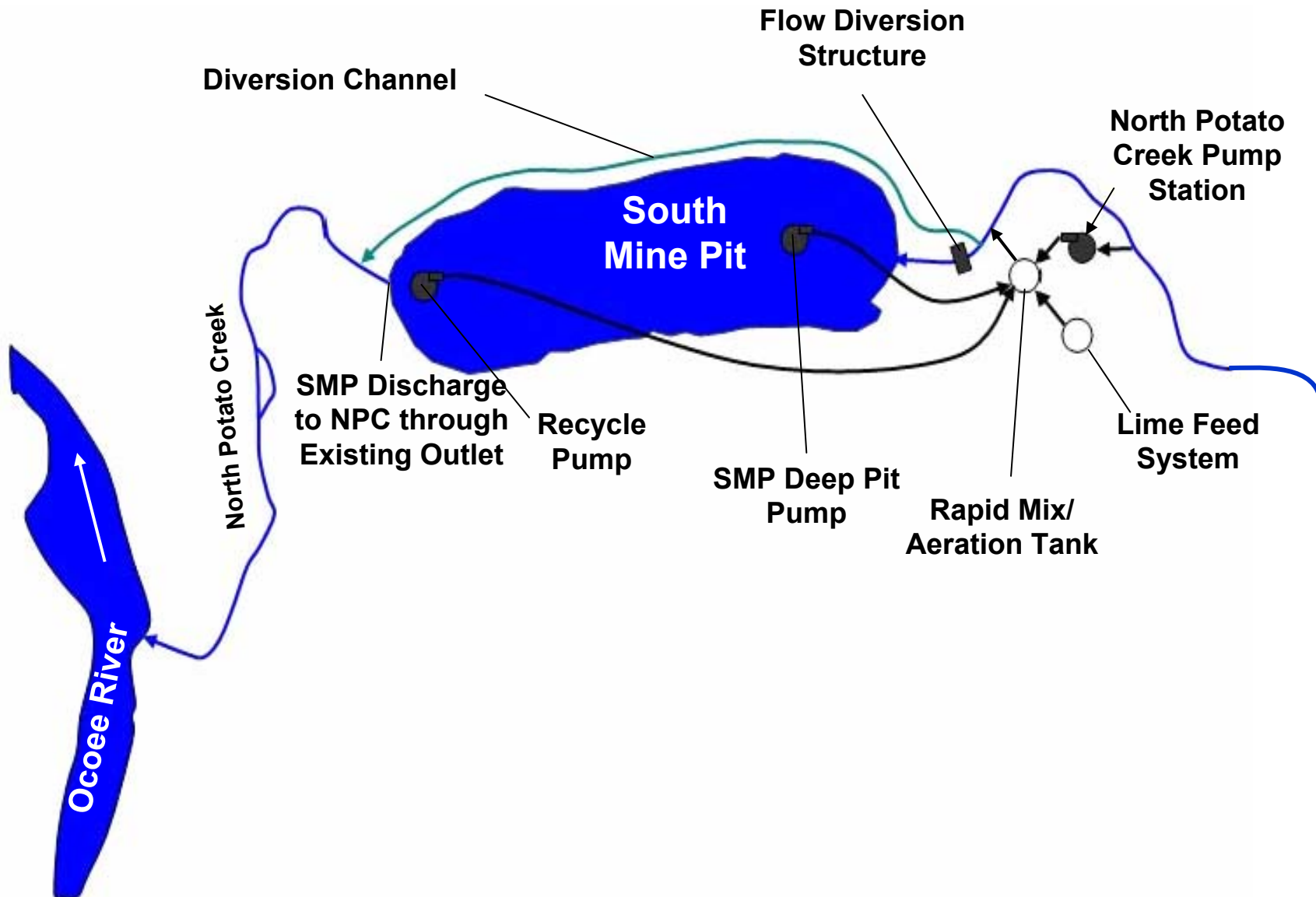


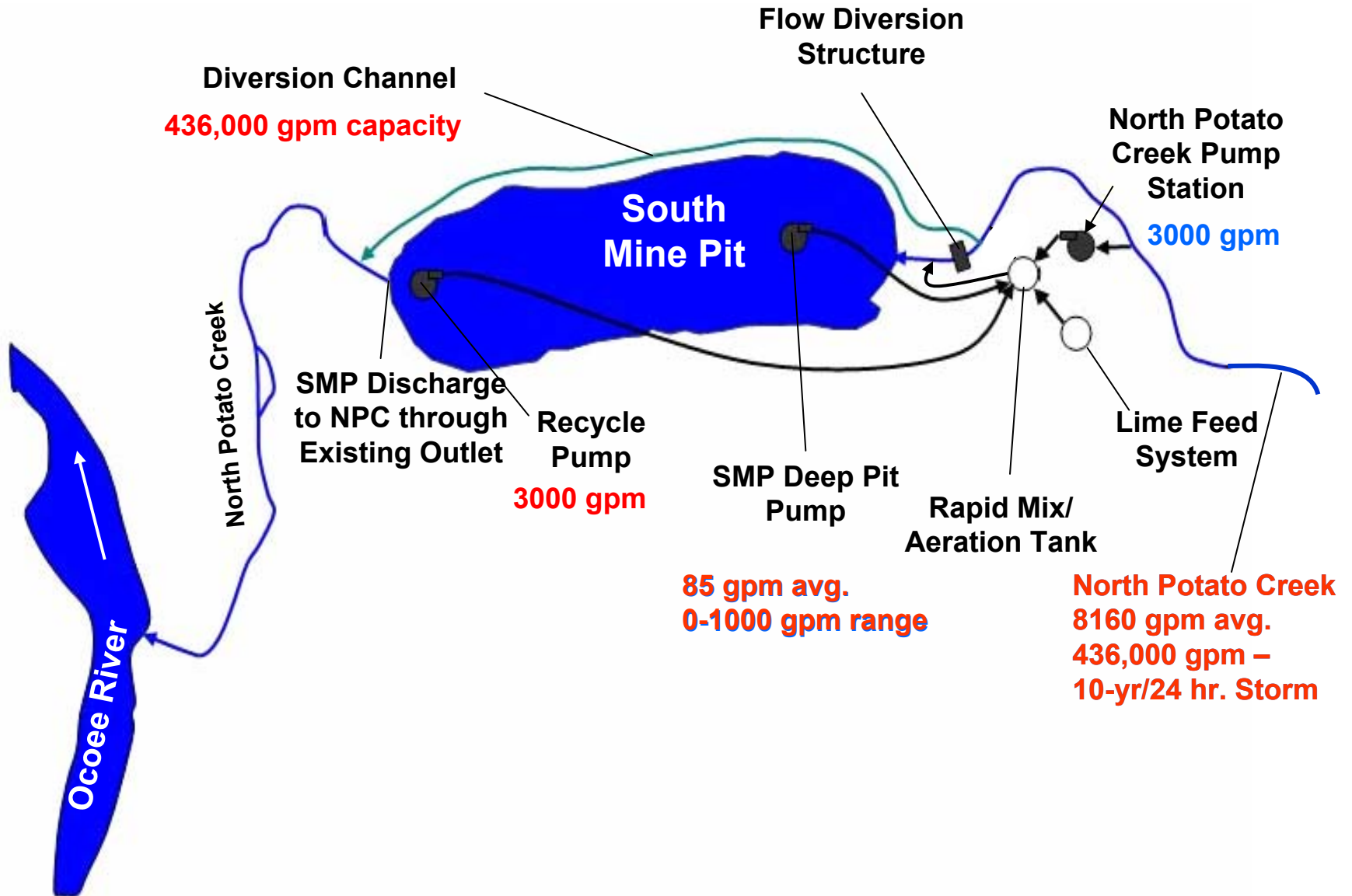


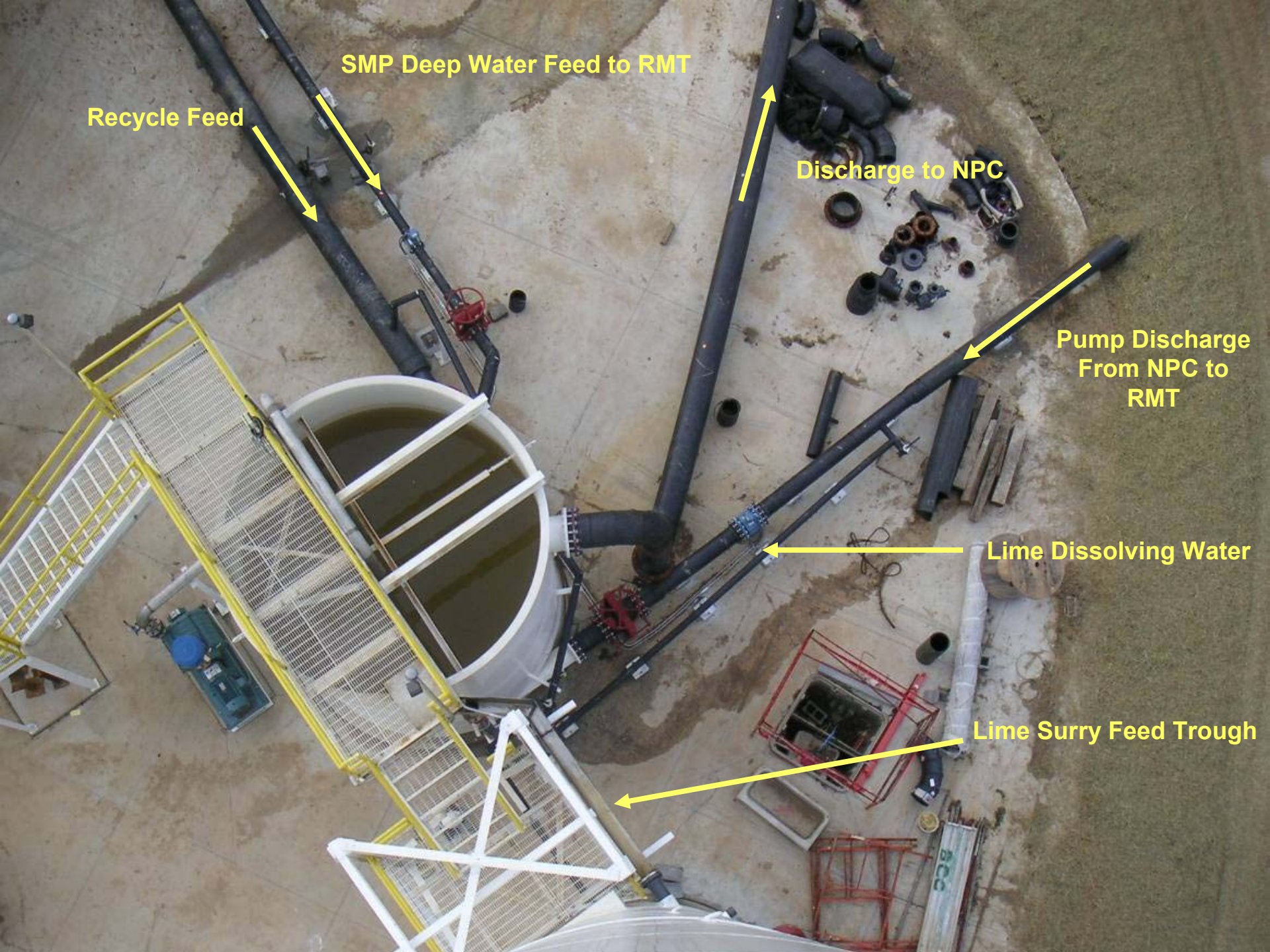
NORTH POTATO CREEK IN-PIT WATER TREATMENT PLANT AT THE COPPER BASIN MINING SITE

**GRIFF WYATT, P.E. - BARGE, WAGGONER, SUMNER AND CANNON, INC.
FRANKLIN MILLER, P.E. - GLENN SPRINGS HOLDINGS, INC.
JOHN CHERMAK, Ph.D. - VIRGINIA POLYTECHNIC INSTITUTE**



RECYCLE/DIVERSION MODE





SMP Deep Water Feed to RMT

Recycle Feed

Discharge to NPC

Pump Discharge
From NPC to
RMT

Lime Dissolving Water

Lime Surry Feed Trough



Iron Oxidation

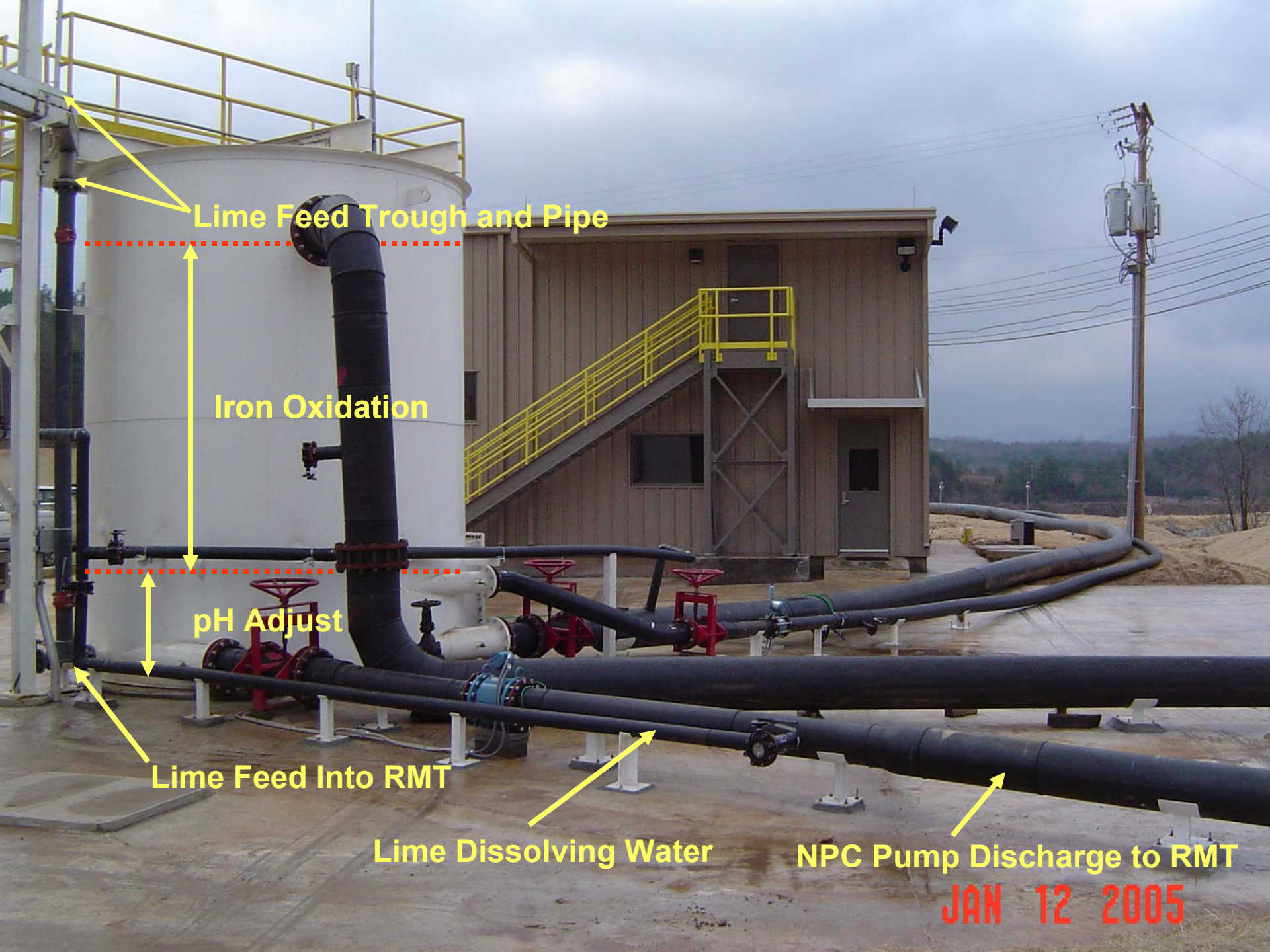
pH Adjust



JAN 12 2005

JAH 12 2005





Lime Feed Trough and Pipe

Iron Oxidation

pH Adjust

Lime Feed Into RMT

Lime Dissolving Water

NPC Pump Discharge to RMT

JAN 12 2005



JAN 12

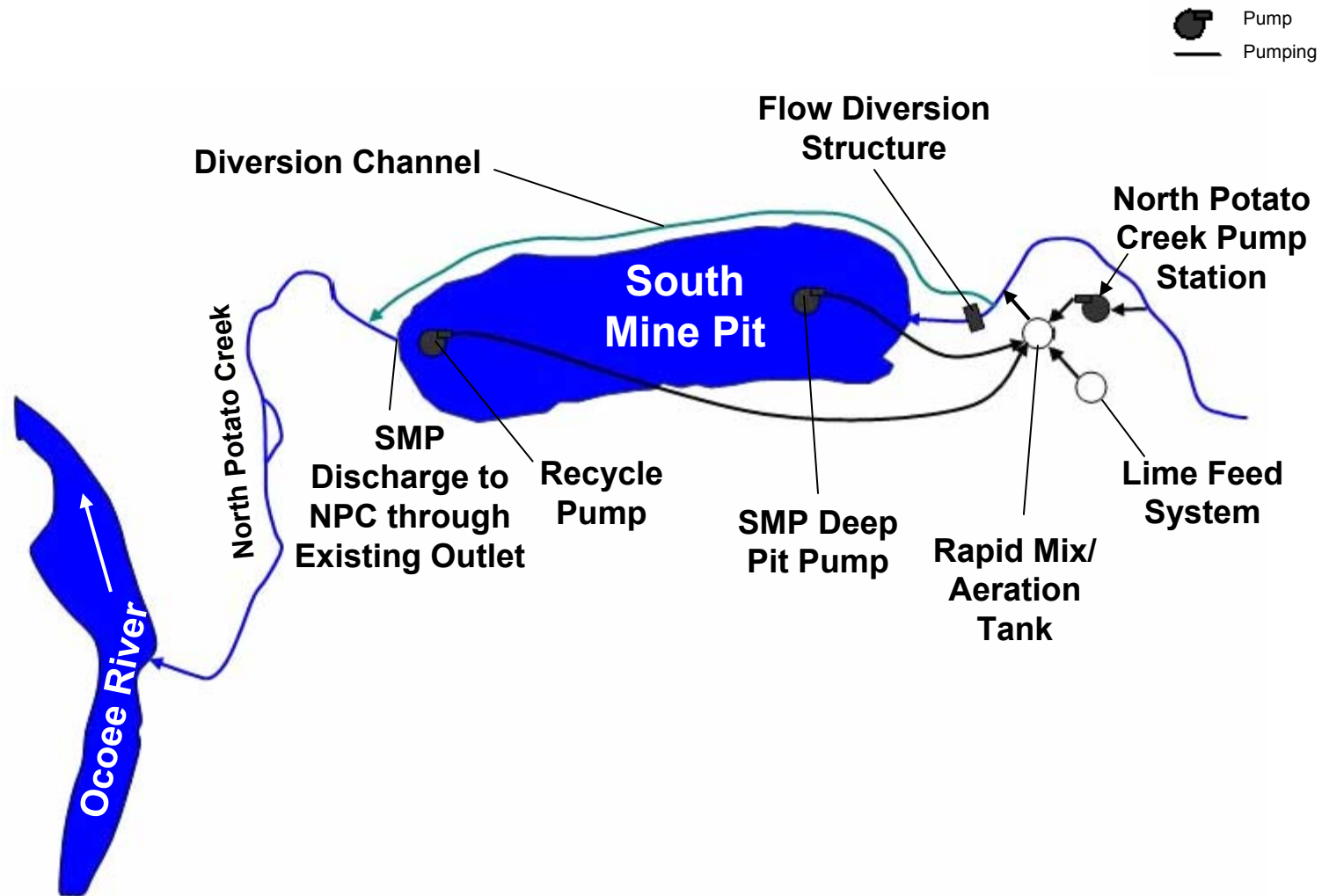


JAN 12 2005

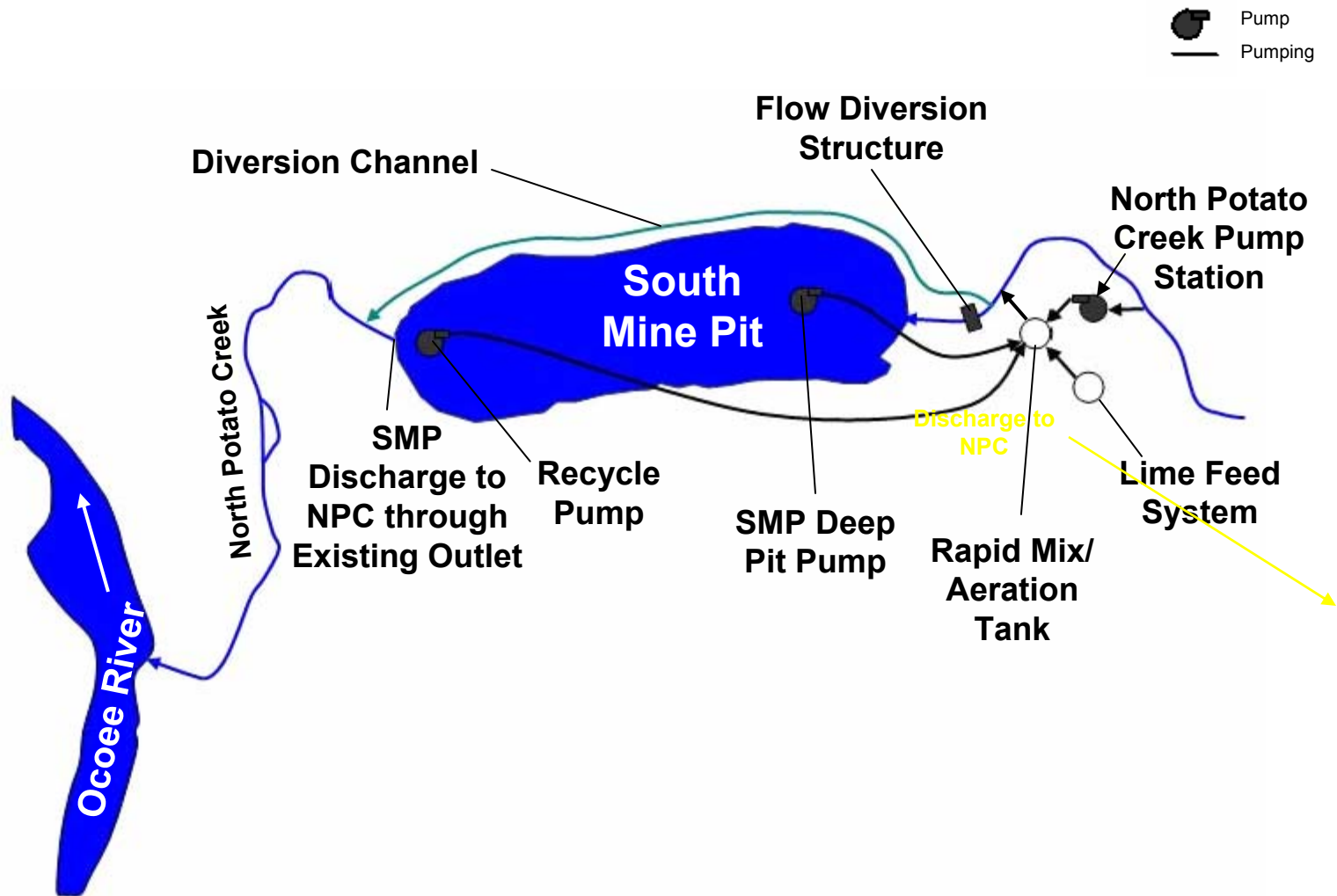




North Potato Creek Water Treatment Plant Conceptual Design



North Potato Creek Water Treatment Plant Conceptual Design





NPC
UPSTREAM

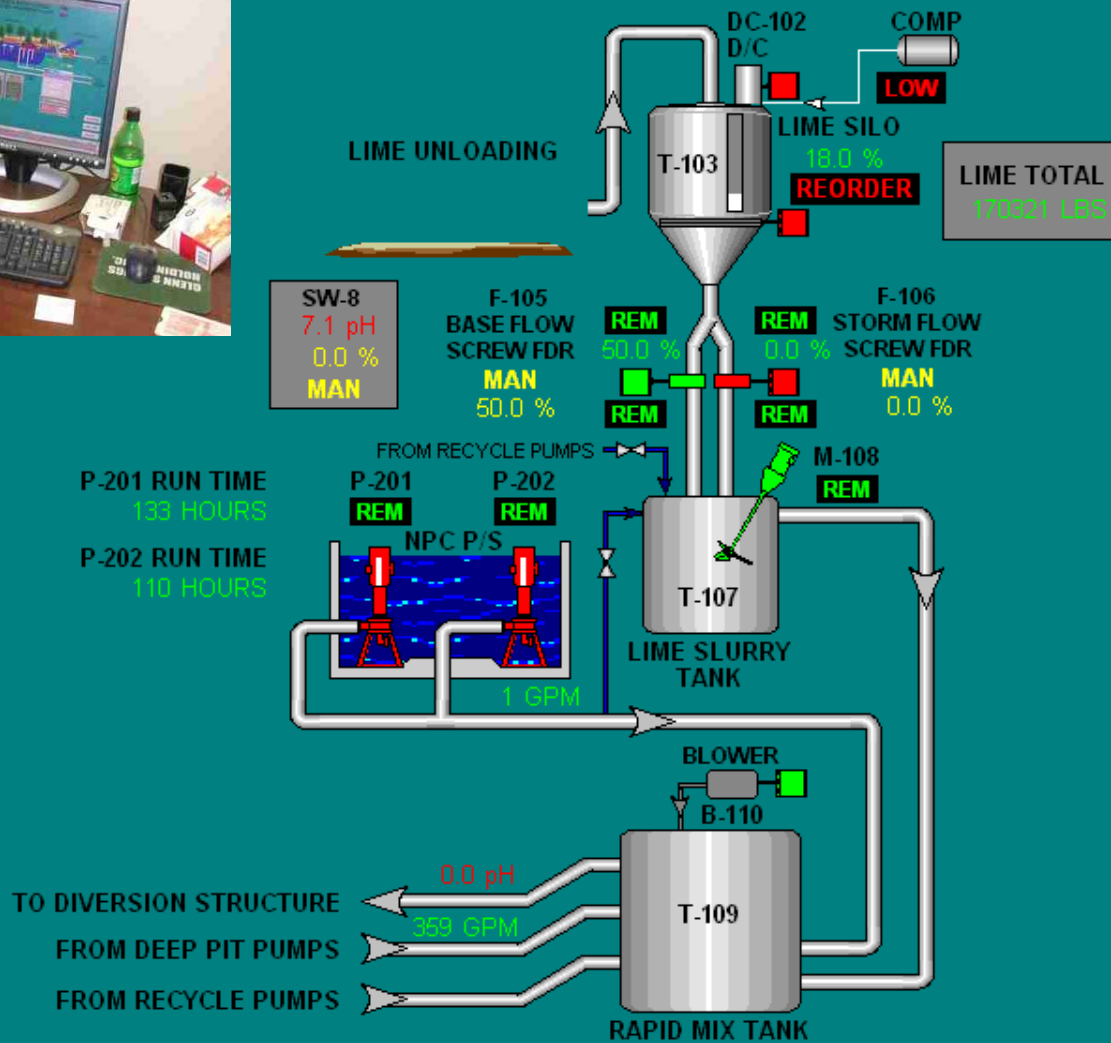
DIVERSION
CHANNEL

NPC DOWNSTREAM (OCOEE RIVER 2100 FEET)





NORTH POTATO CREEK WATER TREATMENT PLANT



TREND

OVERVIEW

S. MINE PIT

ALARMS

Ack	Time In	Time Last	Tagname	Description	Status	Value
✓	16:43:44.046	17:08:45.000	AI109	Rapid Mix Tank Overflow pH	LO	0.0
✓	16:25:23.937	16:25:23.937	AI100	Influent pH	HIHI	11.38

NORTH POTATO CREEK WATER TREATMENT PLANT



LIME SILO

18.0 %

NPC P/S

1 GPM

684 GALLONS

LONDON MILL

INFLUENT 11.4 pH

EFFLUENT 9.9 pH

RAPID MIX TANK

0.0 pH

SW-8

7.2 pH

0.6 uMHOS

15085 GPM

DEEP PIT
PUMPS

359 GPM

225027 GALLONS

HYDROLABS

DEEP

4.9 pH

3.5 mS/cm

0.1 mg/l

120 mV

11.1 deg C

SHALLOW

6.5 pH

0.6 mS/cm

11.0 mg/l

60 mV

5.9 deg C

SW-9

6.8 pH

0.6 uMHOS

14076 GPM

SCADA PLC COMM STATUS: **NORMAL**
 LIME SILO PLC COMM STATUS: **NORMAL**
 DEEP HYDROLAB RF LINK: **FAULT**
 DEEP HYDROLAB BATTERY: 13.3 VOLTS
 SHALLOW HYDROLAB RF LINK: **NORMAL**
 SHALLOW HYDROLAB BATTERY: 13.2 VOLTS
 RECYCLE/SW-9 RF LINK: **NORMAL**

CURRENT FLOW TOTALS

NPC TO RAPID MIX TANK

684 GALLONS

DEEP PIT TO RAPID MIX TANK

225039 GALLONS

PREVIOUS FLOW TOTALS

NPC TO RAPID MIX TANK

888 GALLONS

DEEP PIT TO RAPID MIX TANK

521283 GALLONS

LONDON MILL

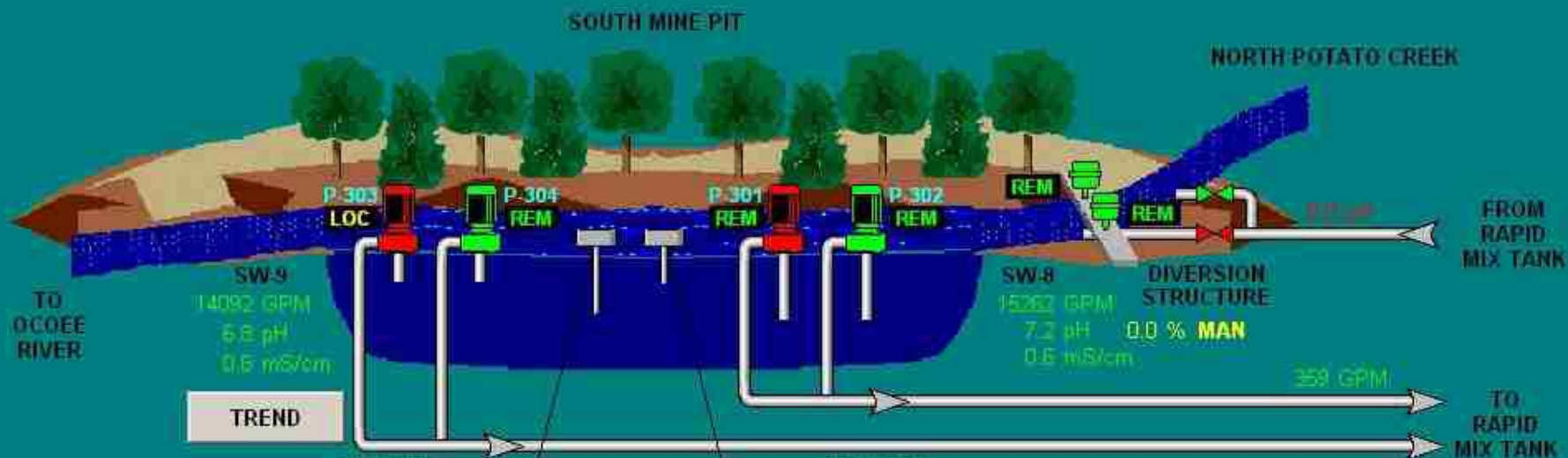
LIME PREP

S. MINE PIT

ALARMS

Ack	Time In	Time Last	Tagname	Description	Status	Value
✓	16:43:44.046	17:08:45.000	AI109	Rapid Mix Tank Overflow pH	LO	0.0
✓	16:25:23.937	16:25:23.937	AI100	Influent pH	HIHI	11.38

NORTH POTATO CREEK WATER TREATMENT PLANT



TREND

RECYCLE
PUMPS

P-303 RUN TIME
88 HOURS

DEEP
HYDROLAB

4.9 pH
3.5 mS/cm
0.0 mg/l
120 mV
11.1 deg C

TREND

SHALLOW
HYDROLAB

6.5 pH
0.6 mS/cm
10.0 mg/l
60 uV
5.0 deg C

TREND

DEEP PIT
PUMPS

P-301 RUN TIME
44 HOURS

P-302 RUN TIME
301 HOURS

TREND



Description:

Rapid Mix Tank Overflow pH
Influent pH

Shallow (low TDS) water

Chemocline

Deep (high TDS) water

SOUTH MINE PIT

NORTH

P-303
LOC

P-304
OC

P-301
REM

P-302
REM

REM

REM

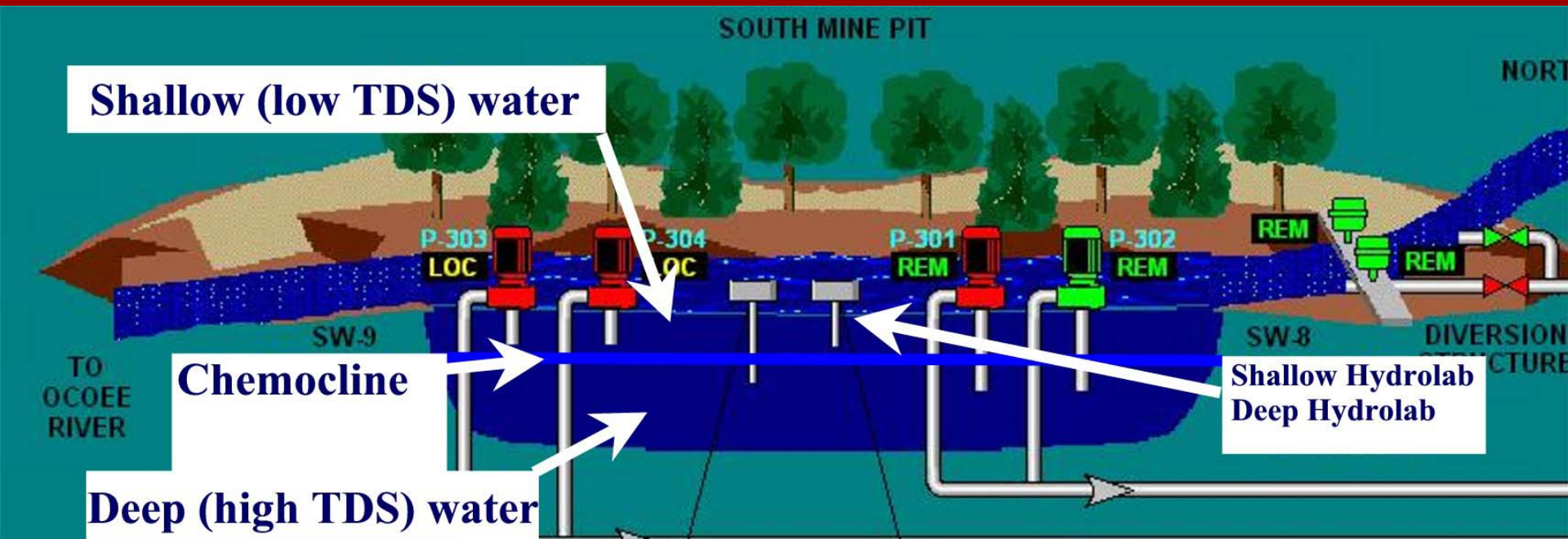
DIVERSION
STRUCTURE

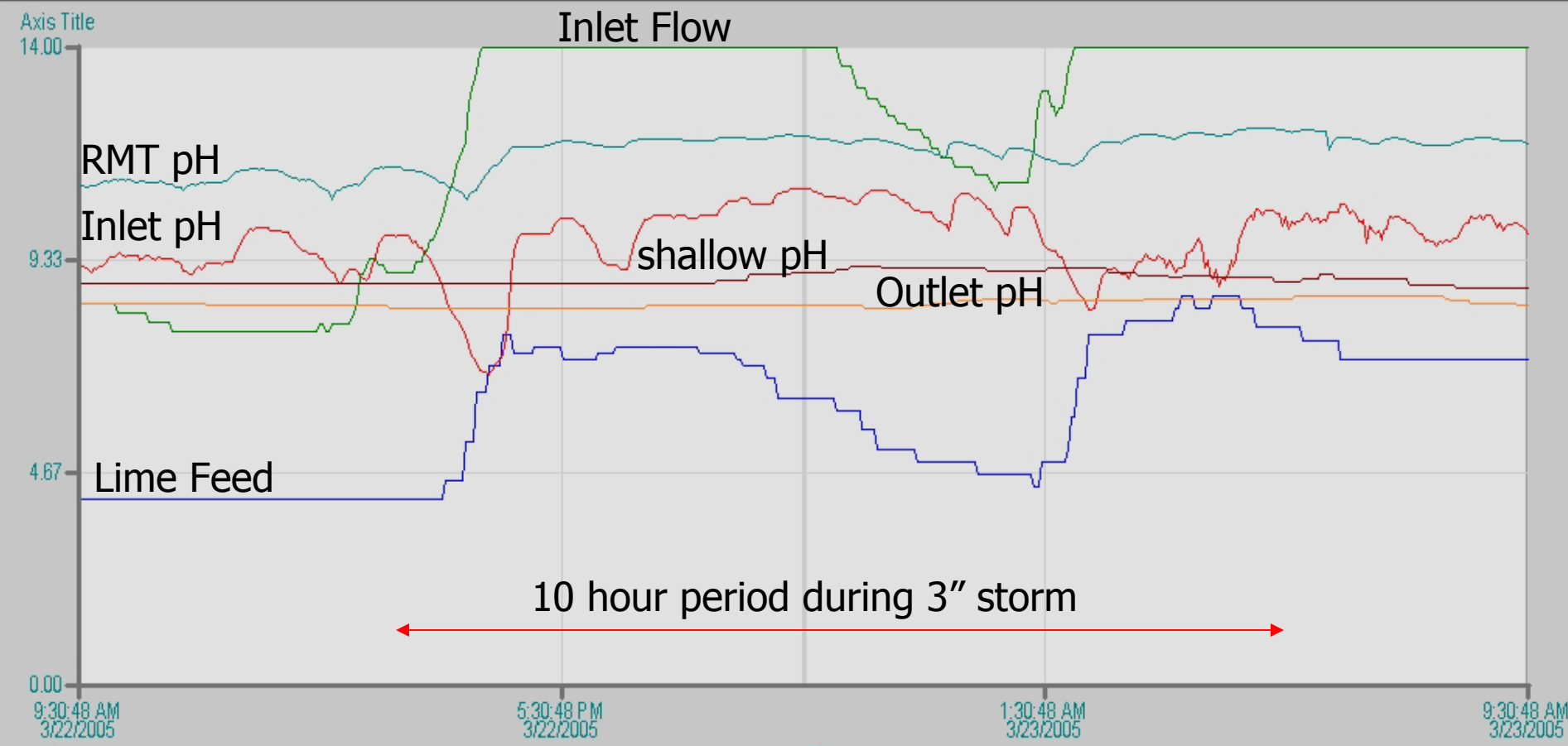
SW-9

SW-8

TO
OCOEE
RIVER

Shallow Hydrolab
Deep Hydrolab





Hist.NPC_WTP.AI109.F_CV
Hist.NPC_WTP.FI402.F_CV
Hist.NPC_WTP.SIC105_PV.F_CV
Hist.NPC_WTP.AI402P.F_CV
Hist.NPC_WTP.AI501P.F_CV
Hist.NPC_WTP.AI600P.F_CV

Rapid Mix Tank Overflow pH
SW-8 Flow
Base Feeder F-105 Speed Feedba
SW-8 pH
Shallow pH
SW-9 pH

12.04
17613.88
45.00
10.88
9.05
8.32

Axis Title

◀◀

◀

▶

▶▶

OVERVIEW

LIME PREP

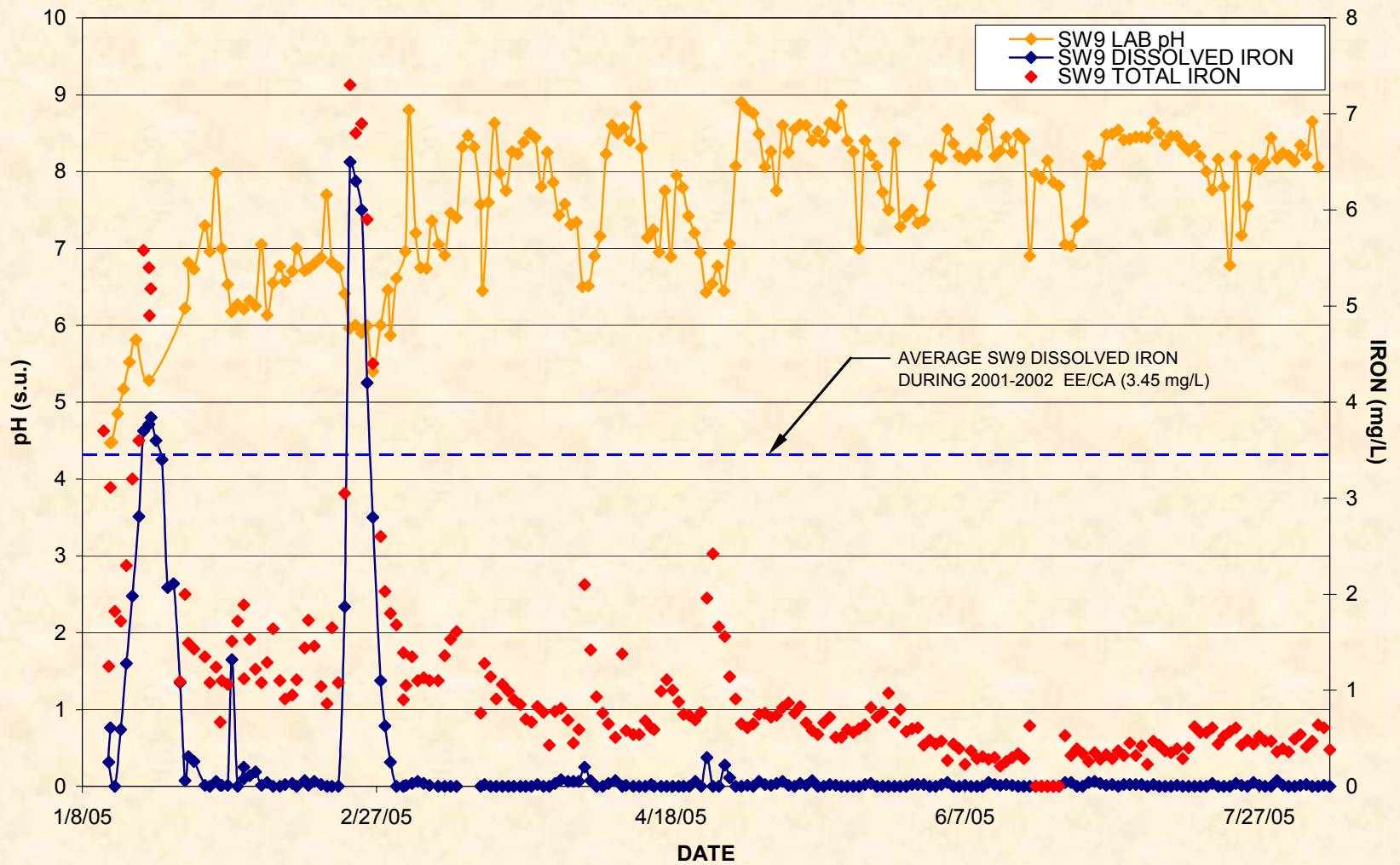
S. MINE PIT

Ack	Time In	Time Last	Date In	Tagname	Description	Status	Value
✓	12:47:22.093	12:47:22.093	3/23/2005	AI501P	Shallow pH	HI	8.78
✓	05:28:11.500	12:07:30.546	3/23/2005	LI100	Lime Silo T-103 Level	LO	67.0

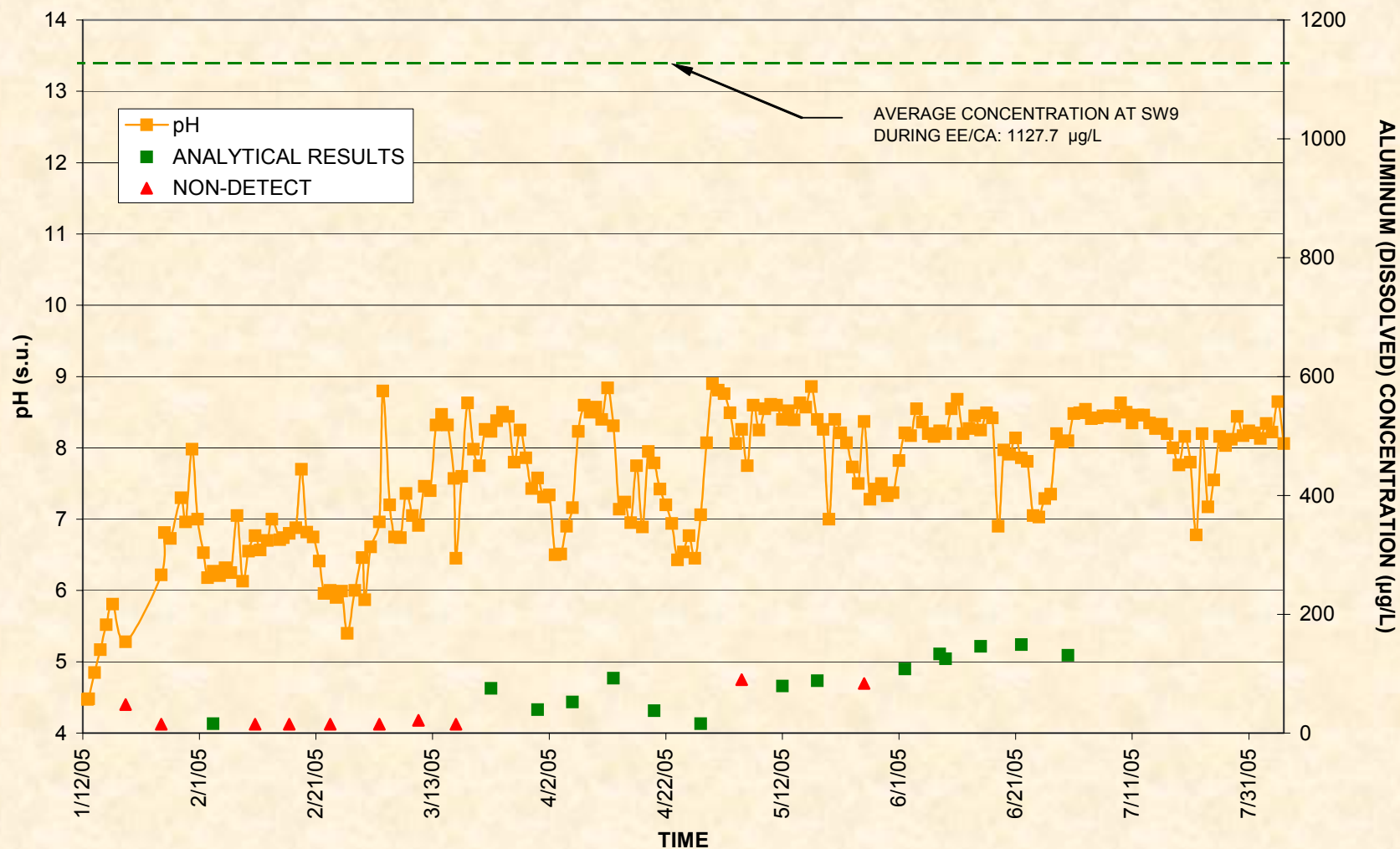


SW-9 MONITORING RESULTS

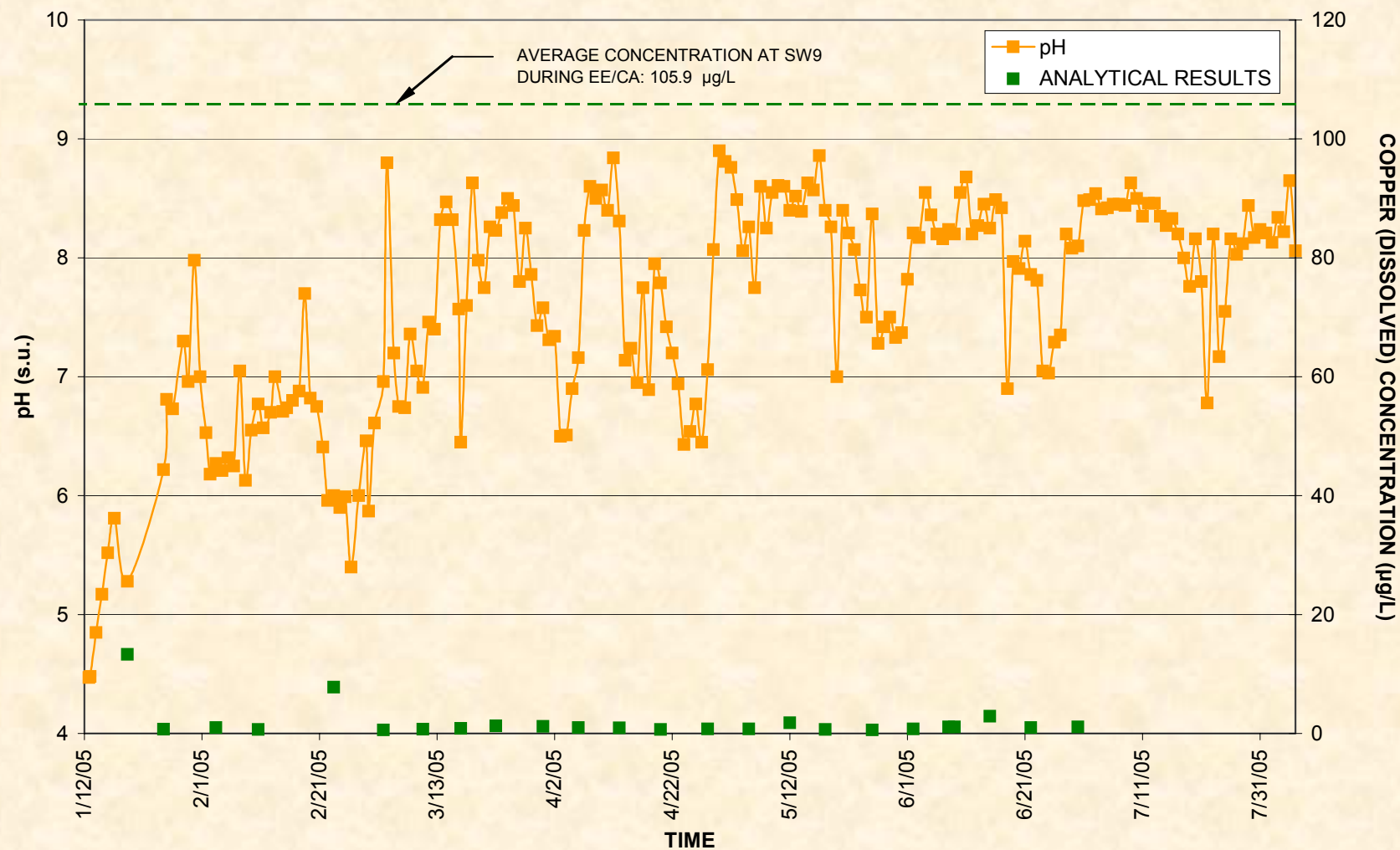
FIELD IRON MEASUREMENTS AT SW9 & pH vs. TIME



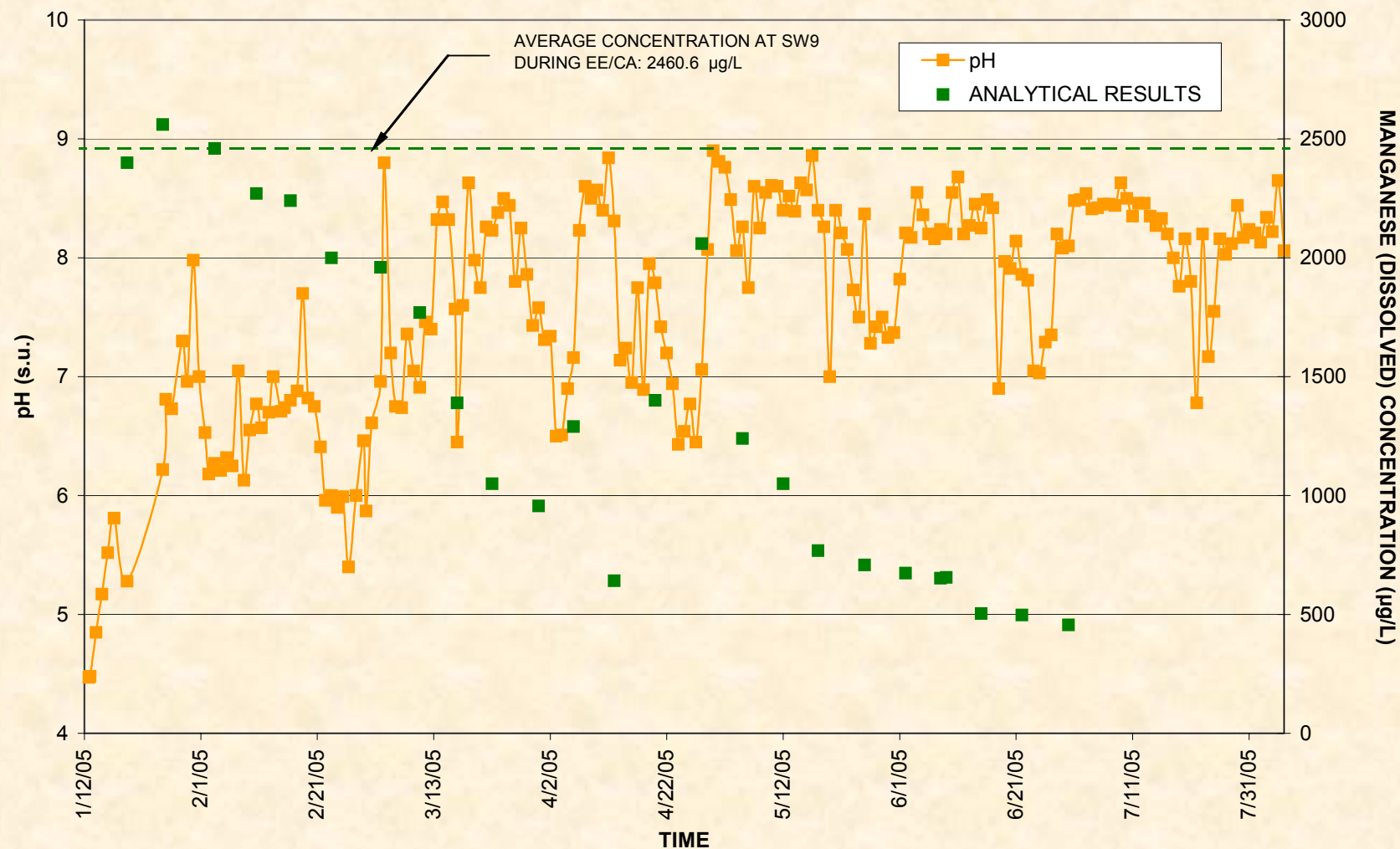
ALUMINUM (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



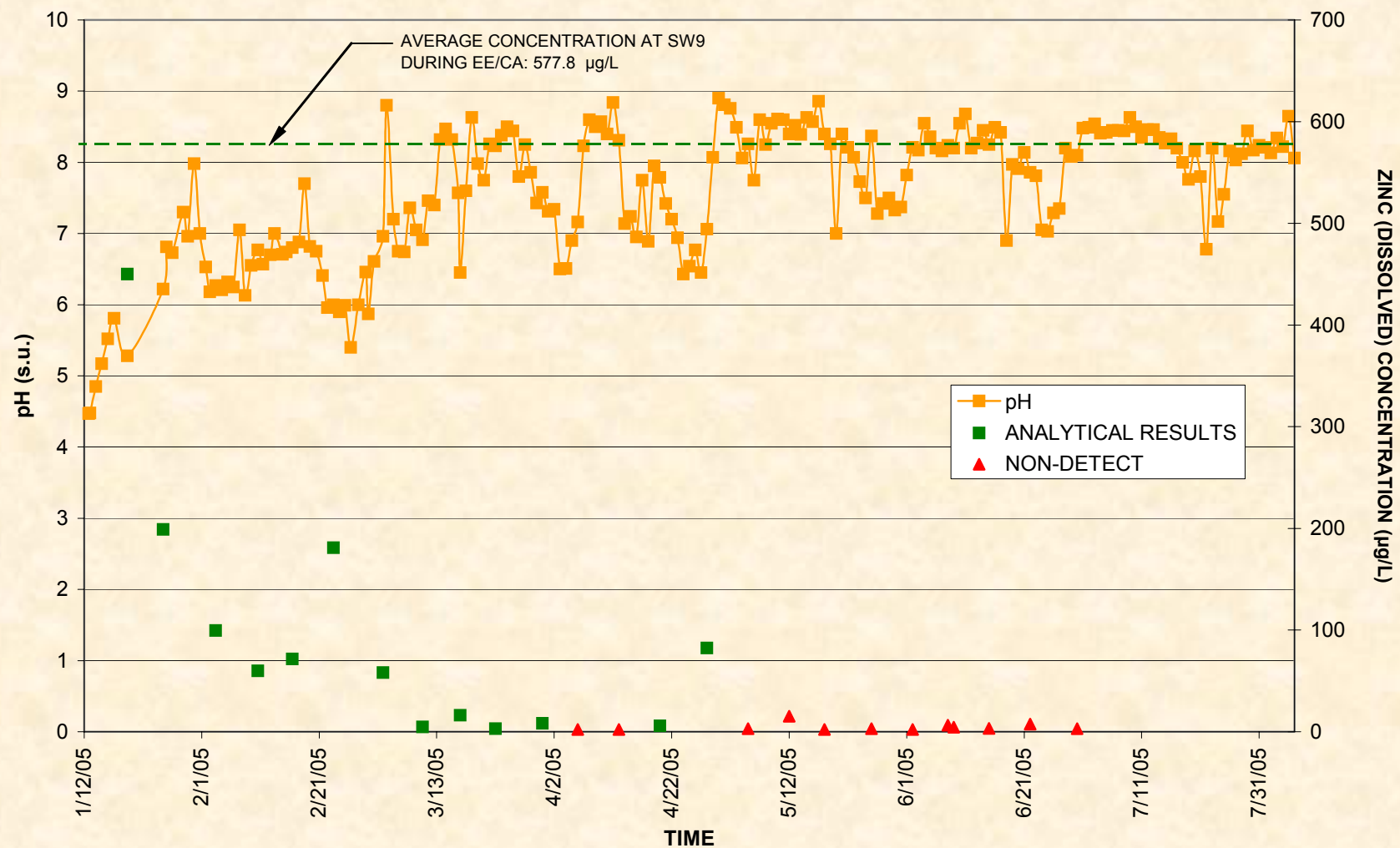
COPPER (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



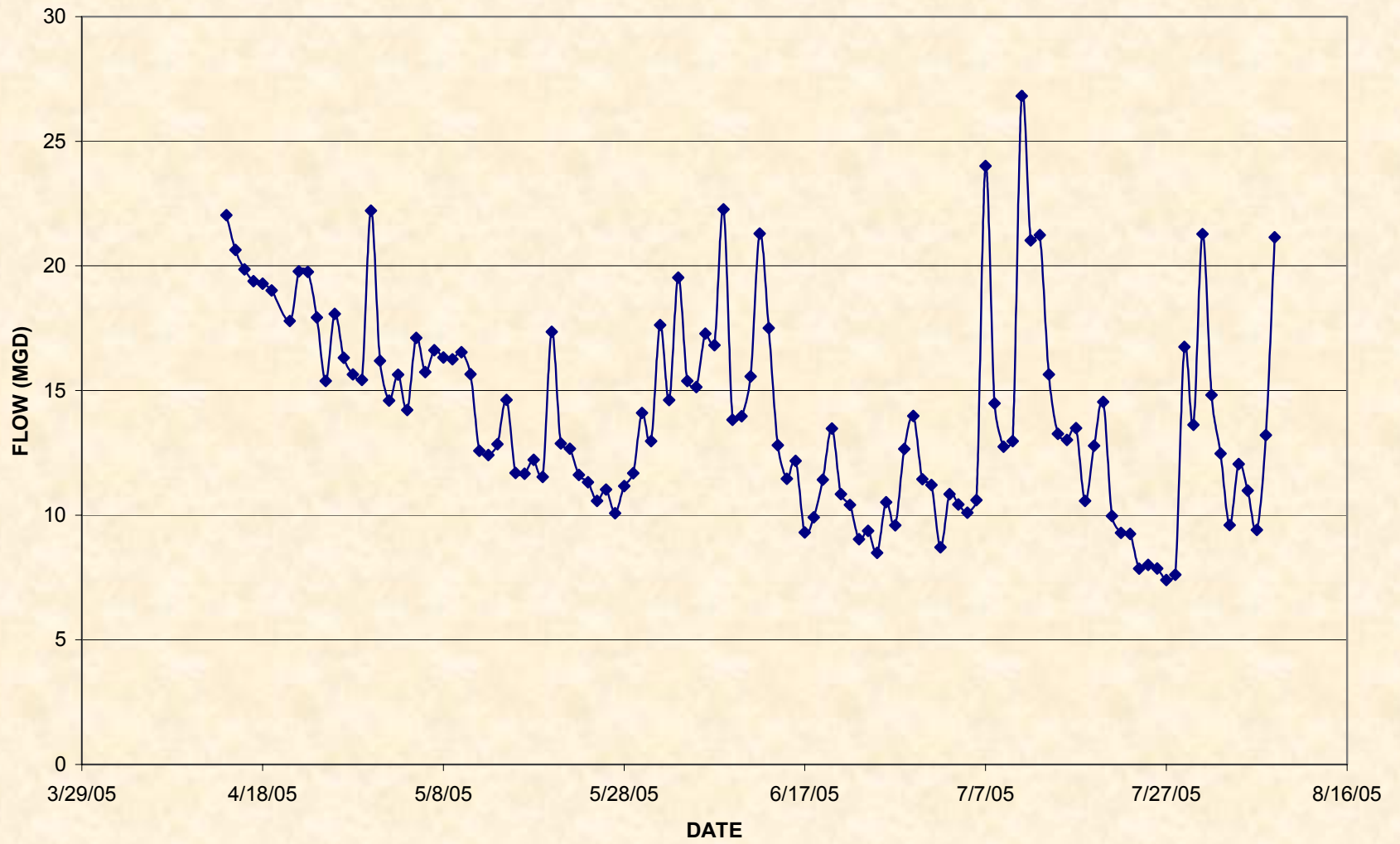
MANGANESE (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



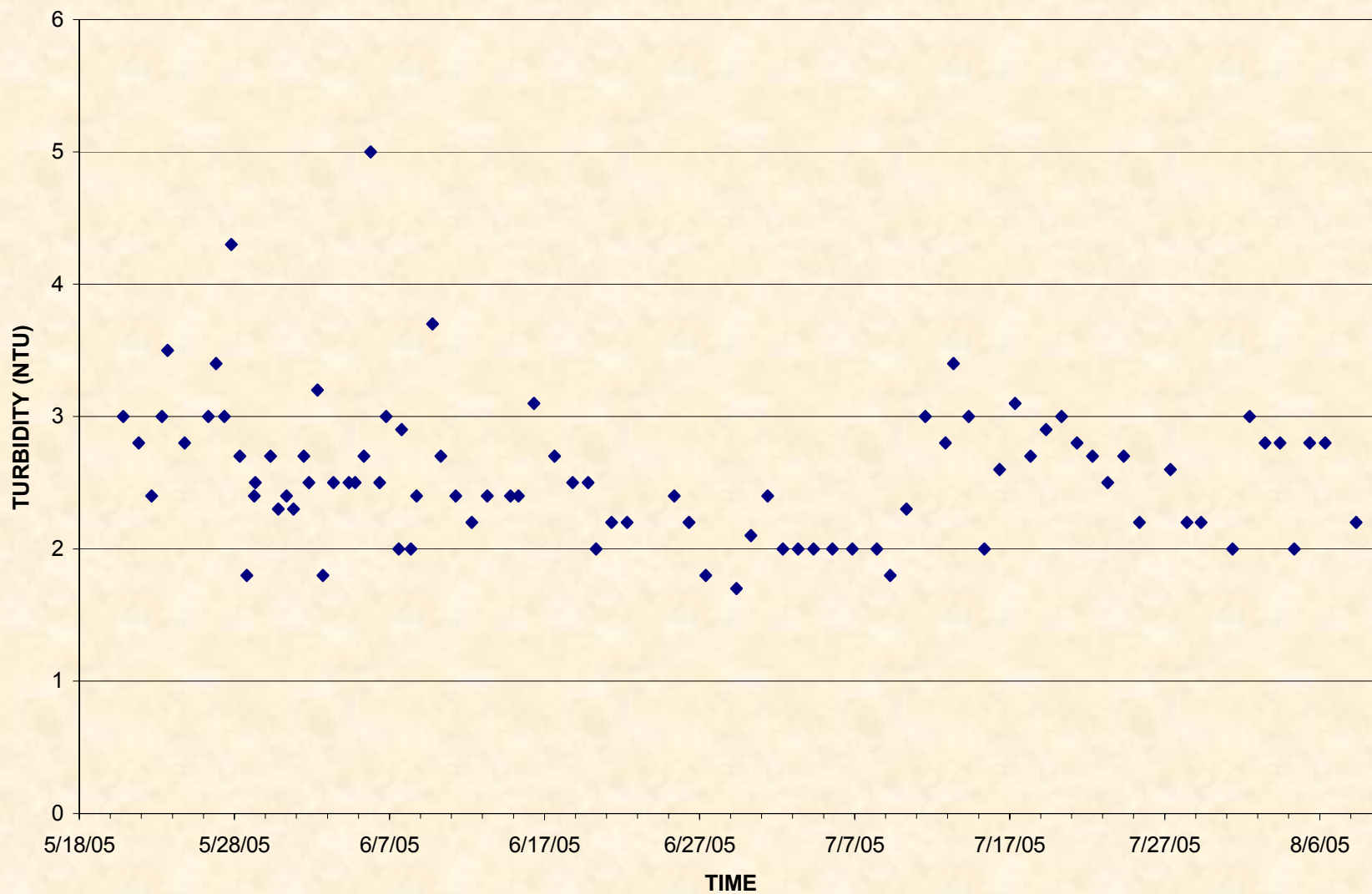
ZINC (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



FLOW AT SW9



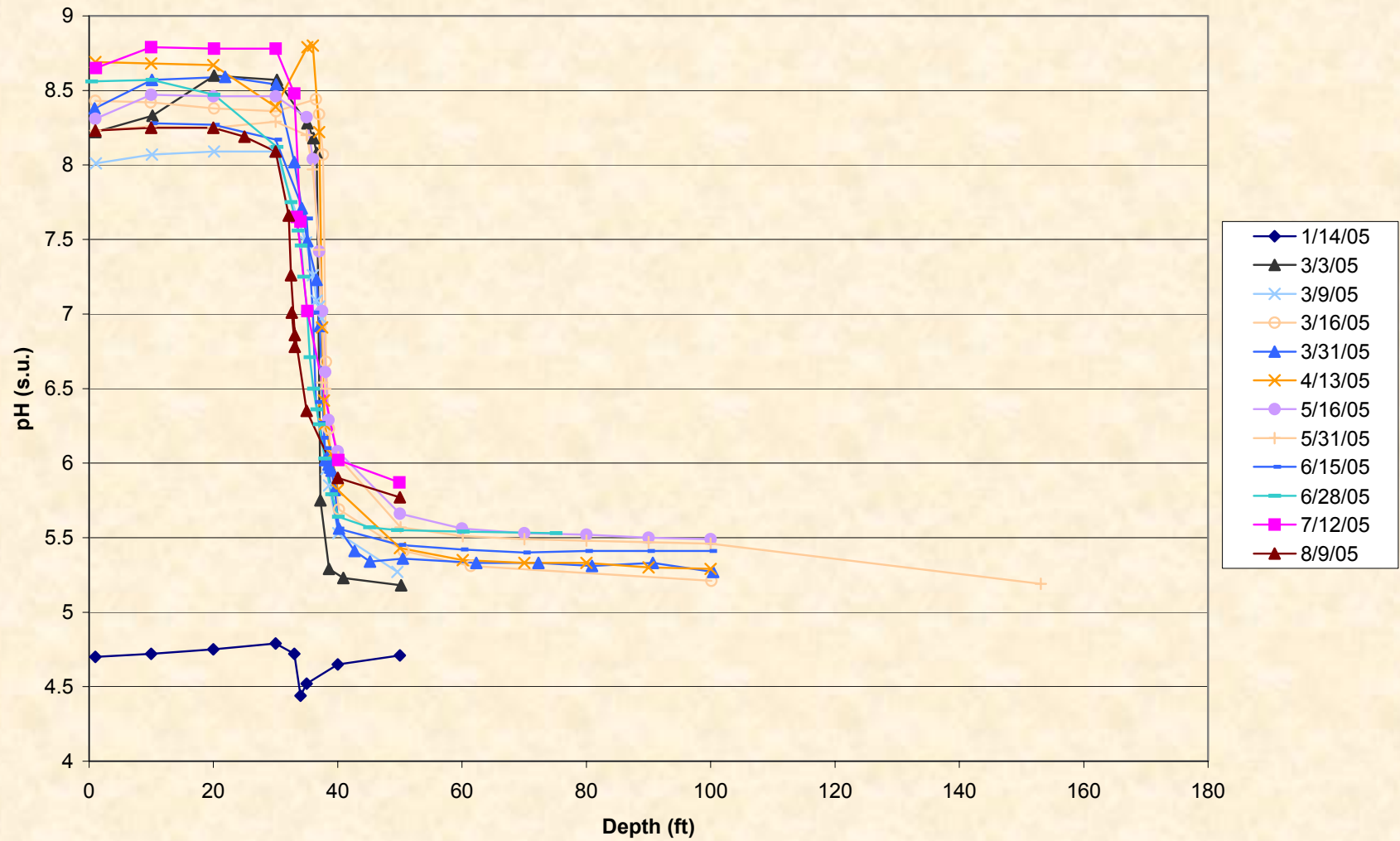
SW9 TURBIDITY vs. TIME





PIT MONITORING RESULTS

SMP-4



LOADING SUMMARY

	Average Concentration at SW9 During EE/CA (µg/L)	Average Concentration at SW9 After Plant Start-Up (µg/L)	Percent Removal (%)	Daily Loading Reduction Based on SW9 Average Flow From EE/CA, 14.6 MGD (lbs.)	Annual Loading Reduction at SW9 Based on Average Annual Flow From EE/CA (lbs.)
Aluminum (Dissolved)	1127.7	67.8	94.0	129.5	47,271
Copper (Dissolved)	105.9	1.02	99.0	12.8	4,678
Iron (Dissolved)	3452.1	49.7	98.6	415.7	151,741
Zinc (Dissolved)	577.8	28.9	95.0	67.1	24,481
Manganese (Dissolved)	2460.6	1272.0	48.3	145.2	53,011
TOTAL:				770	281,181

COST OF TREATMENT SYSTEM

	NORTH POTATO CREEK IN-PIT WATER TREATMENT PLANT	ESTIMATED COST FOR CONVENTIONAL WATER TREATMENT PLANT
Annual Operation and Maintenance Cost	\$400,000	\$1,300,000
Treatment Cost Per 1,000 Gallons	\$0.075	\$0.24

COST OF TREATMENT SYSTEM

	NORTH POTATO CREEK IN-PIT WATER TREATMENT PLANT	ESTIMATED COST FOR CONVENTIONAL WATER TREATMENT PLANT
Construction Cost	4,000,000	25,000,000
Annual Operation and Maintenance Cost	\$400,000	\$1,300,000
Treatment Cost Per 1,000 Gallons	\$0.075	\$0.24