1630 Switch pump out of Barker Tank into 2nd Rain for Rent Tank.
Check $Q_{TOT}$ = 26,467

System Check – System is in pre sleep mode –

R1 INF – 1.1 gpm
R2 INF – 2.1 gpm
} Increased pump speed to ~45%.

DT 11/18/02

$Q_{TOT_1}$ = 34,298 gal

$Q_{TOT_2}$ = 22,349 gal

NUTRIENT TANKS: 145 + 149 gal = 294 gal

ST #1 – 155 gal + 339 gal
ST #2 – 160 gal + 333 gal

1630 P. Tinnes offsite.

1645 D. Tietje offsite.

[illegible]

TUESDAY SEPT. 10

1730 D. Tietje onsite.

System check

- LEAK IN SUCTION PIPING OF ST#2 METERING PUMP.
- $Q_{R1}$ = 1.02 gpm; $Q_T$ = 23,308 gal
  Δ = 959 gal (1.07 GPM)
- $Q_{R2}$ = 2.38 gpm; $Q_T$ = 36,370 gal
  Δ = 2072 gal (2.3 GPM)
- Q BARKER TANK = 5.16 gpm
  Q PUMPOUT, TOT = 31339 gal
  Δ = 4,872 gal
- Nutrient Tanks – Vol = 126 + 128 = 253 gal
  Δ = 41 gal → 2.73 gph (vs. 2 gph)
- Substrate Tanks
  #1 – 147 + 40" → 460 gal
  Δ = 34 gal ⇒ 2.3 GPH ✓
  #2 – 130 + 34" → 396 gal
  Δ = 97 gal ⇒ 6.5 GPH (vs. 5.1 GPH)
- Turn Down to 70% Speed/stroke

IGNORE SINCE THIS TANK (PUMP) LEAKED OVERNIGHT.

0800 Fixed leak on metering pump suction tubing (replaced section)

Left message w/ Dennis, MWH Labs to see if it is ok if we sample today.

0830 Set up/calibrate instruments for parameter check

Check parameters:

| | R1 INF | | R2 INF |
|---|---|---|---|
| pH | ~~7.66~~ 7.65 DT | pH | 7.68 |
| ~~cond~~ | | ~~cond~~ | |
| ~~Turb~~ | | ~~Turb~~ | |
| DO | 0.8 mg/L | DO | 1.2 mg/L |
| T | 23.6 °C | T | 23.5 |
| ~~Sal~~ | | ~~Sal~~ | |

| | R1 INT | | R2 INT |
|---|---|---|---|
| pH | 7.58 | pH | 7.67 |
| ~~cond~~ | | ~~cond~~ | |
| ~~Turb~~ | | ~~Turb~~ | |
| DO | 2.2 mg/L | DO | 0.9 mg/L |
| T | 23.3 °C | T | 23.9 °C |
| ~~Sal~~ | | ~~Sal~~ | |

| | R1 EFF | | R2 EFF |
|---|---|---|---|
| pH | 7.59 | pH | 7.74 |
| ~~cond~~ | | ~~cond~~ | |
| ~~Turb~~ | | ~~Turb~~ | |
| DO | 1.0 mg/L DT | DO | 0.7 mg/L |
| T | 23.1 °C | T | 23.4 °C |
| ~~Sal~~ | | ~~Sal~~ | |

★ USING YSI Model 3500 DT for pH, T, and YSI Model 51B for DO.

955 Slw Tan Sunpizio — World Minerals. He has 1 drum of R635 he can sell to us (this is the minimum amt. he can offer), it is about 100-150 lb. He estimates about a 7-10-d lead time, and will send me an email w/ pricing.

1250 Collect samples for lab analysis.

Check Q TREATED: R1 = 23,621 gal, 1.03 GPM
R2 = 37,148 gal, 2.44 GPM

| | |
|---|---|
| INF-1 | 1250 |
| INF-2 | 1253 |
| INF-3 | 1254 |
| EFF-4 | 1255 |
| EFF-5 | 1258 |
| EFF-6 | 1300 |
| EFF-7 | 1302 |

1330 Dropped off samples @ MWH Labs.

1430 – Set up aerator in 1,000 gal tank (due to low D.O. level(s)

→ 1600 Completed

1610 Switching over pumping to third Rain For Rent Tank – about 7K gal remains.

Checked $Q_{TOT}$ / BAKER = 3390 gal

WEDNESDAY SEPT. 11

Noticed Baker Tank is essentially empty.
Start pumping down Influent EQ Tank to prepare to introduce CW.

Figure we can pump 3500 gal into Baker Tank.
Will add ~ half this volume today, and add the remainder over the course of the next week or so, while waiting to resume the test.

10:30 – 4:30 TODAY: 6 hr × 5 gal/min × 60 min/hr
= 1800 gal

Will speed up pumpout rate today to ~5 gpm, then reduce back down tonight.

$Q_{R1} \cong 1.5$ gpm – $Q_{SF} = 3.4$ gph
$Q_{R2} \cong 3.5$ gpm – $Q_{SF} = 8$ gph
$Q_{NF} = 3.0$ gph

Set pump settings as follows

MP SF1 – 55% speed / stroke
MP SF2 – 100% speed / stroke
MP NF – 50% speed / stroke

1045 Begin pumping well water into Influent EQ Tank @ ~5 gpm

Construct pipe for pressurized air for aerator inside Baker Tank (will use same supply source for BT & Influent Tank)

1445 Collect samples from 2nd and 3rd ~~Baker~~ RAPN FOR RENT Tanks for HW characterization. Sample # 3 .. BT-1 is for the 2nd tank and Sample # 4 .. BT-1 is for the 3rd tank

1515 P. Times departs site to take samples to DMA.

1525 Set up to check system parameters.

R1 INF - 1540
pH - 7.49
T - 23.0 °C
DO - 4.0 mg/L

R2 INF - 1545
pH - 7.59
T - 22.5 °C
DO - 4.0 mg/L

R1 INT - 1550
pH - 8.01
T - 23.9 °C
DO - 1.45 mg/L

R2 INT 1600
pH - ~~[illegible]~~ 7.80
T - 22.8 °C
DO - 2.1 mg/L

R1 EFF 1605
pH - 7.9
T - 29.3 °C
DO - 1.4 mg/L

R2 EFF 1610
pH - 8.12
T - 23.1 °C
DO - 1.9 mg/L

1615
Stop ~~[illegible]~~ pumping well water. Begin recirculation of water through Baker Tank.

Based on Q (from Baker Tank) into "Influent" EQ Tank, will leave Q pumped from Infl EQ Tank @ ~3.5 gpm for R2, 1.25 gpm for R1. { $Q_{TREAT}$ = 25,540 for R1, 41,185 for R2 }

Check Feed Stock Quantities.

NUTRIENT TANKS:

V = 160 gal

ST #1: 121 gal + $\frac{32.5''}{12}$ ⇒ 375 gal

ST #2: 50 gal + $\frac{11.5''}{12}$ ⇒ 140 gal

@ 8 gph — 17 h cap.

Turn back settings to 90%, 90% for ST #2 feed.

1700 Offsite. D. T. 2

THURSDAY SEPT. 12

0820 ONSITE

SYSTEM CHECK

$Q_{R1}$ = 0.6 gpm $Q_T$ = 44626 gal

$Q_{R2}$ = 3.7 gpm $Q_T$ = 26638 gal

Flow is so low through R1 since Q pumpout greatly exceeded $Q_{in}$ for 1,000 gal tank, which was ~~down~~ drawn down almost completely. Will need to ~~[illegible]~~ better balance in & out flows today.

ΔPs through reactors:

| | | |
|---|---|---|
| R1 | INF | 34 psi |
| R1 | INT | 4 psi |
| R1 | EFF | 0 psi |
| R2 | INF | 16 psi |
| R2 | INT | 6 psi |
| R2 | EFF | 0 psi |

Check Tank Volumes:

Nutrient Tanks: 58 + 60 gal = 118 gal OK ✓

ST #1 — 108 gal + $\frac{28''}{12}$ = 327 gal (~2.7 gph) OK ✓

ST #2 is almost completely drawn down — BEGIN FILLING THIS TANK (~3.5 gph)

— Hook up H-H Shut off Float From Baker Tank Pumpout to Influent (1000 gal) EQ Tank

910 Begin pumping groundwater into 11000 gal Tank

930 Adjust flows through R1/R2 to achieve ~ 1.25 in R1, 3.7 in R2 — throttle back flow into R2 increase pump speed.

@ ~~about~~ 80% speed, Q is about 3 gpm into R2, 2 gpm into R1.

P R1 INF is now about 25 psi, P R2 INF is about 18 psi

1000 Well water feed is off.

Recirculate ~~Feed~~ Pump from Baker Tank to Influent (1,000 gal) Tank shuts off - Float in Tank is working OK.

Increased Metering Pump for ST #1 to 70%, 70% speed/stroke based on Q flow = 2.0 gpm (Q feed should be ~ 4.5 gpm).

ADD 3.5 kg NaAc·3H2O to 150 gal SFT #2, and 9.0 kg NaAc·3H2O to 375 gal SFT #2.

9-12-02 1300

| | | T | pH | DO |
|---|---|---|---|---|
| R1 | INF | 25 | 7.85 | 2.0 |
| | INT | 24.7 | 7.74 | 1.5 |
| | EFF | 24.7 | 7.77 | 1.1 |
| R2 | INF | 24.7 | 7.83 | ~~2~~1.8 |
| | INT | 24.7 | 7.81 | .8 |
| | EFF | 24.9 | 7.76 | .9 |

1345 D. ~~Tuttle~~ ONSITE

1600 System Check

$Q_{R1}$ = 1.83 gpm

$Q_{R2}$ = 3.06 gpm

$Q_{T R1}$ = 27,424 gal

$Q_{T R2}$ = 46,074 gal

Volumes in Nutrient Tanks: 97 gal tot OK

ST #1 - FULL (> MAX)

ST #2 - 98 + 25 1/4" = 296 gal - OK

Based on $Q_{R2} = 3.0$ gpm,
$Q_{Feed/Substrate} = 6.9$ gpm.
Based on performance @ 90%, 90%
overnight Q > 8 gph, turn down to
~ 80% speed/stroke.

TO DO'S - FRIDAY

1. TOP OFF NUTRIENT TANKS
2. TURN DOWN FLOW RATE FOR SUBSTRATE PUMPS @ END OF DAY
3. CHECK W/ JOE - B/S - ON MITIGATING IMPACTING OF BIOMASS IN GAC

Sept 13, 2002

1025 Collect Samples for Analyses

| | | |
|---|---|---|
| INF | 1 | 1032 |
| INF | 2 | 1035 |
| INF | 3 | 1037 |
| EFF | 4 | 1039 |
| EFF | 5 | 1041 |
| EFF | 6 | 1045 |
| EFF | 7 | 1050 |

11:00 9-13-02

| | | T | pH | DO |
|---|---|---|---|---|
| R1 | INF | 24.9 | 7.92 | 2.8 |
| | INT | 25.8 | 7.83 | 1.0 |
| | EFF | 26.0 | 7.80 | 1.0 |
| R2 | INF | 24.9 | 7.97 | 2.7 |
| | INT | 25.5 | 7.92 | 1.3 |
| | EFF | 25.7 | 7.85 | 1.0 |

9-16-02

0800 D. Tiage onsite.
Brought 27.5 kg Na Ac
(anhydrous) to site.

System check.

$Q_{R1}$ = 1.6 GPM, $Q_T$ = 36,938 G
$Q_{R2}$ = 2.2 GPM, $Q_T$ = 58,825 G

MP # 1 (For ST #1) Not
Pumping. GFI was tripped.
Water level in this tank
is v. low. Need to ~~add~~
~~more~~ make up addit'l.

Vol Nutrient Tanks is 105 + 110 = 215 gal
Pump setting is 50 % sp, 30 % stroke

ST # 2 – 65 + 14.5" → 178.6 gal

Pump setting 60 % sp, 40 % stroke

1100 Prep to check system parameters
Check calibration of
pH ~~[illegible]~~ on YSI 3500.

Noticed R2 flowmeter ~~[illegible]~~
not ~~[illegible]~~ recording
flow - May be leaking.
P @ Inlet to reactor
is ~ 20 psi - OK.

1130 Checking Parameters

| | pH | T | DO |
|---|---|---|---|
| INF | 7.95 | 23.0 | 0.6 mg/L |
| R1 INT | 7.82 | 23.9 | 0.2 mg/L |
| R1 EFF | 0.2 mg/L | 24.5 | 7.81 |
| R2 INT | 7.96 | 23.7 | 0.2 mg/L |
| R2 EFF | 7.89 | 24.2 | 0.2 mg/L (DT) |

1345 Begin adding well water into
Influent ~~[illegible]~~ tank – tank
already @ high-high level
(override float switch)

1400 Slw Dennis, MWH Labs.
He conveyed $NO_3^-$ & $ClO_4^-$ results
from 9-10-12 samples – All were
ND. He said he will have
Ac results tomorrow. $ClO_4^-$/Ac results
from 9-13 are still pending.

1410 Left msg for Charley from
Yardley Pump to check on status
of Oberdorfer pump order.

1440 Add 7.5 kg NaAc (anhydrous)
to make up ST # 1 (added
5.375 kg to 375 gal tank,
2.150 kg to 150 gal tank). Added
575 gal water to both tanks.
Add 345 gal water to ST # 2
System 8 ~ 4.5 kg to both
(3.22 kg to 375 gal tank, 1.29 kg
to 150 gal tank)

1450 Shut off GCV feed into
1,100 gal Influent Tank

1615 System Check –
Nutrient Tanks – 203 gal
ST # 1 – Full
ST # 2 – Filling (top off Tomorrow AM)

1615 ~~[illegible]~~

1630 Offsite.

~~P. Fre~~

FOR TUESDAY

1. Check Parameters
2. Collect analytical samples
3. Begin working on modifications for new phase
4. Follow ups : ~~[illegible]~~ Yardley Pump

TUESDAY SEPT. 17

0800 D. Tietje, P. Timmes on-site.

P. Timmes called to say that the influent EQ Tank had overflowed during the night a little. This is probably due to the high-high float controlling the pump that feeds this tank in recirculation mode. Will troubleshoot this float today.

System check —

Neither flow meter is reading Q, but Q into EQ Tank after reactors seems ok.

Nutrient Tanks

Vol = 87 + 84 gal = 165 gal

Δ = 36 gal ≃ 2.1 gph

ST # 1 — Vol = 135 + ___ gal

~ 37"

S/W Mark Lost enroute to site today. Will isolate "R2" reactors, remove media & clean out to prepare for start-up w/ Percl ase (in ~ 1 week). During start-up will be monitoring $ClO_4^-$ disappearance. Will continue to operate R1 system in recirculation mode during this start-up period.

Check Pressures

Infl. Tank Outlet — 30 psi

| | |
|---|---|
| R1 infl. — 28 psi | R2 infl. — 29 psi |
| R1 int. — 3.5 psi | R2 int. — 5 psi |
| R1 effl. — 0 psi | R2 effl. — 0 psi |

0820 Shut off flow into R2 system. All flow is now directed through R1. Shut of Substrate Feed Pump for R2 & nutrient feed. R1 infl pressure is now ~ 34 psi

0845 Check Parameters

| | pH | T | DO |
|---|---|---|---|
| R1 INF | 7.89 | 20.2 | 0.2 |
| R1 INT | 7.89 | 20.3 | 0.2 |
| R1 EFF | 7.86 | 20.0 | 0.1 |

0900 Begin pumping groundwater into 1,100 gal tank. Will pump throughout day to bring up ~~to~~ as far as possible in Baker Tank (some water may have left system when 1,100 gal tank overflowed)

1020 Shut off groundwater feed.

1130 Begin adding groundwater into 1,100 gal influent tank.

1330 Shut off groundwater feed.

Prepare to collect samples

Collect samples for lab analysis (for $CO_4^-$, As, $NO_3^-$)

Inf - 1 - 1359
Inf - 2 - 1356
Eff - 4 - 1358
Eff - 6 - 1400

Wednesday Sept 18, 2002

Check parameters

| 9:30 | T | pH | DO |
|---|---|---|---|
| Inf | 22.7 | 7.90 | 0.6 |
| Int | 23.2 | 7.88 | 0.3 |
| EFF | 22.7 | 7.83 | 0.5 |

Thursday Sept. 19, 2002

815 Onsite.

System check. Infl. Feed Pump off. Water in ~~Ex~~ Tank #2 (immed. downstream of reactors) @ HL. Isolation valve for this tank was closed so flow did not recirculate overnight. Opened this valve; water is now circulating.

940 Begin pumping groundwater into influent tank.

1030 Groundwater feed stops.

c. 1130 Replumbed influent feed to R1 vessels, Resumed recirculation flow through R1.

Install new feed pump for R2 system (currently offline).

1530 Add 300 gal water to nutrient tanks ~~to~~ Σ 500g $(NH_4)_2PO_4$ to make up tank to [450 mg/L]. Adjust flow settings to .3 (30%) speed/stroke - appropriate for 1 gpm total flow.

1600 Adjust flow settings on acetate feed for R1 system to reflect 1 gpm flow ($Q_{feed}$ > 2.3 gph. Set pump @ 55% speed/stroke).

1615 Turn on groundwater feed.

To Do's -

1. Check w/ Del Mar on 9-11-02 sampling results. - Has bioassay - waiting for 8270
2. Pump bleach through 400# GAC unit
3. ~~Check~~ Repair/troubleshoot dilution feed pump
4. Scheduling for ~~PIA start-up (test)~~
5. Check w/ MWH Americas on Tuesday's sampling results

1030 Groundwater feed stops.

c. 1130 Replumbed influent feed to R1 vessels, Resumed recirculation flow through R1.

Install new feed pump for R2 system (currently offline).

1530 Add 300 gal water to nutrient tanks ~~to~~ Σ 500g $(NH_4)_2PO_4$ to make up tank to [450 mg/L]. Adjust flow settings to .3 (30%) speed/stroke - appropriate for 1 gpm total flow.

1600 Adjust flow settings on acetate feed for R1 system to reflect 1 gpm flow (Q feed → 2.3 gph. Set pump @ 55% speed/stroke).

1615 Turn on groundwater feed.

To Do's -

1. Check w/ Del Mar on 9-11-02 sampling results. - Has bioassay - waiting for 0220
2. Pump bleach through 3000# CAC unit
3. ~~Check~~ Repair/troubleshoot dilution feed pump
4. Scheduling for ~~P&A start-up (Lesi)~~
5. Check w/ MWH Americas on Tuesday's sampling results

FRIDAY SEPT. 20

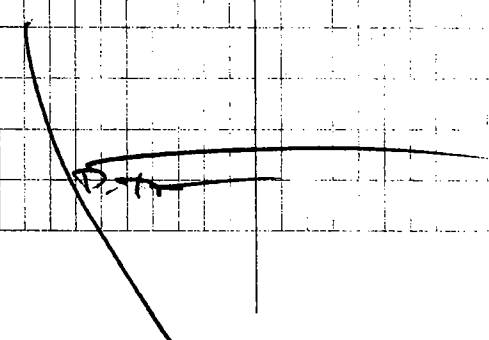
0830 ONSITE. SHUT SYSTEM DOWN DUE TO WATER OVERFLOWING INFLUENT EQ TANK OVERNIGHT (H-H FLOAT DID NOT SHUT OFF RECIRCULATION PUMP). ALSO NOTICED ΔP THROUGH R1 SYSTEM IS V. HIGH. OPENED UP VESSELS - INSPECT INTERNALS WILL CLEAN OUT COLLECTION PIPING AT OUTLET SINCE MAJOR HEADLOSS MAY OCCUR HERE (NOTICED A LOT OF SOLID MATERIAL HERE WHEN CLEANING OUT R2 VESSELS) ALSO NOTICED HYDROXYL MEDIA DOES NOT HAVE GLOBULES OF SLIME LIKE SPONGES DID.

1000 Shw Vitthal. He said we should clean out piping in R1 system, but not clean out media - Rather we should put these reactors in recirculation through the start-up tank. (so we can still utilize JPL aquifer bugs). Set this equipment up... Also, see if we can build new piping for outlet of vessels (to reduce HL).

1445 Checked Notes / Calcs from previous chemical additions in start-up mode. Will Need to add 1.32 kg NaAc (anhyd) and 9.6 g $(NH_4)_2PO_4$ to the ~250 gal of water circulating through reactors.

1515 System is now in recirculation mode (2 "R1" reactors, inoculated w/ JPL bacteria) w/ small start-up tank. Adding in e⁻ acceptor via submerged air bubble diffuser (hooked up to air compressor)

1600 Depart site.



MONDAY SEPT. 23

830 Arrive onsite.

System is in recirculation mode w/ start-up tank (Reactor 1 A & B)

Prepare To Check System Parameters.

Cannot get pH probe to calibrate to w/i ±/0.1 of pH 4, 7, and 10 standards. *
Need to obtain new standards.

0900 Slw Lost. He will meet me tomorrow AM w/ bacteria, FTW media & pH standards.

0915.
Check Parameters —

| | T | pH | DO | |
|---|---|---|---|---|
| INF | 26.9°C | 8.23 | 0.2 | (taken from tank) |
| INT | 27.2°C | 8.20 | 0.1 | DO |
| EFF | 27.0°C | 8.17 | 0.1 | |

Need to pump down start-up tank & bring in GW to increase D.O.

* pH 4,10 seem ok. pH 7 off.

1330 Added 1.32 kg NaAc (Anhyd) to R1 Start-up Tank.

## INDEX OF CURVE AND REDUCTION TABLES


Table I—SLOPE STAKE

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Table III—TRIGONOMETRIC FORMULAE

Table IV—NATURAL TRIGONOMETRICAL FUNCTIONS

CURVE FORMULAE

Table V—TANGENTS AND EXTERNALS TO A 1° CURVE

USEFUL RELATIONS

Table VI—INCHES TO DECIMALS OF A FOOT

Table VII—MINUTES IN DECIMALS OF A DEGREE

Table VIII—MIDDLE ORDINATES OF RAILS

Table IX—SHORT RADIUS CURVES

Table X—RODS IN FEET, 10THS AND 100THS OF FEET

Table XI—LINKS IN FEET, 10THS AND 100THS OF FEET

9/25/02 10:00 AM

| | T | pH | DO |
|---|---|---|---|
| R1 | | | |
| Tank | 25.4 | 7.82 | .7 |
| INT | 25.4 | 7.55 | .6 |
| EFF | 25.6 | 7.60 | .6 |

R2

| | | | |
|---|---|---|---|
| Tank | 27.6 | 6.67 | .55 |
| int | 27.7 | 6.70 | 1.3 |
| EFF | 28.0 | 6.69 | .95 |

* DID NOT CALIBRATE pH BIF TAKING READINGS. pH read ~6.85 UPON CHECKING ~~CORRECTING~~ AFTER TAKING READINGS

35.5
9x16
99.5

$$\frac{100\ mg\ ClO_4^-}{L} \times \frac{140.46\ mg\ NaClO_4 \cdot H_2O}{99.5\ mg\ ClO_4^-} \times 8.90\ L = 125.6\ g$$

9/26/02 JPL

0930 Parameter Check

pH probe calibration ok — 7.0, 3.95, 10.05 (w/i 0.1)

| | pH | T | DO |
|---|---|---|---|
| R1 INF | 7.79 | 24.0°C | 1.6 mg/L |
| INT | ~~7.95~~ 7.95 | 24.5 °C | 1.0 mg/L |
| EFF | 7.96 | 24.2°C | 0.9 mg/L |
| R2 INF | 6.87 | 25.3 | 0.3 mg/L |
| INT | 6.84 | 25.5 | 1.7 mg/L |
| EFF | 6.88 | 25.4 | 0.2 mg/L |

1010

Collected sample from R2 for $CCl_4$ – analysis.

1015

Measured [$CCl_4^-$] in sample. Reading is > 380 mV, which is < 1 mg/L $CCl_4$ –

1100 Slow Mech Loss. Since we should put reactor 2 (percolate) in aerobic mode & continue to monitor DO's in both reactors. After measuring DO concentrations tomorrow, we should give consideration to oxidizing more NH4+ (esp. if DO levels have increased significantly).

10/2

- Check parameters (pH, T, DO) @ end of day
- Check volumes in substrate & nutrient tanks @ end of day & record in book, then top off substrate tanks (w/ water from larger holding tanks)
- Check flows, flow total, pressure; adjust flow if not 1 ± 0.1 gpm

DOWNLOAD P.U. TRACKER FOR JPL

55 gal #1 55 gal #2

R1 INF 1.5 EFF
Do T pH
R2 19.9 8.37 INF EFF
Do T pH

INF 7.43 EFF 1.8
7.3 Do T pH 20 21.8 8.28 7.01

PBR PILOT STUDY PHASE 2 BOOK 2

"Rite in the Rain"®
ALL-WEATHER
FIELD BOOK
No. 350 N

SEPT. 1982

CONTENTS

| REFERENCE | DATE |
| --- | --- |

310-704-6580 — MIKE MALLOY — CELL

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
# FIELD BOOK

Name FOSTER WHEELER

Address 1990 E. DEERE AVE. # 200
SANTA ANA, CA 92705

Phone

Project JPL PBR PHASE 2
BOOK 2 OF 2

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

| Page Pattern | | Cover Options | |
| --- | --- | --- | --- |
| Left Page | Right Page | Polydura Cover | Fabrikoid Cover |
| Columnar | 1/4" Grid | Item No. 350N | Item No. 350NF |

THURSDAY SEPT. 26

(SEE NOTEBOOK FOR NOTES UP TO 11 AM)

TO DO'S FOR FRIDAY:

1. MEASURE PARAMETERS ✓
2. INSTALL AIR/VAC VALVE ON WELL INFLUENT LINE ✓
3. PREPARE MANIFESTS (3) FOR MONDAY
4. FILL UP SUBSTRATE TANKS & ADD ACETATE TO PREP FOR MONDAY.

---

FRIDAY SEPT. 27

0930 Note levels in substrate & nutrient feed tanks.

#2 – FULL

#2 – 12" (lg. tank) + ~~85~~ 47 gal

NUTRIENT TANKS – 140 gal/ea – OK

GAL TO ADD TO ST'S #1 –

389 gal ~~[illegible]~~ gal

~~389 [illegible] kg [illegible] 0.37 kg~~



Mass of NaAc (anhy) to add:

150 gal tank – 1.4~~8~~ kg mass for 150 gal →

375 gal tank – 4.~~6~~ kg mass for 375 gal →

1000 Checked system parameters

| R1 | T | pH | DO |
|---|---|---|---|
| TANK | 22.0°C | 8.17 | 5.6 mg/L |
| INT | 21.5°C | 8.06 | 4.7 mg/L |
| EFF | 21.8°C | 8.12 | 4.8 mg/L |

| R2 | T | pH | DO |
|---|---|---|---|
| TANK | 22.8°C | 8.20 | .3 mg/L |
| INT | 22.8°C | 8.22 | .3 mg/L |
| EFF | 22.9°C | 8.22 | .1 mg/L |

1010 Slw Losi. Told me to add NaAc to R1 & check DO's @ end of day. He also said we should change out the NaAc sol'n if it has been sitting for 2 weeks since bacteria will grow inside & we will not have a handle on the [NaAc]

∴ will empty & rinse out ST #2 (both tanks) & ST #1 (small tank).

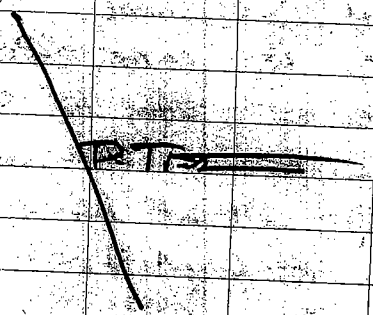
1030 Measure & add 1.3 kg NaAc (anhyd.) to R1.

1145 Noticed 1 of 2 nutrient tanks also should be cleaned + refilled.

1430 Check R1 D.O. Levels

TANK – 1.8 mg/L
INT – 1.5 mg/L
EFF – 0.95 mg/L

1530 Offsite.



MONDAY SEPT. 30



0645 ONSITE. (ISLAND ENVIRONMENTAL ATTORNEY ON-SITE. THEY ARE ONSITE TODAY TO REMOVE WW FROM 1ST RAIN FOR RENT TANK

0700 NOTICED AERATOR (COMPRESSOR) WAS OFF – ONE TO GO1 BEING TROUBLESH. IT NOT KNOW HOW LONG IT WAS BEEN OFF.

0900 Island Environmental offsite. JPR signs manifests (will stop by w/ photocopies). All but about 14000 gal is measured out of the first Rain For Rent Tank (~ 20,000 gal total). Will assume for practical purposes that this tank is empty.

1000 Pump out water in Baker Tank through OAC into 1st Rain For Rent Tank

1015 Set up to check system parameters R1 & R2 systems both in recirculation mode w/ start-up tanks. Water is being aerated.

pH probe calibrated ok – 7.09, 4.01, 10.01

| R1 | ~~R1~~ pH | ~~R2~~ T | DO |
|---|---|---|---|
| TANK | 8.11 | 18.9°C | 1.5 mg/L |
| INT | 8.16 | 19.2°C | 1.0 mg/L |
| EFF | 8.13 | 19.3°C | 0.9 mg/L |

| R2 | pH | T | DO * |
|---|---|---|---|
| TANK | 8.49 | 19.8°C | 4.8 mg/L |
| INT | 8.49 | 20.0°C | 4.6 mg/L |
| EFF | 8.49 | 20.0°C | 4.5 mg/L |

* R2 system could be a donor limiting, as DO's have increased significantly since Friday. Will not add more NaAc for now, since system should be online later today.



– Will add later today if system is not put in recirculation mode.

1115 Prep to make down NaAc & $(NH_4)PO_4$ feeds –

* ADD 2.15 kg anhyd NaAc to each 150 gal Substrate Tank & 5.4 kg anhyd NaAc to each "375 gal" tank (note that tank # 2 ~~[illegible]~~ is a little fuller than the level corresponding to 375 gal – by about 50 gal)

* ADD 511 g $(NH_4)_2PO_4$ to both (1/2 to each) ~~[illegible]~~ feed tanks.

1345 Measure & add 1315 g NaAc (anhyd) to R2.

1415 offsite.

D. [illegible]

TUESDAY OCT. 1

0845 ONSITE.

BARGE TANK IS PUMPED DOWN AS FAR AS POSSIBLE.

SET UP FOR START-UP. BEGIN PUMPING GROUNDWATER INTO INFLUENT TANK.

FINAL PARAMETER CHECK FOR R1, R2 IN RECIRC. MODE.

pH Probe Calibration Could — 7.02, 3.97, 10.00

| | DO | T | pH |
|---|---|---|---|
| R1 | | | |
| TANK | 0.8 | 20.2 | 8.29 |
| INT | 0.6 | 20.4 | 8.54 |
| EFF | 0.6 | 20.2 | 8.35 |
| R2 | | | |
| TANK | 6.2 | 20.8 | 8.57 |
| INT | 0.6 | 20.6 | 8.57 |
| EFF | 0.15 | 20.9 | 8.56 |



1000 Turn off adv compressor. Pump down start-up tanks in preparation for forward flow.

1115 Forward flow operation through R1 & R2 @ ~1 gpm each begins.

INITIAL SETTINGS:

Pump speed — 15%. ISR

$Q_{R1,TOT} = 0$ gal
$Q_{R2,TOT} = 0$ gal
} Zeroed totalizers @ 1145

INITIAL SETTINGS FOR FEED PUMPS

ALKALINITY #1 — 50% SPI STROKE
#2 — 50% SPI STROKE

BASED ON $Q_f \cong \frac{2}{\text{gph}}$ FOR 1 GPM

NUTRIENT — 40% SPI STROKE

BASED ON $Q_f \cong \frac{1.25}{\text{gph}}$ FOR 2 GPM

1300 Check Pressure Into 10WT of R1 IN2

R1: IN- 15 psi
OUT - 0 psi

R2: IN- 5 psi
OUT- 0 psi

PLAN FOR SAMPLING TOMORROW
AM -
WILL SAMPLE
INF-1 - $NO_3^-$, $Cl_4^-$
INF-2 - Ac
INF-3 - Ac
EFF ~~INF~~-4 - INF-B - $NO_3^-$, $Cl_4^-$, Ac

(19) CONTAINERS
B45

NOTICED ΔP THROUGH GAC UNIT IS V. HIGH - PROBABLY DUE TO HIGH CONC. OF BIOMASS IN RECIRCULATION SYSTEMS. WILL ADD BLEACH TO EQ TANK #1 & PUMP THROUGH GAC UNIT -



RECHECKED ΔP THROUGH GAC
UNIT - 21 psi - IN
15 psi - OUT } Δ = 3 psi

NOT sure if conditions were same during previous reading (i.e. if outlet valve was closed)

1410 Needed to increase motor speed for R1 feed pump to 25%. to increase Q to 1 gpm (pump kept shut off for short time due to high level in EQ Tank 1- was not being pumped out)
BLEP AIR OUT OF LINE - Q INCREASED. REDUCED SPEED BACK TO 15% - Q OK.

1600 Prepare to check parameters -

| | DO | T | pH |
|---|---|---|---|
| INF | 8.0 | 19.9 | 7.30 |
| R1 | | | |
| INT | 2.4 | 19.8 | 8.19 |
| Eff | 2.2 | 19.6 | 8.53 |

| | pH | T | DO |
|---|---|---|---|
| R2 INT | 7.89 | 19.7 | 2.9 |
| EFF | 7.91 | 19.4 | 2.0 |
| FIN EFF | 7.69 | 19.4 | 2.5 |

1645 Check system parameters:

$Q_{R1}$ = 1.1 gpm; $Q_{R1,TOT}$ = 300.5

$Q_{R2}$ = 1.14 gpm; $Q_{R2,TOT}$ = 298.6

PR2 IN = 8 psi
PR1 IN = 18 psi

ST #1 – ~132 gal
ST #2 – ~150 gal
NUTRIENT TANKS – 143 + 146 gal

1650 Offsite.



WEDNESDAY OCTOBER 2

0845 ONSITE

0900 SYSTEM CHECK ΔTIME = 16 hr

$Q_{R1}$ = 0.85 gpm
$Q_{R1\,TOT}$ = 1173.6 Δ = 973.1 gal
$Q_{AV}$ = 0.91 gpm

$Q_{R2}$ = 0.97 gpm
$Q_{R2\,TOT}$ = 1260.8 Δ = 962.2 gal
$Q_{AV}$ = 1.0 gpm

R1 INLET P = 18 psi
R2 INLET P = 11 psi

ST #1 – VOL ≅ ~~85~~ 68 gal ; $Q_A$ ≅ 4 gph – high
ST #2 – VOL ≅ 72 gal ; $Q_A$ ≅ 4.9 gph – high

NUTRIENT TANKS – VOL = 122 + 125 GAL
Δ = 42 gal ; $Q_{AV}$ ≅ 2.6 gph – ~~[illegible]~~ high

REDUCE SPEED/STROKE SETTINGS ~~ON~~ FOR SUBSTRATE PUMPS TO 40%, 40%.
REDUCE NUTRIENT FEED PUMP SETTINGS TO 30%. SPEED/STROKE

0910 Checking system parameters
pH probe calibration OK
+/- 0.05 for all standards

| | T | pH | DO |
|---|---|---|---|
| INF | 18.8°C | 7.30 | 7.4 mg/L |
| R1 INT | 18.4°C | 8.46 | 2.2 mg/L |
| EFF | 17.3°C | 8.61 | 2.0 mg/L |
| R2 INT | 18.0°C | 8.28 | 2.3 mg/L |
| EFF | 17.5°C | 8.48 | 2.2 mg/L |
| EFF | 17.2°C | 8.63 | 2.2 mg/L |

1000 S/W LOSI - He said the pHs are OK @ 8.5 - 8.6 & THAT I should check w/ the lab to see if they can add NaOH to samples after they are analyzed the first time (if they require reanalyzation)

1015 S/W Dennis about adding NaOH to $CO_3^-$, Ac samples after they are initially analyzed - will check on appropriateness of this for Ac.



1020 Begin collecting samples for lab analysis:

INF-1 - 1023
-2 - 1025
-3 - 1026
EFF-4 1028
-5 - 1031
-6 - 1033
-7 - 1036
-8 - 1038

1055 P. Tinnes takes samples to MWH Labs.

1500

| | T °C | pH | DO mg/l |
|---|---|---|---|
| INF | 20.0 | 7.01 | 7.3 |
| R1 INT | 19.9 | 8.37 | 1.5 |
| EFF | 20.0 | 8.61 | ~~1.6~~ 1.5 |
| R2 INT | 19.9 | 8.39 | 1.5 |
| EFF | 20.1 | 8.50 | 1.2 |
| EFF | 21.8 | 8.28 | 1.8 |

@ 1530
Levels in Substrates #1 and #2 are

#1 55 gal
#2 55 gal

THURSDAY OCT. 3

0630 ONSITE

SYSTEM CHECK

$Q_{R1}$ = 1.04 gpm
$Q_T$ = 2786 gal } $P_{IN}$ = 11 psi
$\Delta Q_T$ = 1612 / 24 hr = 1.12 gal/hr

$Q_{R2}$ = .73 gpm
$Q_T$ = 2468.8 gal } $P_{IN}$ = 18 psi
$\Delta Q_T$ = 0.84 gpm

NUTRIENT TANKS –
110 gal/ea (vs. 122 & 125 gal)
Δ = 27 gal / 24 hr ≅ 1.1 gal/hr OK

SUBSTRATE TANKS / YESTERDAY @ 1530
#1 – 56 gal (~95 gal) Δ = 39 gal – ~22 gph OK
#2 – 36 gal (~90 gal) Δ = 54 gal – ~3 gph HIGH



INCR. SPEED OF R2 FEED PUMP TO INCR. FLOW TO 1 GPM

TURN DOWN SUBSTRATE #2 METERING PUMP SPEED/STROKE TO 30%, 30%...

1100

| | | | |
|---|---|---|---|
| INF | 20.2 | 7.52 | 8.2 |
| INF | T °C | pH | DO mg/l |
| $R_1$ INT | 20.9 | 8.41 | ~~1.5~~ 1.3 |
| EFF | 20.9 | 8.59 | 1.35 |
| $R_2$ INT | 21.3 | 8.41 | 1.6 |
| EFF | 21.5 | 8.50 | 1.2 |
| EFF | 22.7 | 8.54 | 0.7 |

1500 S/W Dennis Reyes of MWH Labs & obtained results from 9-17-02 sampling. I also mentioned I would be sampling tomorrow. He said $ClO_4^-$ & $NO_3^-$ results from 10/2/02 may be available tomorrow.