

Comments on Eco:Logic's "DSPUD Wastewater Facility Plan" of May 2010

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Eco:Logic's proposed 20.2 million dollar plant upgrade may be elegant, but it is also very expensive. A sufficient and affordable alternative would be to fix the plant, not expand it. Once fixed, a better understanding of the plant's capacity and a better use of equalization may lead to the desired 21% increase in future EDUs.

There are Cheaper Alternatives

If one looks at fixing the current plant to meet the new Ammonia and Nitrate limits without increasing the capacity of the plant, then the cost is less than half the expense Eco:Logic is proposing. One comes to this conclusion by assuming a better use of equalization and by scaling back Eco:Logic's cost estimates to reflect current flows.

This suggested \$8.3M "Just Fix It" solution includes many of Eco:Logic's proposals, including equalization, influent heating during the winter months, improved ammonia/methanol/soda feeding systems, reuse of the existing AccuWeb frames in a four stage process, and the use of UV disinfection. This "Just Fix It" solution saves money because it doesn't require new clarifiers, sludge handling improvements or any filtering upgrades.

The bottom line is that a careful read of Eco:Logic's report leads to an \$8.3M "Just Fix It" solution, not the \$20.2M solution they've proposed.

The Wrong Approach

One wonders, when reading Eco:Logic's plan for fixing and expanding DSPUD's treatment plant, whether a cost effective solution was actually ever considered. The report is well written, very persuasive, but misleading. If one reads the report while searching for what it would take to fix the existing plant, not expand it, then one would be disappointed. Fixing the existing plant, or even considering what capacity the existing plant could provide, is not addressed. In addition, the report doesn't take full advantage of the flow and load limiting potential of equalization.

The expansion numbers are wierd

The assumptions for expansion do not make sense. DSPUD and SLCWD have asked for a 21% increase in EDUs, but Eco:Logic wrote the report assuming a 32% increase in peak flow and loading. Logic dictates that a 21% increase in hookups should be a 21% increase in peak flow and peak loading, not 32%. The 32% increase is not justifiable. In fact, as the existing peak flow includes I&I (unwanted Inflow and Infiltration leakage into sewer pipes), and since one can assume that I&I will not increase with new hookups, then the peak flow should increase much less than 21%. Eco:Logic's 32% load increase assumption has driven Eco:Logic's cost estimates through the roof.

The \$12 million Expansion, Who Pays for it?

Eco:Logic's assumption that the plant needs to process 32% more loading to handle a desire for 21% more EDUs more than doubles the cost from the "Just Fix It" \$8.3M solution to Eco:Logic's proposed \$20.2M solution. Do the rate payers really want to pay \$11.9 million for future expansion?

If DSPUD plans to charge the \$11.9 million to new ratepayers, then each new hookup will cost \$30,000. Will there be buyers for these new EDUs? Will DSPUD "bankroll" the \$11.9 million expansion until someone buys the new hookups?

SLCWD should pay less for the Upgrade/Expansion

The report also claims that each new DSPUD hookup contributes twice the peak flow and peak load than each new SLCWD hookup contributes. Why is this? Does Eco:Logic assume Serene Lakes Cabins are somehow more efficient than DSPUD cabins? Is Eco:Logic assuming that new DSPUD hookups will be resort/commercial hookups and those are somehow more "loaded"? This lopsided flow/loading per EDU does not make sense. A new EDU should be a new EDU, independent of its SLCWD or DSPUD source.

If one does use Eco:Logic's EDU numbers, then SLCWD's share of the flow and load expansion is only 10% of the total flow/load increase. This means that SLCWD should only pay 10% of the \$11.9M expansion cost. Add SLCWD's contractual 46% share of the "Just Fix It" upgrade cost of \$8.3M to 10% of the \$11.9M expansion cost, and SLCWD's share of the project is only \$5 million. DSPUD needs to pick up the remaining \$15.2 million.

The conclusion is, if DSPUD pursues the \$20.2 million upgrade/expansion, then SLCWD should only pay \$5M as its share.

What is the "just fix it" upgrade?

The objective of the "Just Fix It" upgrade described here is to look at what can be done to make the current plant

meet the new effluent quality limits while assuming that the current flow and influent loading doesn't change.

The needed improvements, according to Eco:Logic's report, are: to add equalization, to heat the influent as necessary, to improve the ammonia/methanol/soda feeding equipment, to switch to a four stage biological process, and to improve disinfection. What Eco:Logic does not address is how the current plant can be retrofitted to meet these goals without adding expensive new structures and equipment.

If one assumes the current flows remain unchanged, and equalization is added to limit peak flows, then the current plant should easily handle the improved four stage biological process using the existing AccuWeb frames and without building new clarification basins. The existing clarifiers in the center of the plants are reused, and the four stage process is implemented by dividing the outer ring basins of each plant into four basins to handle the four stage anoxic-aerobic-anoxic-aerobic processing steps.

Most of Eco:Logic's other suggestions for improving the operation or for enhancing the safety of the plant are incorporated in this "Just Fix It" solution, but scaled back to reflect the reduced peak equalized flows.

The "Just Fix It" upgrade and its costs are outlined below.

Peak flow and Loading after equalization

Eco:Logic shows in the equalization study (included in the report's appendix) that peak flows over the last 10 years can be drastically limited using equalization. They show that, with the exception of the 2005/2006 rain on snow event that caused I&I flooding through the system, the peak flow can be reduced to below 0.4MG/day by adding only 500,000 gallons of equalization storage (see figure A9 of the equalization report). Therefore, a 0.4MG/day peak flow limit seems quite reasonable considering the 700,000 gallons of equalization storage being proposed by Eco:Logic.

The unusually high flow event that occurred over the 2005/2006 holidays should be considered a 10 to 20 year anomaly. That year the daily peak flow spiked to around 1MG/day due to a freak "rain on snow" event. This unusual event would be handled using what Eco:Logic describes in the report as the current plant's emergency plan:

As an example of emergency provisions for high flows, the DSPUD plant design in 1985 was based on an equalized peak 3-day flow of 0.52 Mgal/d. However, the plant was designed to hydraulically pass the projected peak hour flow rate of 1.7 Mgal/d, in case the equalization storage tank was prematurely filled. In the event of such high emergency flows, treatment performance could be severely impacted, including the need to partially or fully bypass the filters. Any noncompliant final effluent could be routed to the emergency storage tank (for storage and subsequent re-treatment) until that tank is filled, but then would have to go to the river discharge.

The emergency plan should remain, i.e., if equalization storage is getting full, then treatment flows through the plant needs to be increased, even if full treatment can not be sustained. The partially treated effluent is stored in the 1.6MG emergency storage tank and then routed back through processing when the peak flows subside. Note that even Eco:Logic's proposed \$20.2M plan could not have handled the 2005/2006 event and would have to use this same emergency "overflow" procedure.

Eco:Logic's proposed equalization technique unnecessarily increases peak flows

Eco:Logic has proposed using the equalization storage to perform "seven day flow averaging" instead of performing "peak flow limiting" as described in their previous report. Their flow "averaging" approach, which is much harder for plant operators to implement, results in higher post-equalization peak flows than are needed. There is very little justification given for this new "averaging" approach other than it was used for the simulation of their "pet" four stage MBR process. Eco:Logic's proposed flow "averaging", when scaled by 32% to allow for growth, results in a peak flow of 0.72 MG/day, much higher than the 0.4MG/day achieved by simply peak flow limiting. Even if the 0.4MG/day limit is scaled up by 32% to allow for growth, the limit should be 0.52MG/day, not 0.72MG/day.

As a result, Eco:Logic analyses the wastewater treatment options assuming 0.72 MG/day as the post equalization peak flow. In contrast, the "Just Fix It" design assumes a peak flow of 0.4MG/day, thereby drastically reducing the cost of the upgrades.

The peak flow equalization also limits the peak BOD loading. Rather than the 1100Lb/day loading used by Eco:Logic in their simulation (see Figure 9-19), the peak loading for a "Just Fix It" solution is only 500Lb/day.

Equalization Cost

The 700,000 gallon equalization storage system proposed by Eco:Logic is more than sufficient to limit the flows to 0.4MG/day. Eco:Logic's capital cost estimate of \$950k is used for equalization.

Influent heating Cost

The influent heating system proposed by Eco:Logic is included at a cost of \$740k. The actual cost may be much lower when scaled to heat a 0.4MG/day flow rather than a 0.72MG/day flow.

Ammonia/Methanol/Soda Feeding Cost

The ammonia/methanol/soda feeding system improvements proposed by Eco:Logic are included at a cost of \$420k.

Biological Treatment Cost

Eco:Logic examined two treatment options that used fixed media technology (IFAS) and one option using their "pet" MBR technology system. These options were examined with the 0.72MG/day peak flow and 1100Lb/day peak loading assumptions, not the lower 0.4MG/day peak flow and 500Lb/day peak loading of the "Just Fix It" goal. This means that the biological basin sizings in the report can be scaled back by 0.4/0.72 for flow or 500/1100 for loading to match the "Just Fix It" requirements.

Eco:Logic determined that the IFAS processing options needed 511,000 gallons of reactor volume to meet the new effluent limits. When this volume is scaled back to reflect the "Just Fix It" flows and loads, the needed reactor volumes are between 232,000gal (scaled for load) and 289,000gal (scaled for flow). Since the current plant has 340,000gal of reactor volume in the outer treatment rings, the IFAS processing can fit into the outer rings and don't need to use the inner clarifier basins. This means that either IFAS option would fit easily into the current plant without the need to build new clarifiers.

Eco:Logic emphasizes that treatment is a function of total suspended solids inventory as shown in table 9-5 of their report. When their "pet" MBR design's suspended solids inventory of 39,000Lbs is scaled back to reflect the lower peak loading of the "Just Fix It" goal, the MBR solids requirement drops to 17,000Lbs. An estimate of the current solids inventory for the existing AccuWeb frames (30 frames at 250 Lb/frame according to Brentwood, plus the suspended liquor solids of 7500Lbs) shows that the existing plant has around 15,000Lbs of solids, roughly equivalent to the scaled back MBR system. If the mixed liquor concentration is increased from 3,000mg/L to 4,000mg/L, as Eco:Logic says is possible for the IFAS systems, then the current system will even have more suspended solids than the MBR system.

Finally, there is no rational reason to get rid of the existing AccuWeb frames. Brentwood has discontinued them because of the redworm problem, but as DSPUD does not have a redworm problem, and due to DSPUD's climate and location, is not likely to ever have one, the existing frames are fine and should be reused in the new four stage configuration.

Eco:Logic also doesn't mention that IFAS systems are considered better for DSPUD's conditions because the large attached biological growths are more robust during wide temperature swings, and are less susceptible to washing out during peak flows.

The "Just Fix It" biological treatment cost can be estimated, using Table 9-4 as a guide, as: demolition and modification (\$150,000), new anoxic mixer (\$90,000) and new aeration facilities (\$250,000). This total is \$490,000.

Sludge Handling Cost

As the existing sludge handling and drying beds are adequate for the existing flows, no improvement cost is needed.

Filtering Cost

Eco:Logic's report only proposes additional filtering costs to add a backwash storage system. As the backwash storage system is only needed to prevent disruption during chlorine disinfection, and UV disinfection is being proposed for the "Just Fix It" solution, then no filtering improvement cost is required.

Disinfection Cost

DSPUD needs to avoid the byproduct contaminants introduced by their current chlorine disinfection system. In addition, as a safety issue, it is desirable to get rid of chlorine altogether. UV disinfection has no byproducts and requires no chlorine, and is better for the South Yuba River, and should be adopted. With the reduced equalized flows, the closed vessel UV system described by Eco:Logic will work for the proposed non-MBR solution. The closed vessel UV system also reduces the physical footprint of the disinfection system. Eco:Logic's cost of the closed vessel UV system (\$700,000) is included.

Reduction in Miscellaneous Costs

The report does not justify the need for more office/shop space (\$75,000) or a new standby power system (\$300,000) which have been added to the Eco:Logic cost summary (Table 2-11). These should only be included in a "Just Fix It" solution if they are needed to meet the new effluent requirements.

"Just Fix It" Summary

The total cost for the "Just Fix It" option is:

Item	Cost (\$)
Equalization	950,000
Heating	740,000
Feeding	420,000
Biological	490,000
Disinfection	700,000
Total Capital	3,300,000
Electrical (25%)	825,000
Sitework (5%)	165,000
Site Plumbing (10%)	330,000
Subtotal	4,260,000
General Conditions, OH, profit (20%)	852,000
Subtotal	5,544,000
Contingencies (20%)	1,109,000
Subtotal	6,653,000
Engineering, Admin, Environ (25%)	1,663,000
Total	8,316,000

Conclusions

Unless DSPUD can find someone to pay for the \$20.2 million upgrade, Eco:Logic's proposal should be thrown out in favor of a "Just Fix It" solution. DSPUD and SLCWD ratepayers do not need to pay an extra \$12 million for a modest amount of extra EDUs. The rational approach should be to fix the plant, and then see how many more EDUs it can handle.

In fact, the desired 21% expansion may be possible with the "Just Fix It" upgrade because the proposed 700,000 gallons of equalization storage is more than 21% greater than the 500,000 gallons needed for the 0.4MG/day flow limit. The additional equalization storage should be enough to absorb the 21% higher peak flows and still keep the flow through the plant below 0.4MG/day.

The question is: *Do ratepayers want to pay \$20.2 million for elegant and expensive, or \$8.3 million for adequate and affordable? I think I know how the ratepayers would vote!*