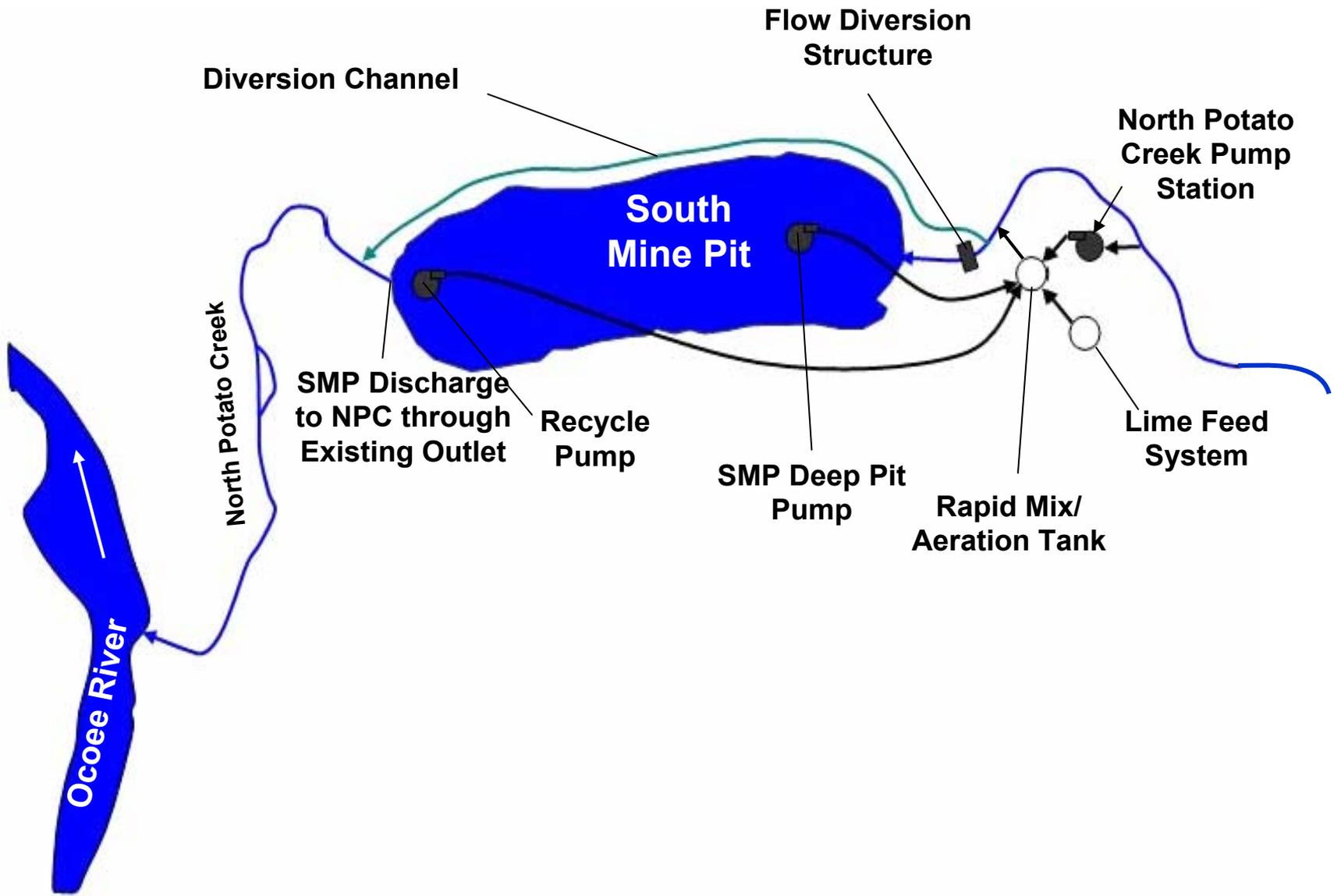


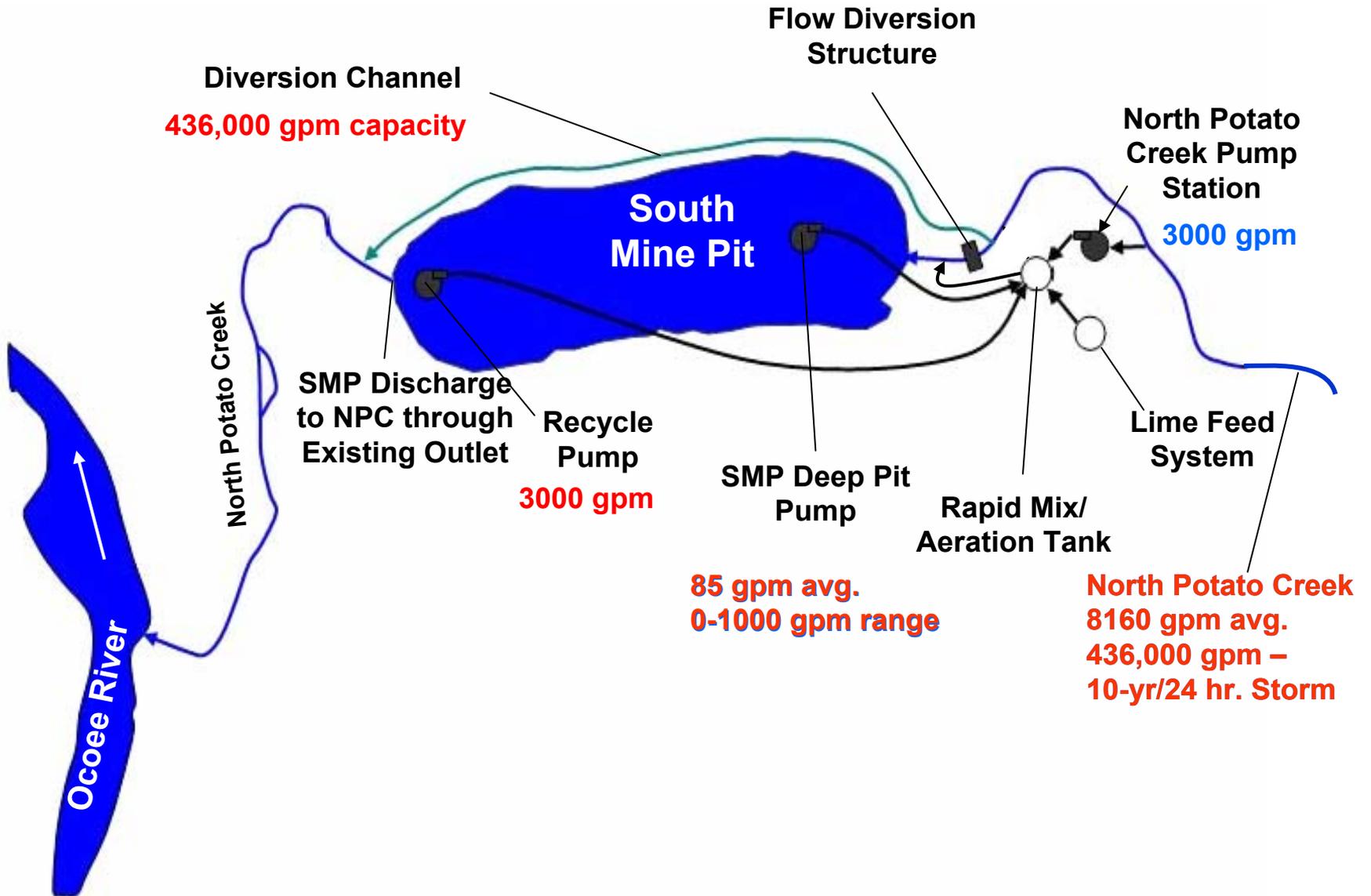


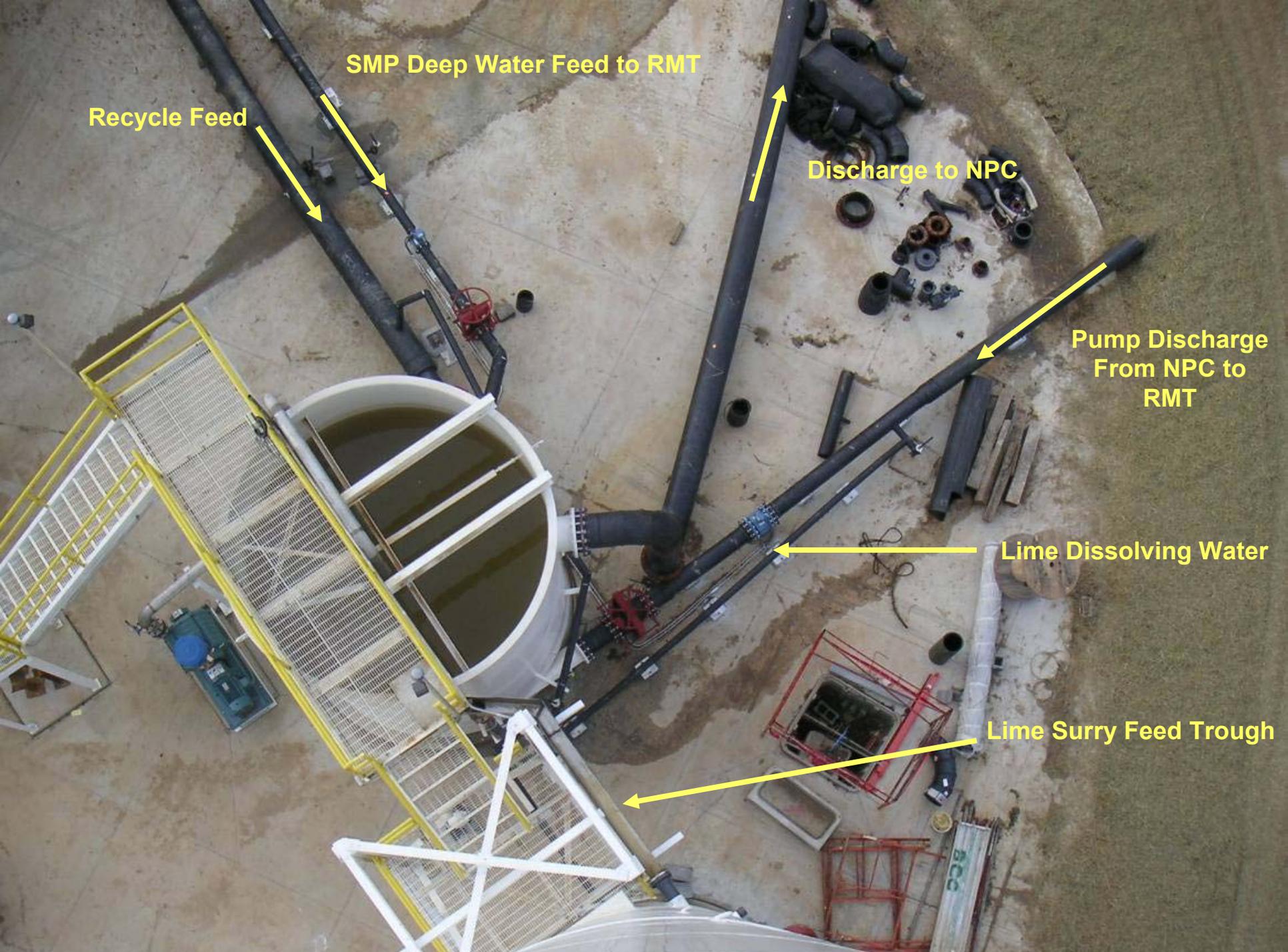
**NORTH POTATO CREEK
IN-PIT WATER TREATMENT PLANT
AT THE
COPPER BASIN MINING SITE**

**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

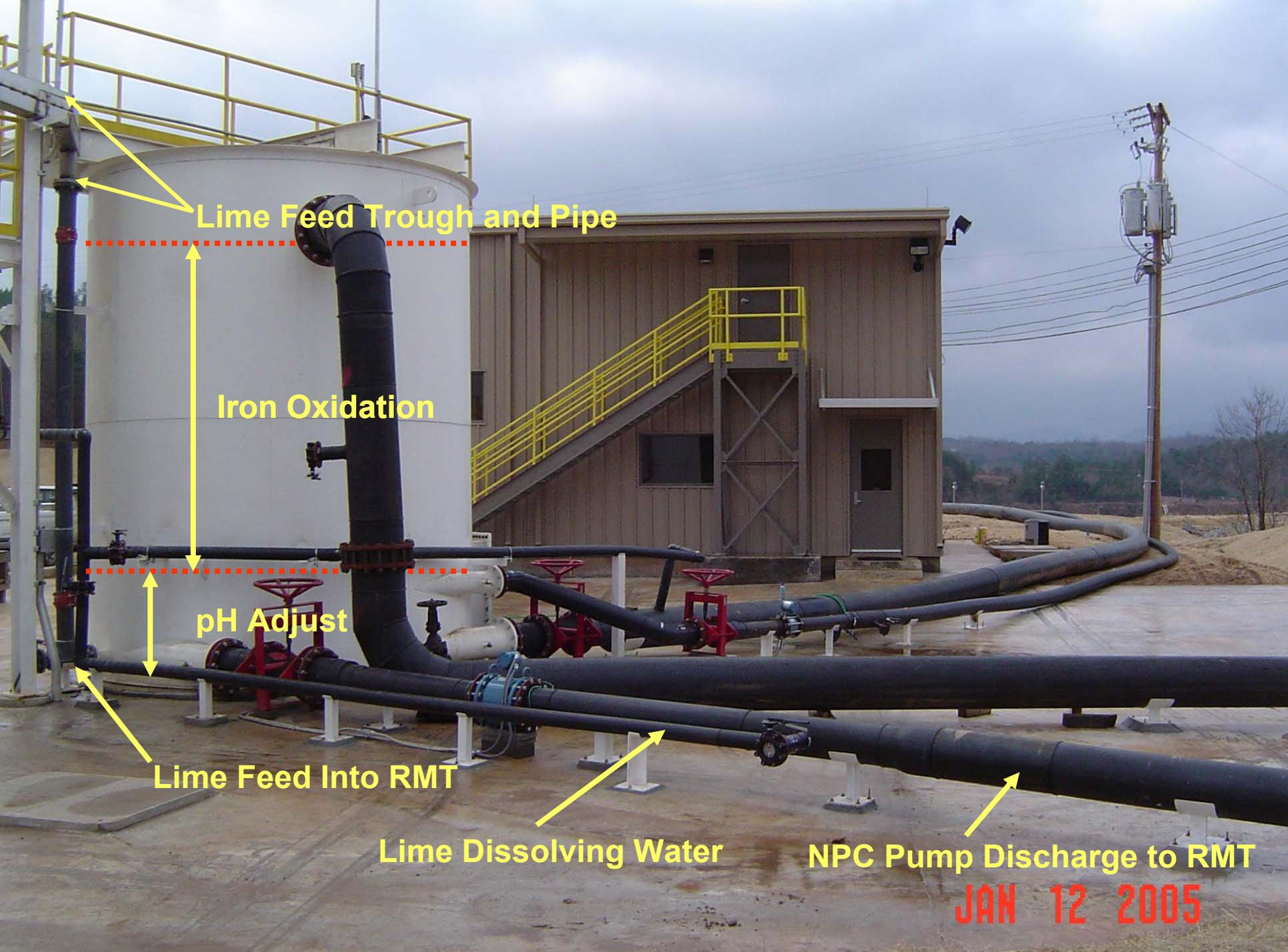


JAN 12 2005



JAN 12 2005

AvestaPolaris
1000



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

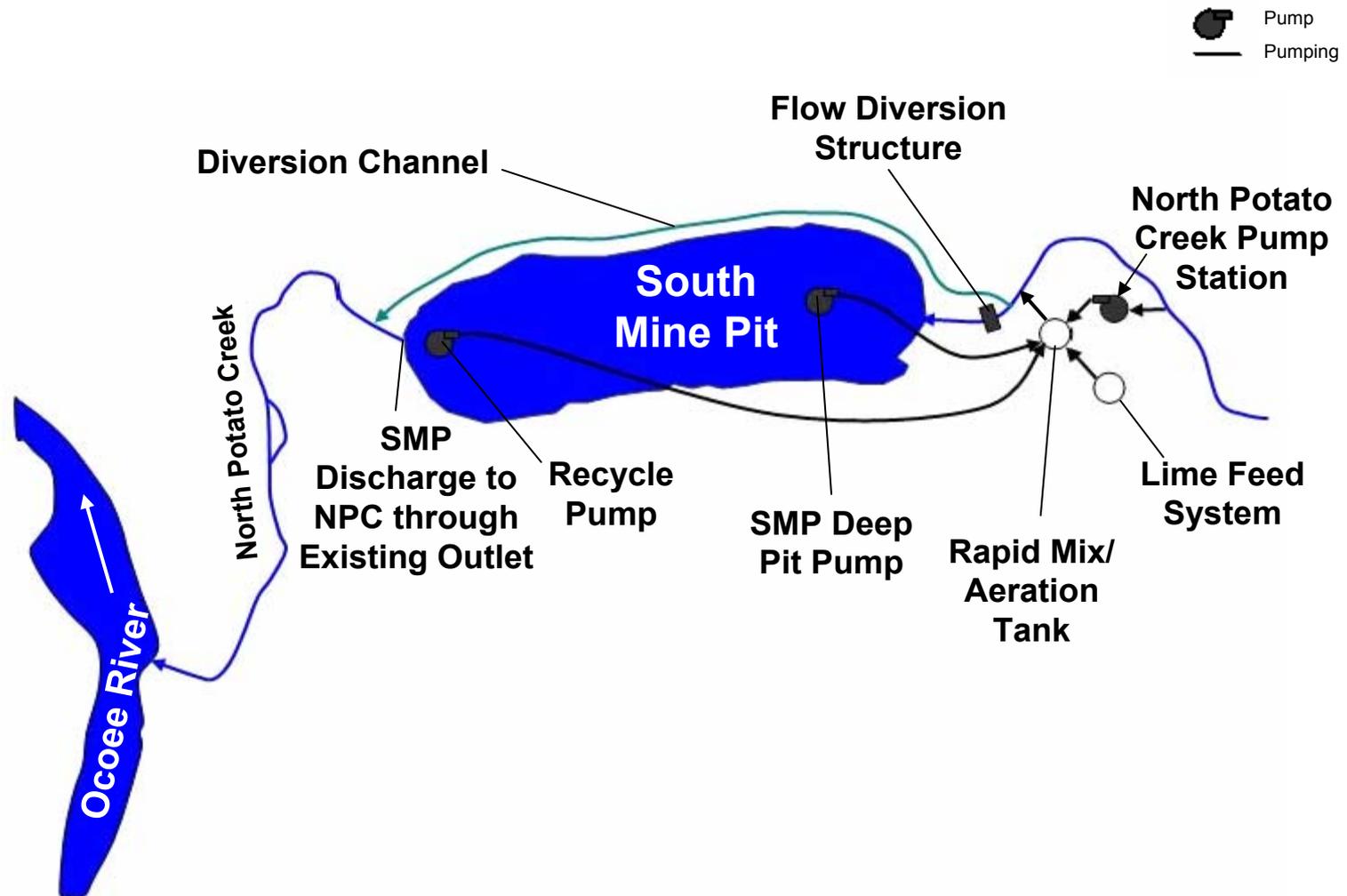


JAN 12 2005

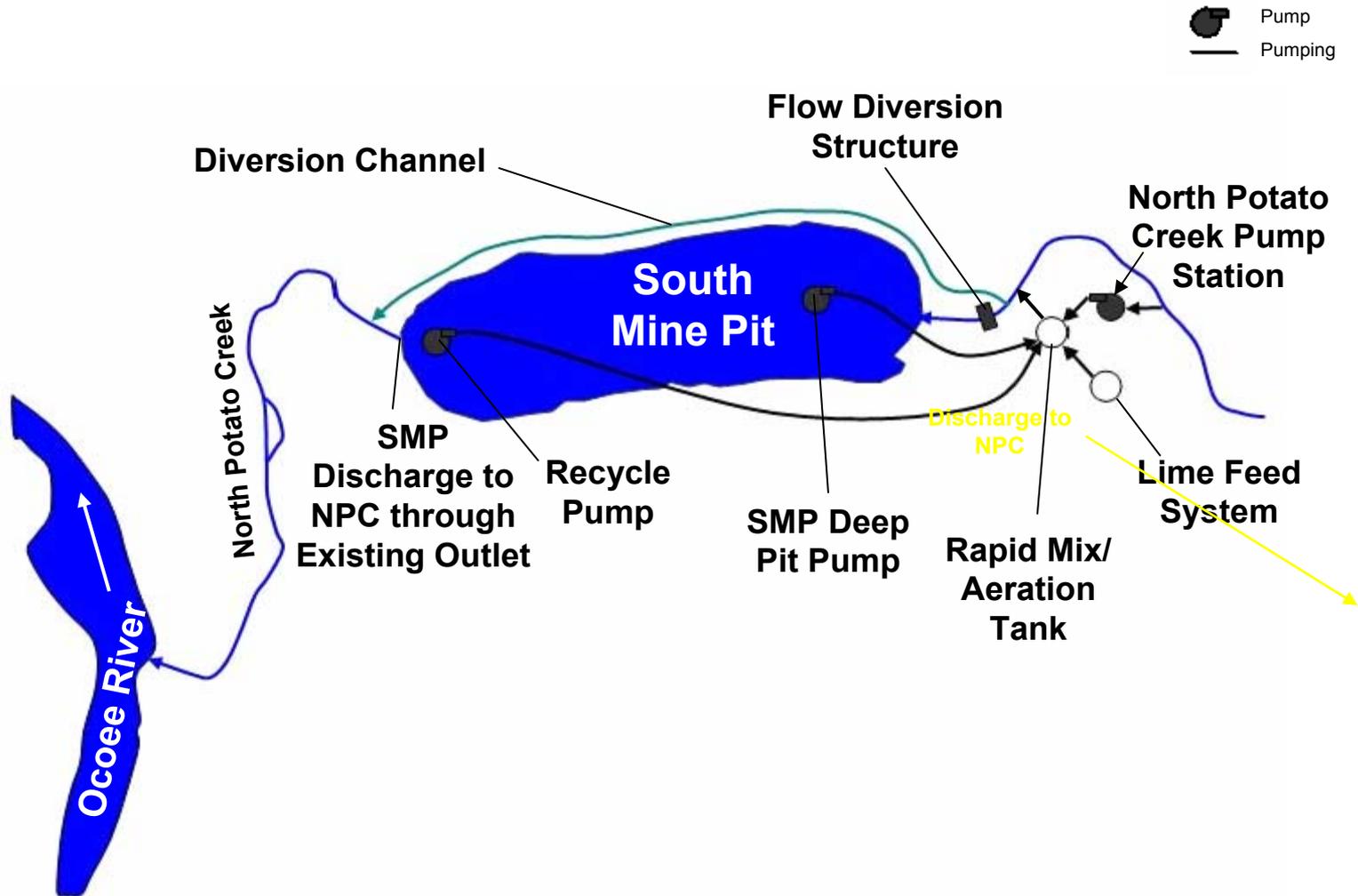




North Potato Creek Water Treatment Plant Conceptual Design



North Potato Creek Water Treatment Plant Conceptual Design





**NPC
UPSTREAM**



**DIVERSION
CHANNEL**

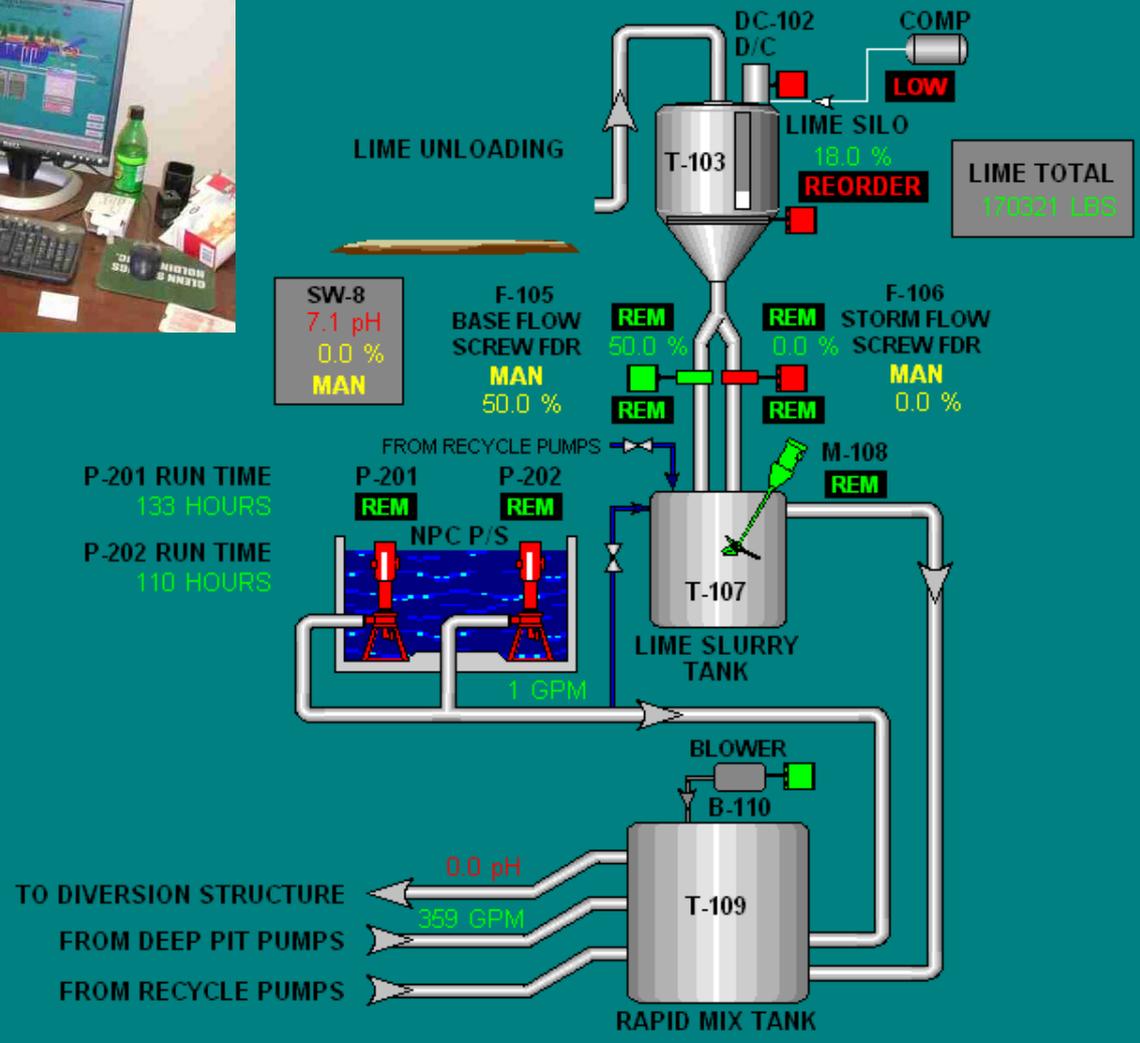


NPC DOWNSTREAM (OCOEE RIVER 2100 FEET)





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	NPC P/S	RAPID MIX TANK	SW-8	DEEP PIT PUMPS	HYDROLABS		SW-9
					DEEP	SHALLOW	
18.0 %	1 GPM	0.0 pH	7.2 pH	359 GPM	4.9 pH	6.5 pH	6.8 pH
	684 GALLONS		0.6 uMHOS	225027 GALLONS	3.5 mS/cm	0.6 mS/cm	0.6 uMHOS
			15085 GPM		0.1 mg/l	11.0 mg/l	14076 GPM
					120 mV	60 mV	
					11.1 deg C	5.9 deg C	
<u>LONDON MILL</u>							
INFLUENT 11.4 pH							
EFFLUENT 9.9 pH							

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
 688 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

SW-9
114092 GPM
6.8 pH
0.6 mS/cm

SW-8
15262 GPM
7.2 pH
0.6 mS/cm

0.0 % MAN
359 GPM

RECYCLE PUMPS

DEEP HYDROLAB

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

SHALLOW HYDROLAB

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

DEEP PIT PUMPS

TREND

P-303 RUN TIME
86 HOURS

P-301 RUN TIME
44 HOURS

P-302 RUN TIME
301 HOURS

TREND

TREND



Description:

Rapid Mix Tank Overflow pH
Influent pH

SOUTH MINE PIT

Shallow (low TDS) water

TO OCOEE RIVER

Chemocline

Deep (high TDS) water

P-303
LOC

P-304
OC

P-301
REM

P-302
REM

REM

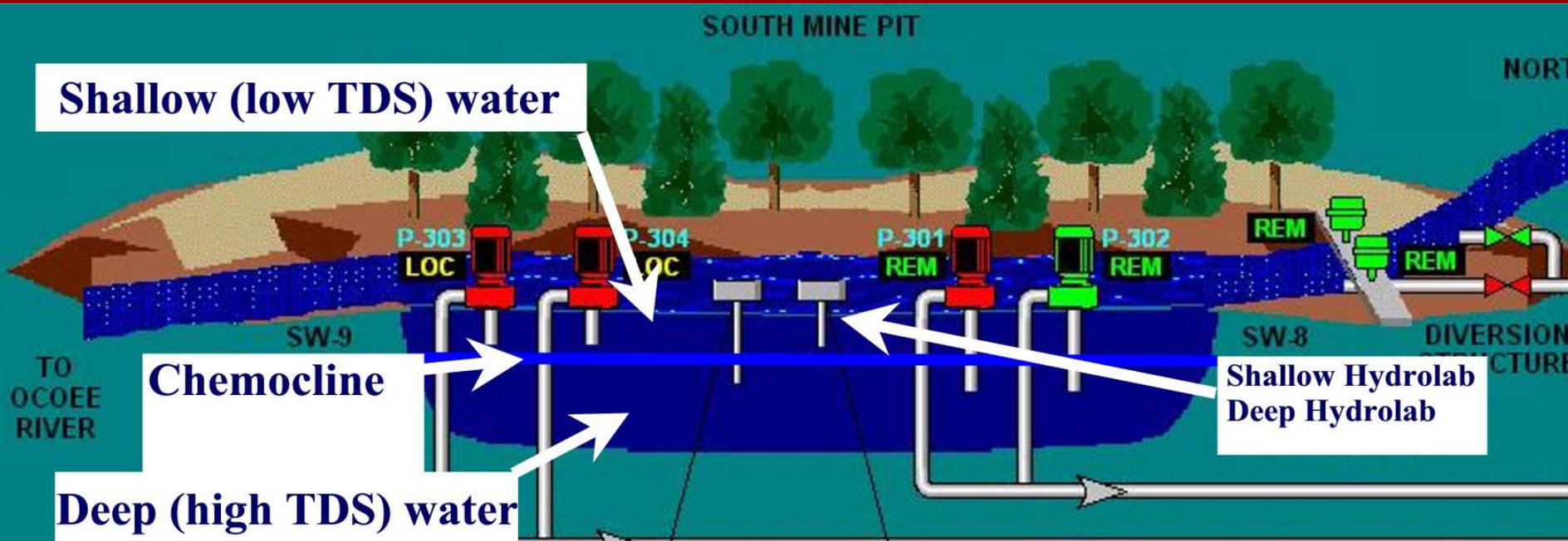
REM

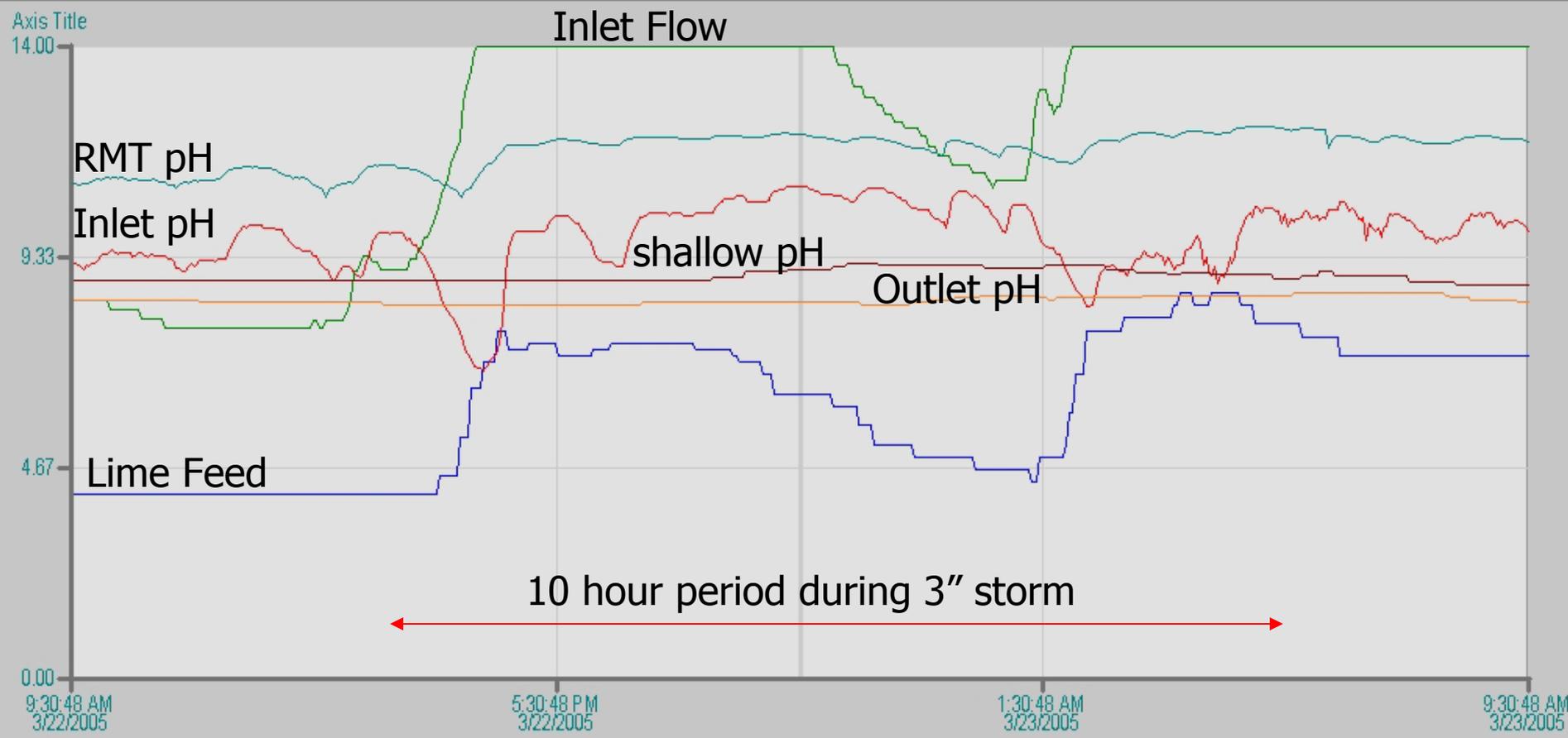
Shallow Hydrolab
Deep Hydrolab

SW-9

SW-8
DIVERSION
STRUCTURE

NORT





Hist.NPC_WTP.AI109.F_CV	Rapid Mix Tank Overflow pH	12.04
Hist.NPC_WTP.FI402.F_CV	SW-8 Flow	17613.88
Hist.NPC_WTP.SIC105_PV.F_CV	Base Feeder F-105 Speed Feedba	45.00
Hist.NPC_WTP.AI402P.F_CV	SW-8 pH	10.88
Hist.NPC_WTP.AI501P.F_CV	Shallow pH	9.05
Hist.NPC_WTP.AI600P.F_CV	SW-9 pH	8.32

Navigation buttons: Previous, Home, Next, Stop

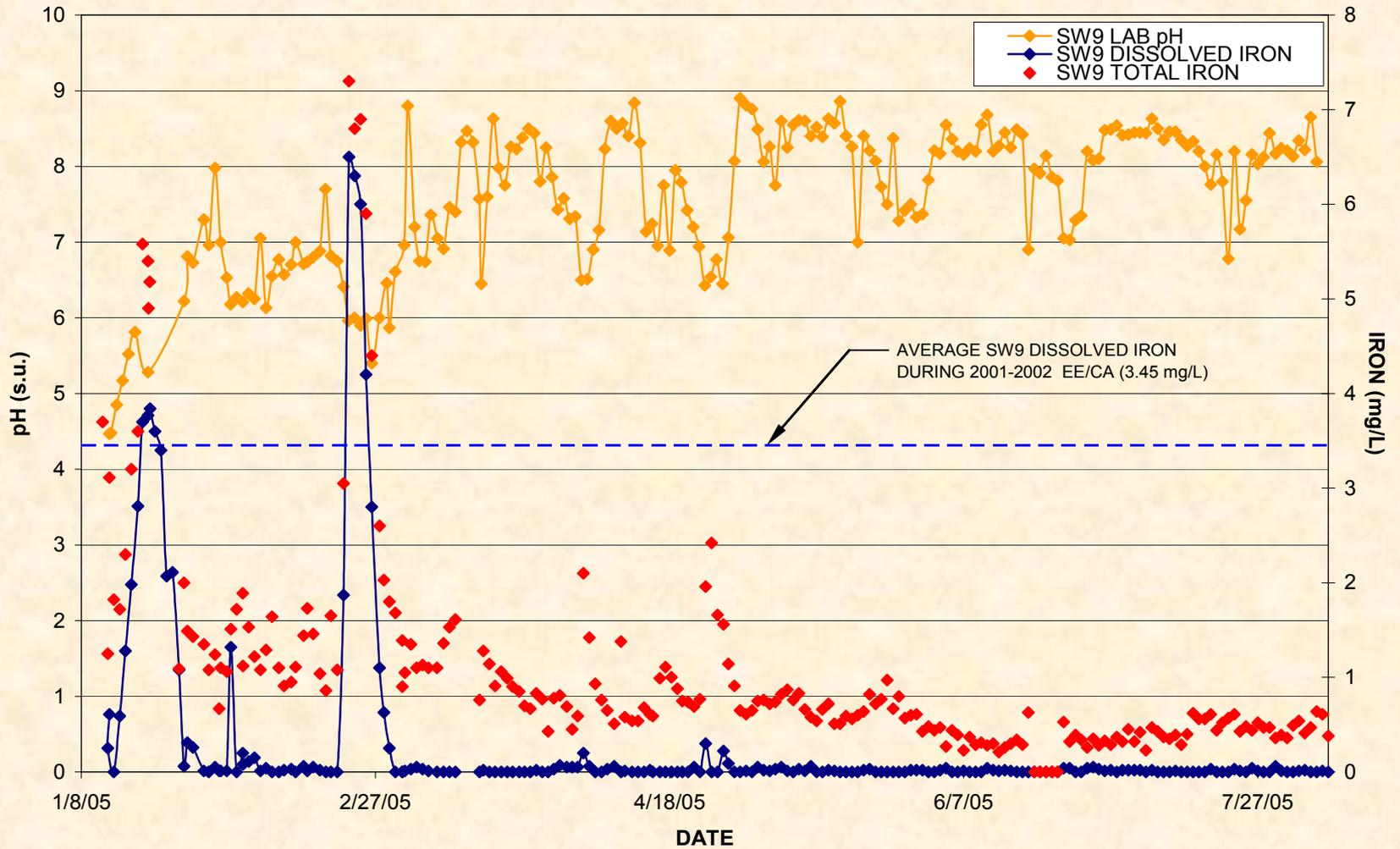
OVERVIEW LIME PREP S. MINE PIT

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

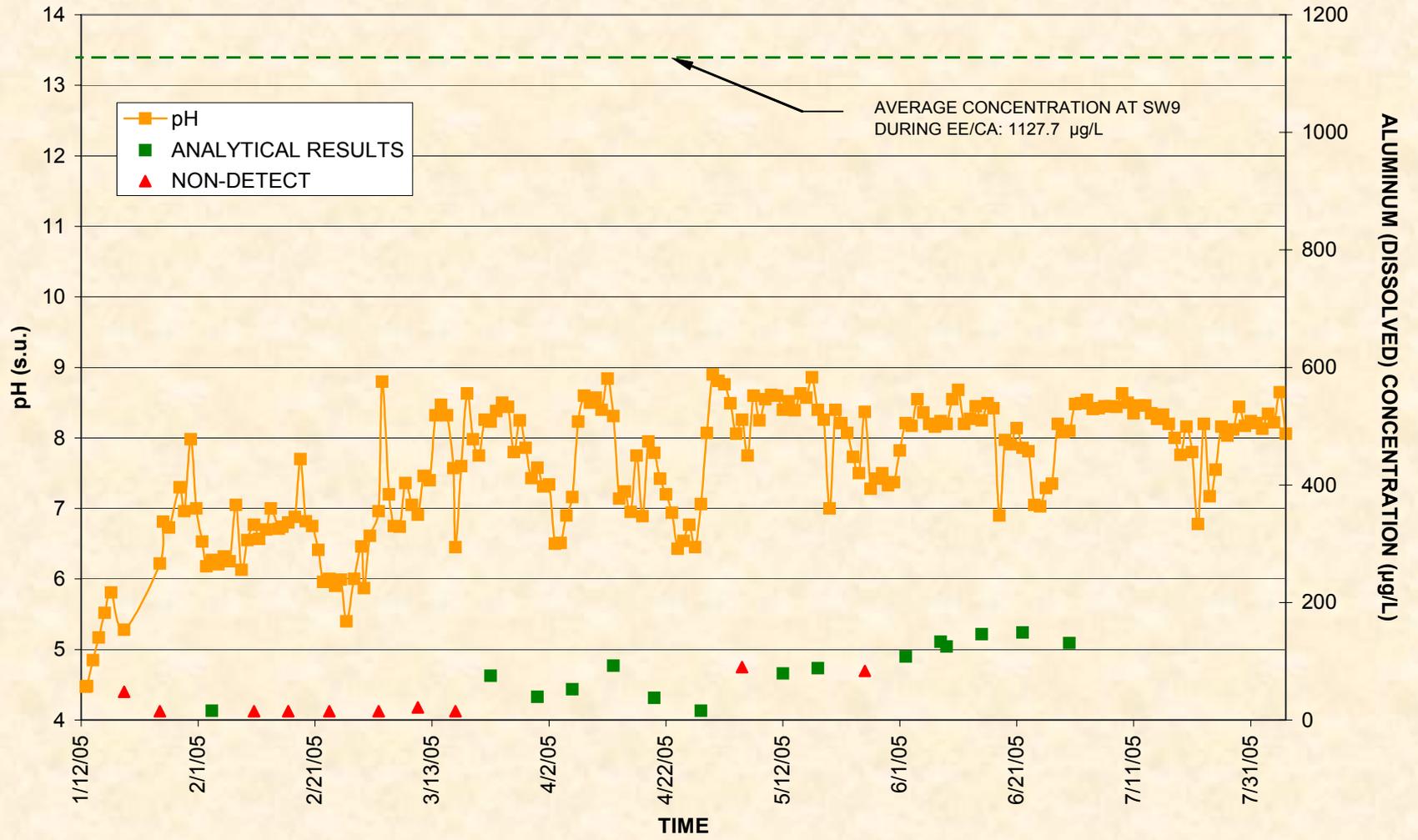
A photograph of a stream with a weir and monitoring equipment. The text "SW-9 MONITORING RESULTS" is overlaid in yellow. The scene shows a rocky stream bed with a metal weir structure. Water is flowing over the weir, creating white foam. To the right, there is a metal structure with a control box and pipes. The background is a rocky, vegetated hillside.

SW-9 MONITORING RESULTS

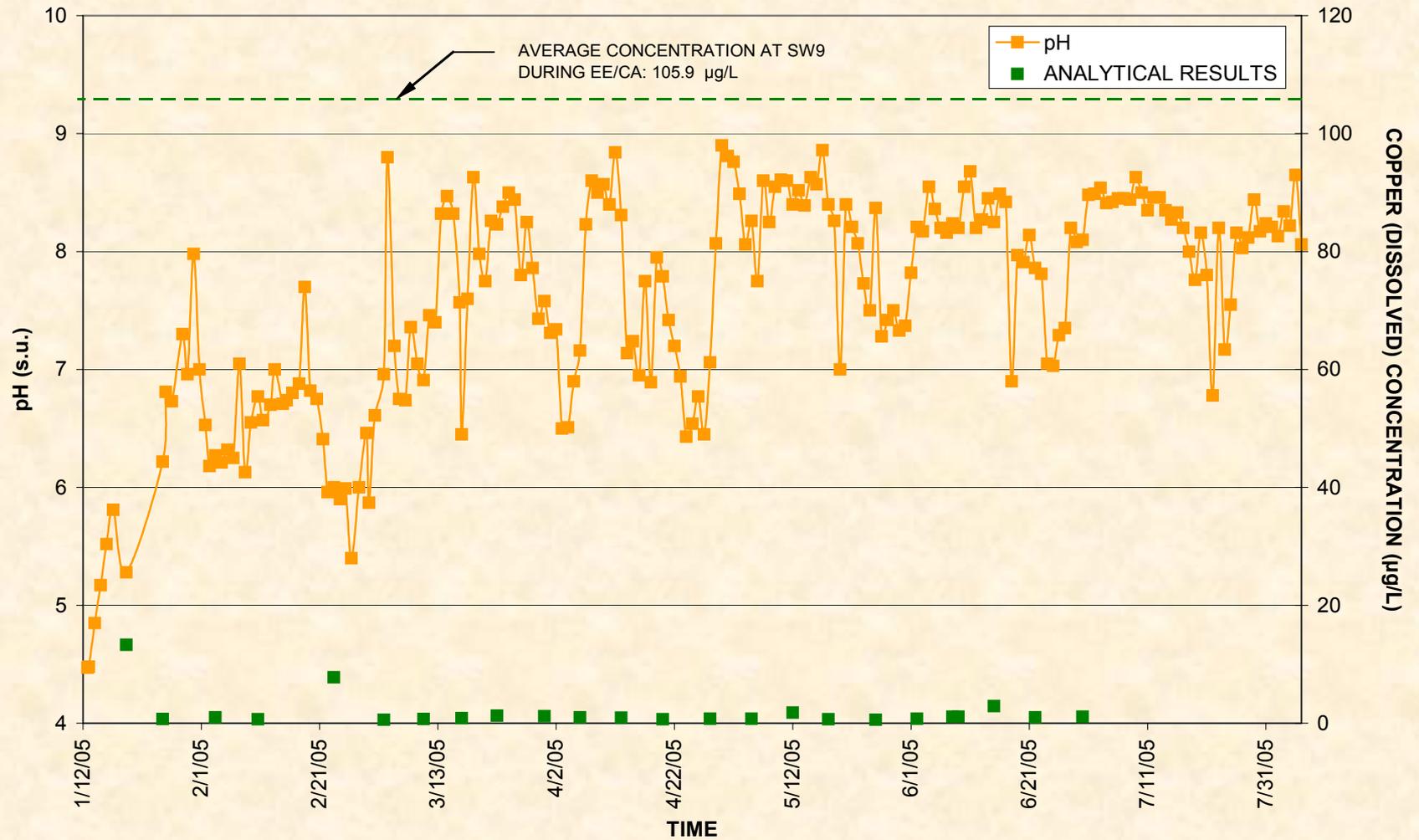
FIELD IRON MEASUREMENTS AT SW9 & pH vs. TIME



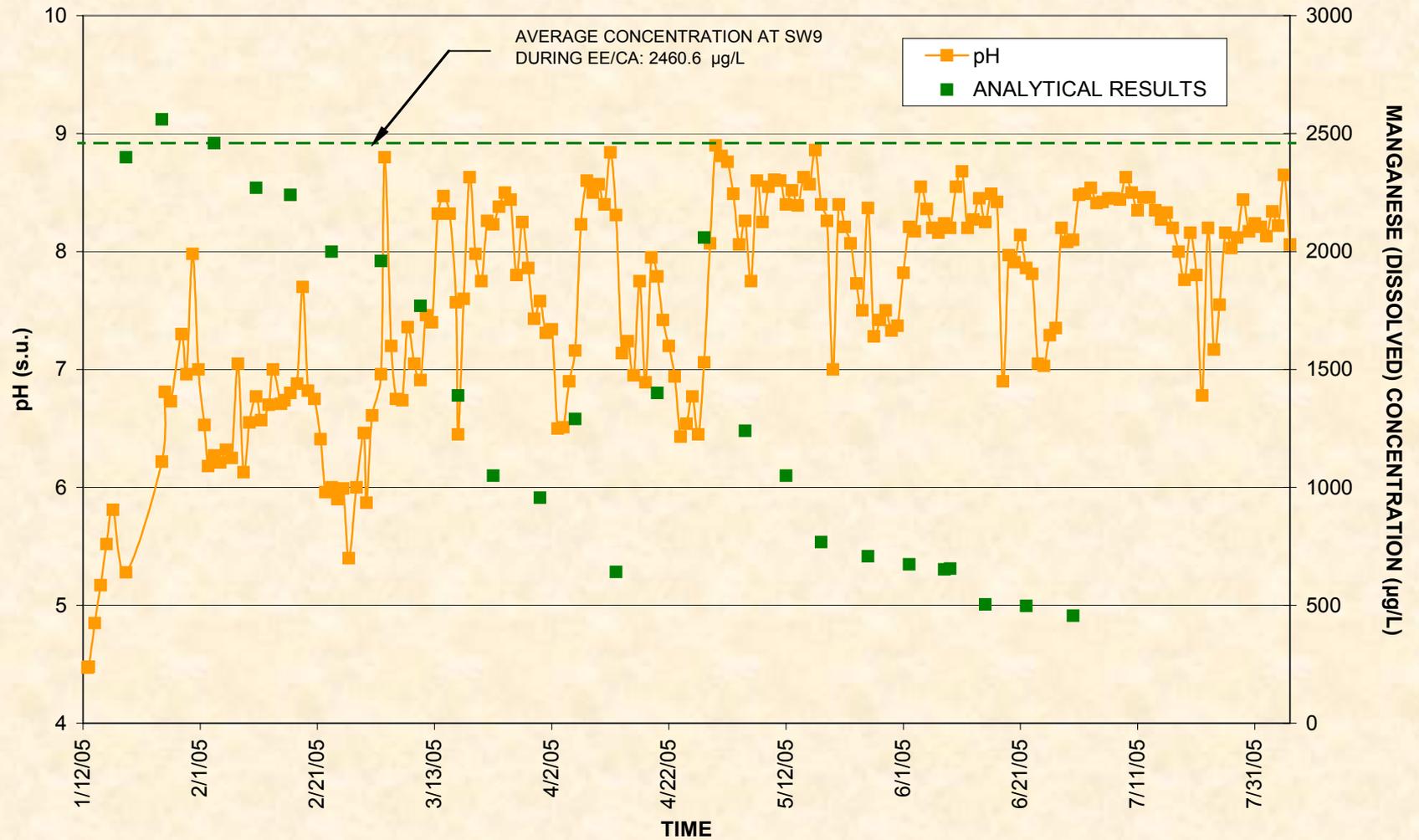
ALUMINUM (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



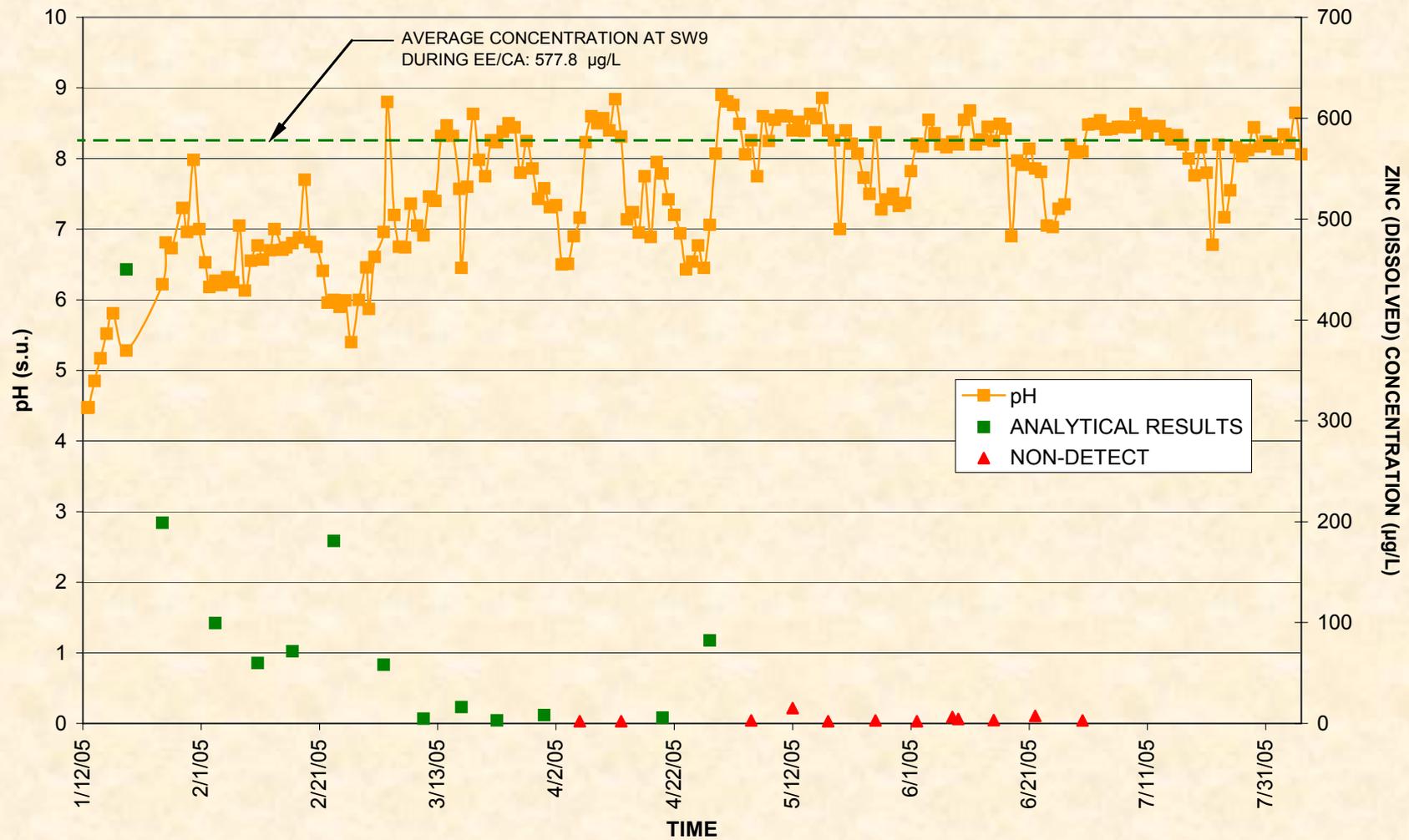
COPPER (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



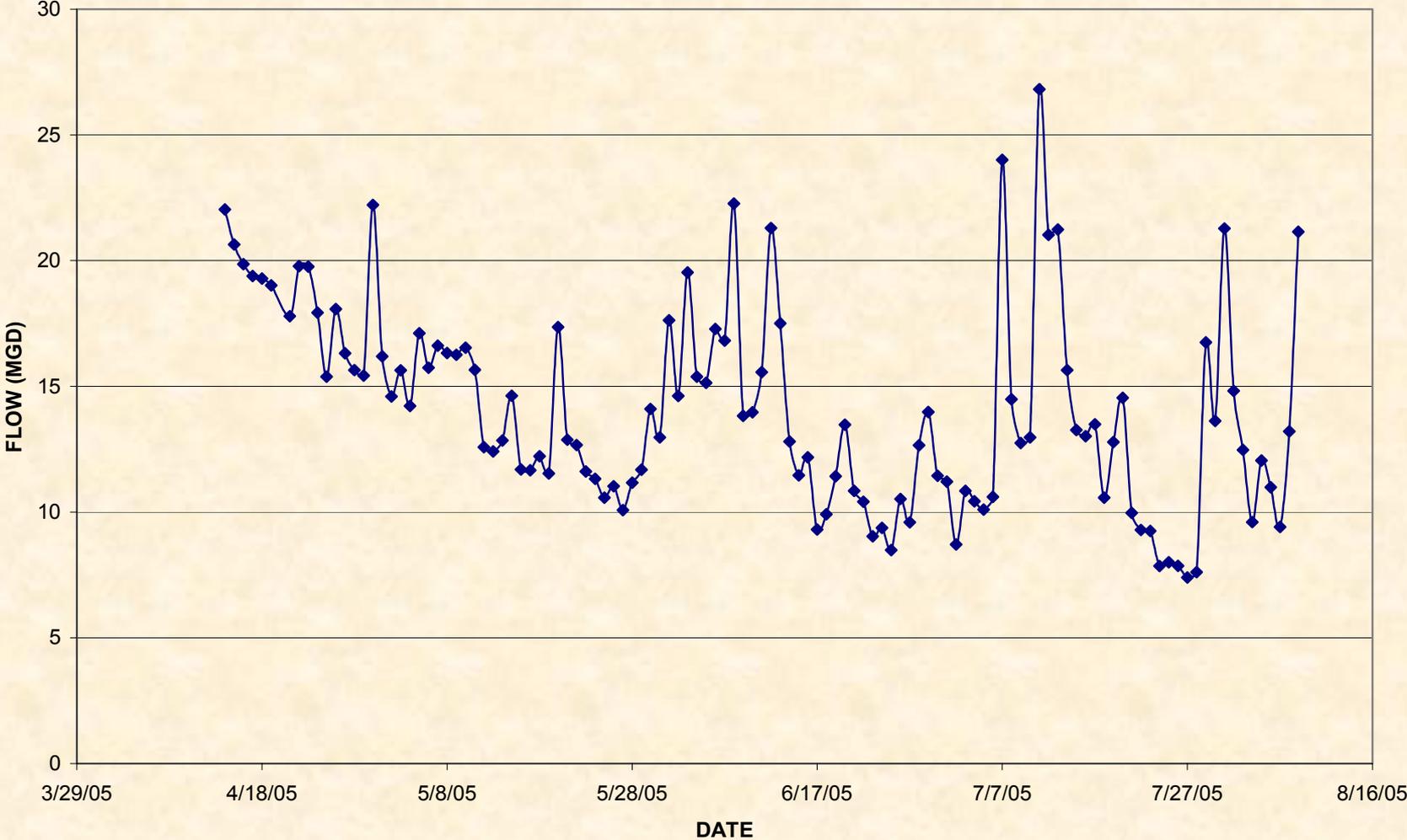
MANGANESE (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



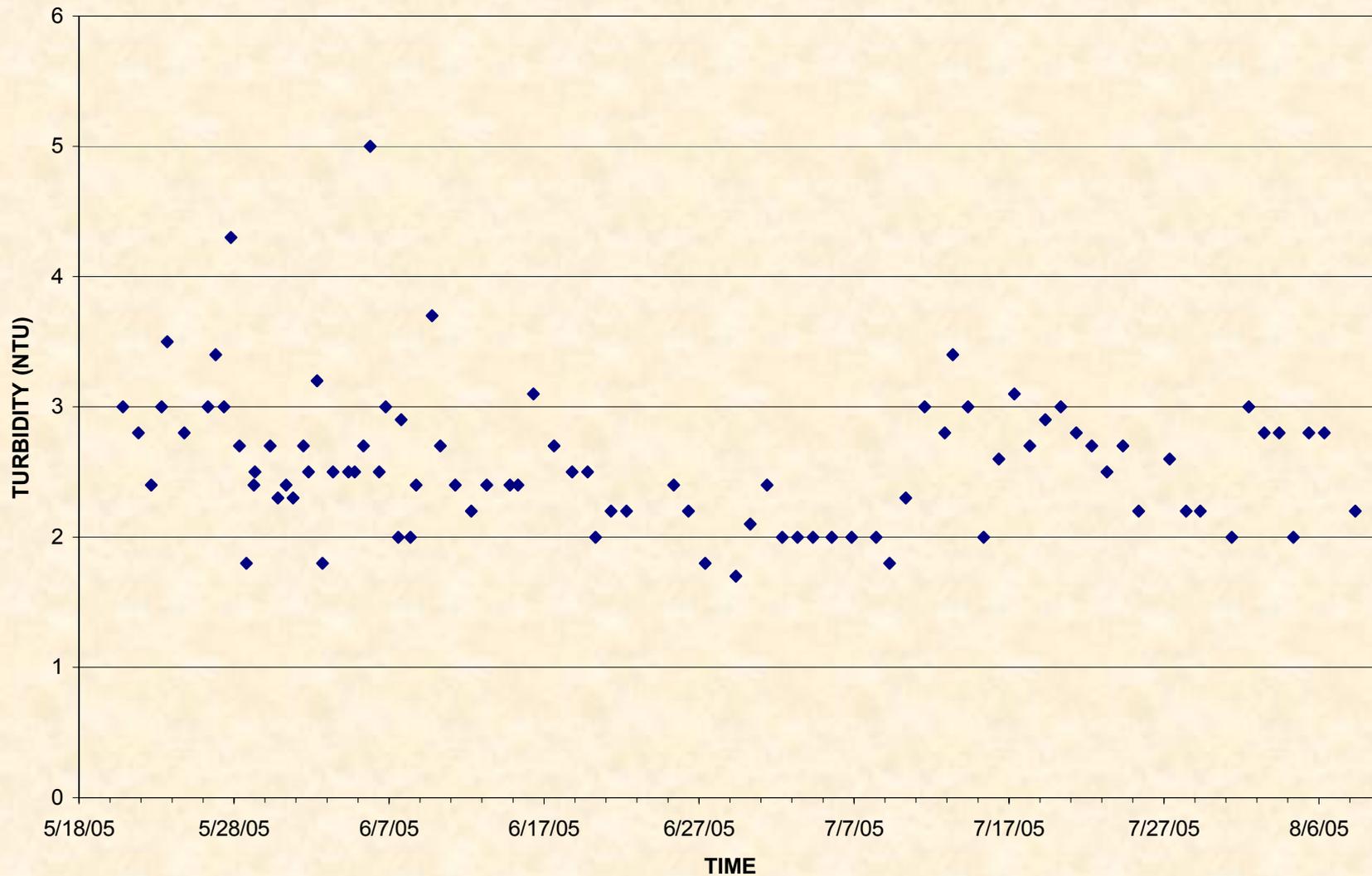
ZINC (DISSOLVED), pH and AVERAGE CONCENTRATION DURING EE/CA AT SW9



FLOW AT SW9



SW9 TURBIDITY vs. TIME





PIT MONITORING RESULTS

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