	behavior at	design temperature	20 °C			
		s.w.d.	3.5 m			

C-1294 PM lagoon model
tentative first two lagoons

		mgd				
wastewater flow	1600 m3/day	0.423				
BOD in (mg/L)	300		1057.6 lbBOD/day	1586.5 lbO2/day		
TKN in (mg/L)	34		119.9 lbTKN/day	551.4 lbO2/day		
			AOR	2137.9 lbO2/day	89.1 lbO2/hr	

basin I

length	45 m			HP/mg	HP for mixing	if CFM for mixing
width	45 m	obelisk volume	residence (days)	50	67.5	1241 CFM
s.w.d.	3.5 m	5111.2 m3	3.19	60	81.0	
	11.48 (feet)	1.350 mg		70	94.5	

k-rate	0.55	lbBOD/day 1000 cu.ft.	5.9	MLSS	3500
temperature	20	lbBOD/day acre	2113.7	f/m	0.026832

BODout as per EPA model 109 mg/L percent removal 63.7 %

basin II

length	45 m						
width	45 m	obelisk volume	residence (days)	HP/mg	HP for mixing	if CFM for mixing	
s.w.d.	3.5 m	5111.2 m3	3.19	50	67.5	1241 CFM	
	11.48 (feet)	1.350 mg		60	81.0		
		lbBOD/day 1000 cu.ft.	2.1	70	94.5	removedBOD prorate	

BODout as per EPA model **39 mg/L** percent removal 63.7 %

HP share		50.9
#1	0.64	32.4
#2	0.23	11.8
rest	0.13	6.7

total tankage volume 2.701 mg
total residence time 6.39 days

AOR	AOR/SOR	SOR	HP at 2.5 lb/h per HP	de-rate 5	de-rate 10	de-rate 15	HP/mg	HP for mixing
89.1	0.7	127.3	50.9	53.6	56.6	59.9	50	135.0
89.1	0.6	148.5	59.4	62.5	66.0	69.9	60	162.0
89.1	0.5	178.2	71.3	75.0	79.2	83.8	70	189.1

quick-and-dirty diffused aeration estimates
CFM for diffused aeration/oxygen transfer 1304 CFM AOR/SOR = .37 1.7% per feet
HP estimate for oxygen 50.8 HP

notes:

1. The outlet from the second lagoon, with BOD5 = 39 mg/L would be fed to an identical 3rd. Lagoon producing a 14 mg/L effluent
2. I'm taking TKN at full value for HP calculation, although some nitrogen would be used up for normal biological/BOD processes
3. Design spirit for this alternative would be to try to get away with three PM lagoons in series, totalling c. 9-10 days detention.
4. I have used 20°C ww temperature although from G's data, actual temperature values would be much higher, ave 33.14°C
5. Arbitrary k-rate assumed to be 0.55 in order to hover around 10 days residence w/ three cells
6. Actual basin would probably be a single lagoon with partitions rather than isolated constructions, I.e. better retention
7. System is once through, I.e. no RAS help
8. Possible preliminary quote:
   two 20 HP each mechanical aerators for first cell
   two 7.5 HP each mechanical aerators for second cell
   two 5 HP each mechanical aerators for third cell about 65HP total probably high speed units
9. I would label approach as some classical partial mix lagoons in series
10. Will elaborate an activated sludge alternative using f/m=0.1 and 300 gpd/sq.ft. for a secondary clarifier
    using low speed aerators and/or retrievable tube diffusers
11. Assuming no aid at all from DAF, I.e. having to face a BOD5 of about 600 mg/L with same 3-cell approach would probably
    require c. 89 HP (just type in value and see if program works north of the equator); aerator proposal would probably be
    two 30 HP each for first cell
    two 15 HP each for second cell
    two 7.5 HP each for third cell about 105 HP total
12. Aeration allocation/rationale has been to assign HP in proportion to expected removals. I'm aware other approaches may
    propose maintaining or rather evenly spreading HP along say, min. 30 HP per mg (-> 1.35mg*3 basins *30 HP per mg = 121.5 HP needed)
    or zig zaging power densities following some other criteria, e.g. Bartsch & Randall's textile example.
13. While I would to volunteer an improved design, I feel much heresy has been done already so I better quit.

other notes:

14. HP for mixing are calculated on the basis of perhaps medium 50 to 70 HP per tank mg guidelines, too low for complete suspension
15. Diffused aeration is included to have a quick comparison, 0.12 CFM per bottom floor sq.ft.. "Final" calcs would probably recommend
    diffuser software.
16. Sloped basins 1:2 volume calculated according to Bronstein/Semendiaev's Math Handbook. I have been able to test results with
    calculator program based on Crites/Tchobanoglous formula (8-7) page 549 for side sloped earthen basins
17. MLSS value is only "superficially" used to quickly calculate f/m for a possible, ideal situation; does not participate much
18. BOD removal formula is the same as the Bartsch & Randall paper