 4 to 5 feet from the high water line and raising the dam by 3 to 5 feet could place some of the houses around the lake into the FEMA Flood area which would require them to have flood insurance. Raising the dam by 1 to 2 feet might not present a problem for the homes but could cause a major problem with flooding back up in the drainage ditches.

Raising the dam is a minor problem to do it is only adding rows of concrete blocks on top of the 30 foot dam but the problems created would transfer our problem to several of the residences.

Alternative #5 USE OF AQUA SHADE WATER DYE

Aqua shade is a water dye that prevents sunlight from getting into the water and allowing the algae to grow, the amount of dye added is directly related to the amount of algae control you obtain. It is recommended that this dye be used in closed systems and not to systems that have a constant flow of water coming into the system, such as we have.

We are still looking into the use of Aqua Shade and what effects it could have on Laguna Joaquin water.

Alternative #6 CHANGE IRRIGATION SYSTEM (RMA)

Part of the problem is the water being pumped out of the lake for irrigation is coming from the bottom of the lake and full of algae and when it hits the lawns it dies and creates a major odor problem.

If Aqua Shade is used would it turn the lawns blue because it is a dye, should RMA use some type of chemical to kill the algae or should they install some type of filter to remove the algae before it gets onto the lawns.

Alternative #7 PUBLIC EDUCATION OF THE USES OF THE LAKE

To educate the public about the water in Laguna Joaquin and where it comes from and what it is used for would require putting together a mailing on the lake explaining all of that and having meetings with the residences to answer their questions. Even with that there would be some residences would not believe what was said.

This is the one thing that would get more information out to the public and do the most good.

Alternative #8 CHANGE OPERATION OF DRAINAGE SYSTEM

At present we clean the drainage ditches and spray them to prevent any growth of weeds in the bottom. A possible suggestion would be to let the weeds grow to a height of 6 inches in the bottom of the ditches which would hold back some water and use the water and nutrients before they can reach Laguna Joaquin.

This could reduce the chemical cost in the drainage budget and reduce the cost of labor to spray the ditches. It would take some study and checking to make sure no flooding will occur with this change in normal operation of the drainage ditches.

The above 8 alternatives are the suggestions we have heard or items that we have considered on ways to clean up the water in Laguna Joaquin, all of them are good ideas each with its own merits and each with its own drawbacks.

There is no way this lake will have a pristine look to it unless something is done to correct the things that cause the problems with the water. The fountains were placed in the lake to maintain the oxygen levels in the water and not for their ability to clean up the lake, they add to the algae problem.

This lake is not used as a swimming lake because it is a drainage-settling basin.

This memo is for information and if you have any other suggestions we will be happy to look into them and see if they can be made to work,

EXHIBIT C
 RECLAIMED WASTEWATER & RAW WATER DELIVERY SYSTEMS
 OPERATION AND MAINTENANCE
 RESPONSIBILITY MATRIX

No.	Facility	A. TYPE		B. OWNERSHIP		C. OPERATION AND MAINTENANCE		D. COST OF O&M		E. WATER QUALITY		F. POINT OF SERVICE	G. REMARKS
		Reclaimed Wastewater	Raw Water	District	Non District	District	Non District	District	Non District	District	Non District		
1	Reclaimed Wastewater Equalization Pond	0		0		0		0		0		n/a	Pond level controlled by District
2	Equalization Pond-Lakes 16/17 (South Course) Pipeline	0		0		0		4		0		Pipeline Discharge Structure at Lake 16	
3	Lake 10-16/17 (South Course) Transfer Pipeline	0	0		RMPI		RMCC		RMCC		RMCC	n/a	Lake level controlled by RMCC via Adjustable Probes and transfer pumps
4	Lakes 10 & 16/17 (South Course)	0	0		RMPI		RMCC		RMCC		RMCC	n/a	Lake level controlled by RMCC via Adjustable Probes and Transfer Pumps
5	North Course Irrigation System	0	0		RMPI		RMCC		RMCC		RMCC	n/a	
6	South Course Irrigation System	0	0		RMPI		RMCC		RMCC		RMCC	n/a	
7	North Course Pumps at Equalization Pond	0		0		0			RMCC	0		Pump Station Intake Structure at Equalization Pond	Pumps controlled by Irrigation System
8	North Course Treated Effluent Force Main (Wastewater treatment plant to Yellow Bridge)	0		0		0		4		0		North Course Side of PRV near Yellow Bridge	
9	Bass Lake River Pump and Pipeline to Bass Lake		0		RMPI	0		6		0		Pipeline Discharge Structure at Bass Lake	Water quality dictated by Cosumnes River quality

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		Reclaimed Wastewater	Raw Water	District	Non District	District	Non District	District	Non District	District	Non District		
10	Bass Lake Pipeline/Lake Clementia - Lake 10 Pipeline Intertie	0	0		RMPI	0		6		0		Lake Clementia - Lake 10 Pipeline Intertie	Water quality dictated by Cosumnes River quality
11	Bass Lake	0	0	1		1		1		1		n/a	Lake level controlled by District upon request of RMCC
12	Bass Lake Irrigation Pump Station	0	0		RMPI		RMCC		RMCC		RMCC	Pump Station Intake Line	Pumps controlled by Irrigation System
13	Cosumnes Irrigation Association System		0	2		2		2		2		n/a	System includes Granules Dam, CIA Ditch; Pipelines & Appurtenances
14	Laguna Joaquin		0	1		1		1		1		n/a	Lake level controlled by District
15	Laguna Joaquin Pump Station		0		RMPI		5		5		5	Pump Station Intake Line	Pumps controlled by Irrigation System
16	River Pump at Old Bridge		0		RMPI		RMCC		RMCC		RMCC	n/a	Water quality dictated by Cosumnes River quality
17	Lake Clementia		0	3		3		3		3		n/a	Lake level controlled by District
18	Lake Clementia-Lake 10 (South Course) Pipeline		0	0		0		4	4	0		Pipeline Discharge Structure at Lake 10	
19	North Course Treated Effluent Force Main (Yellow Bridge to Bass Lake)	0			RMPI		RMCC		0	0		North Course side of PRV near Yellow Bridge	

Footnotes:

1. Bass Lake and Laguna Joaquin are owned by Rancho Murieta Association (RMA), but the District has an Easement for Operation and Maintenance of the lakes. District is responsible for water quality and control of aquatic growth and for maintaining the water level in the lakes. The District recovers its cost for operation and maintenance by direct billing to its customers.
2. The system is owned by the Cosumnes Irrigation Association (CIA), but the District is authorized by the CIA to operate and maintain the facilities. The District charges CIA for its expenses and CIA in turn prorates this expense to its members on a benefit basis. Since the District is a member of CIA, the District in turn bills its customers for their respective share of these expenses. Water quality in CIA system is dictated by Cosumnes River quality.
3. Lake Clementia is owned by RMA, but the District has an easement from RMA for operation and maintenance of the lake. The District is responsible for maintaining water level within limits of water rights, water quality and control of aquatic growth below the high water line of the lake and for maintenance and control of vegetation above the high water line of the lake. The District recovers its cost for diversion, storage and release of water by meter charges to its customers.
4. District and RMCC agree to share the Operation and Maintenance costs of these facilities on a 50/50 basis.
5. RMCC and RMA will share the responsibilities and costs on a mutually agreeable pro rata basis.
6. The District recovers its cost for operation and maintenance of this facility by direct billing to its customers.