

Operating the Bunker Hill Central Treatment Plant Under Challenging Conditions

*Mine Design,
Operations & Closure
Conference*

May 2012

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Apex Engineering, PLLC

Gary Fulton, Ferguson Contracting



Presentation Outline

- 1. What is the CTP?**
- 2. Changes in water quality and flow**
- 3. Changes in lime usage**
- 4. Similar event in 2008**
- 5. Changes in plant operations**
- 6. Effects on water quality**
- 7. Recommendations**



Central Treatment Plant



CTP Operations

- **Operator: Ferguson Contracting**
- **Process Engineer: Apex Engineering**
- **Client: USACE**
- **Funding: USEPA**
- **EPA's Engineer: CH2M Hill**
- **Ultimate Owner: Idaho DEQ?**
- **Other Interested Parties**

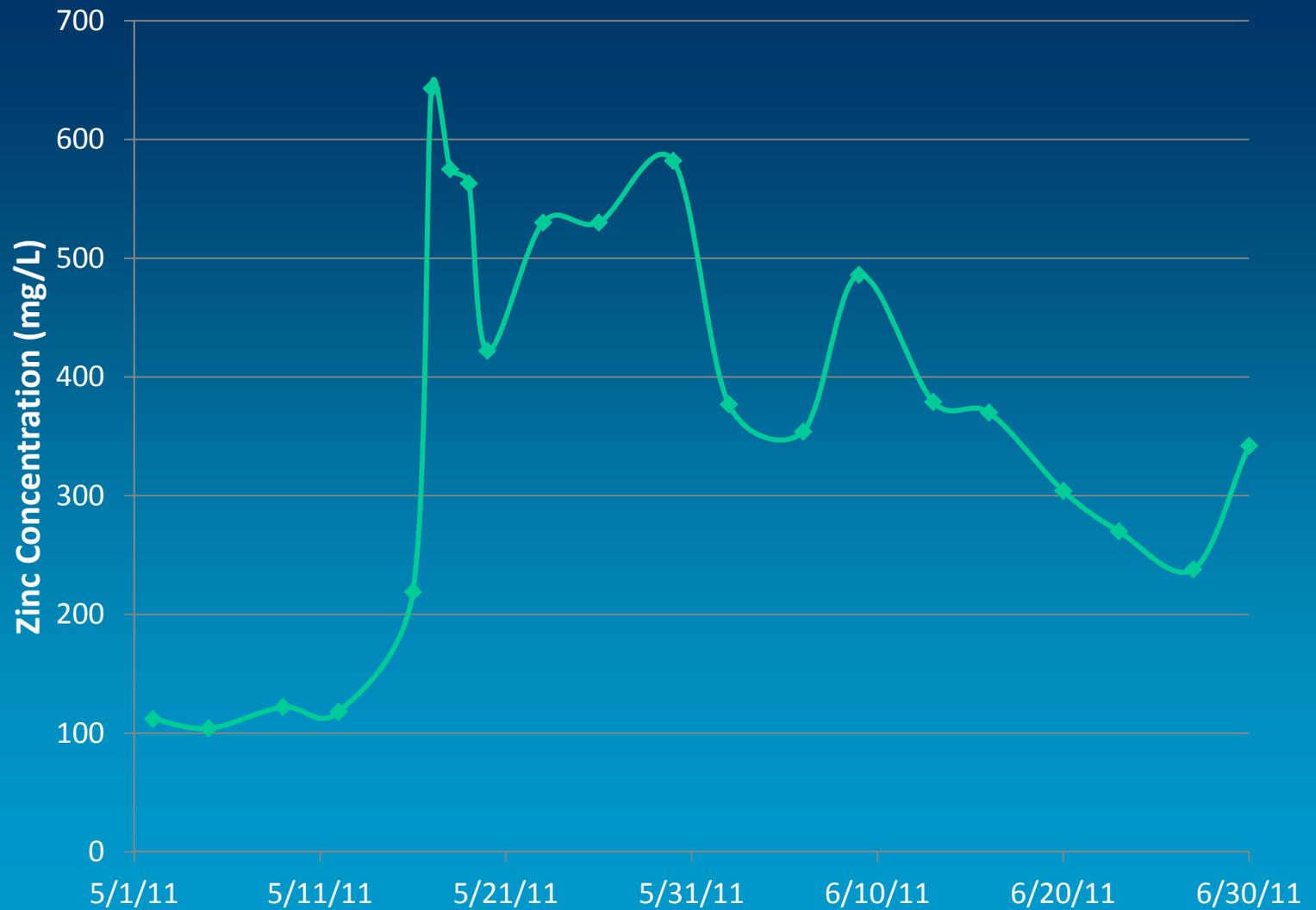


2011 Runoff Event

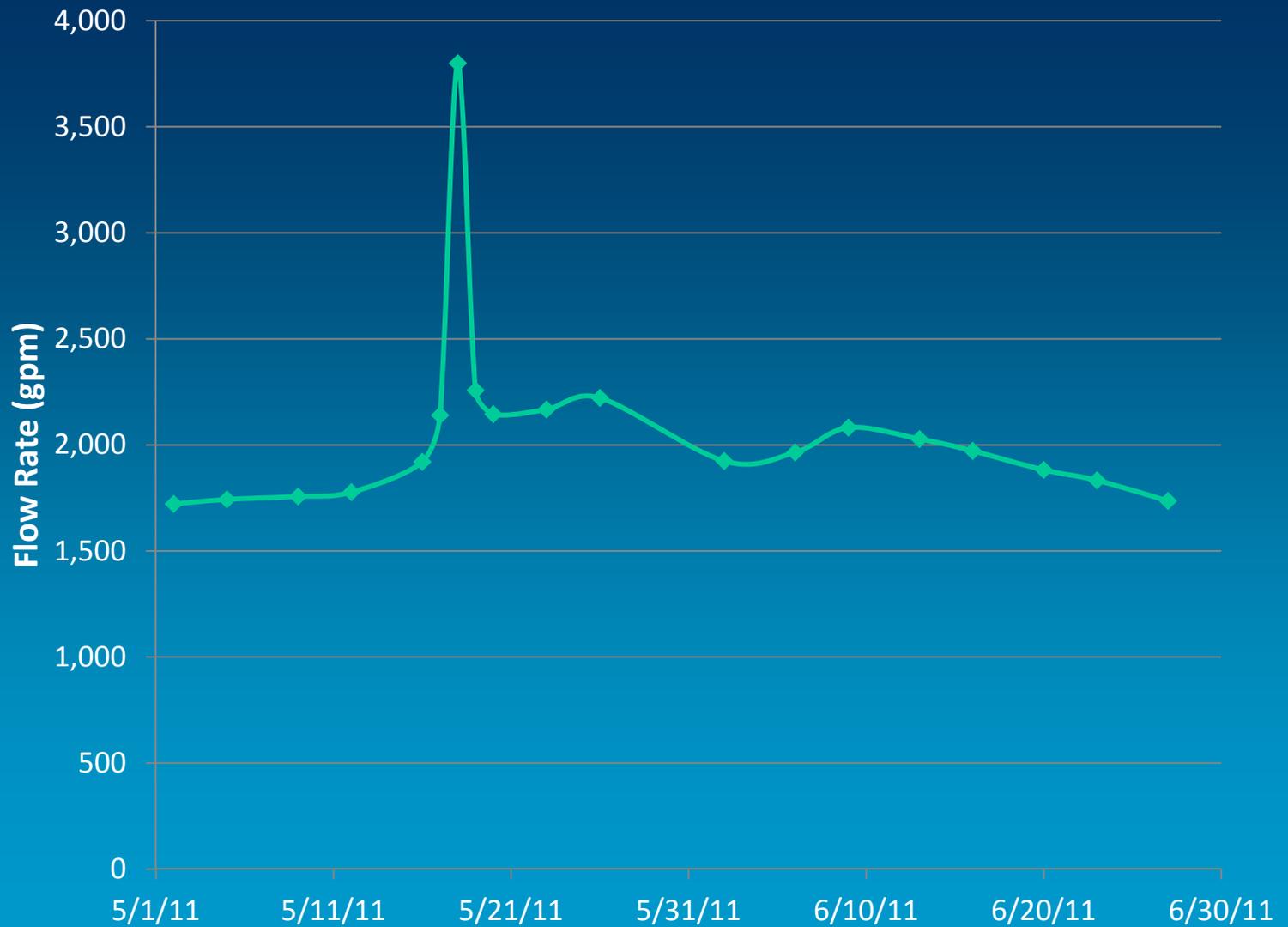
- **Began Sunday evening, May 15th**
- **Increased lime demand was first indication**
- **Began 24/7 staffing on May 16th**
- **Zinc concentration peaked at 643 mg/L on May 17th**
- **Main concern was to manually adjust lime system operating parameters**



Zinc Concentrations



Kellogg Tunnel (KT) Flow Rate



KT Monthly Flows

KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Jan.	61,000,000	61,677,510	54,606,100	53,066,890	52,223,080	53,150,000	56,050,900	56,281,000	53,465,820	50,936,960
Feb.	57,600,000	45,584,000	52,840,000	46,493,470	48,306,920	49,860,000	51,188,000	50,511,300	49,282,209	48,146,111
March	60,730,000	57,740,360	50,452,060	60,162,290	59,852,720	58,073,000	56,332,830	65,443,650	54,578,130	61,712,540
April	68,680,000	54,846,000	65,583,230	63,335,350	50,715,310	53,775,350	72,039,280	66,636,500	61,690,530	63,055,350
May	97,719,900	57,501,901	76,082,410	63,335,350	53,245,000	54,181,650	72,027,000	63,203,308	86,680,760	70,233,580
June	69,800,000	55,835,590	67,299,960	59,532,434	50,451,170	51,750,000	68,385,600	57,981,410	82,622,590	64,623,180
July	63,698,850	53,652,330	64,820,120	66,252,746	56,538,980	55,255,000	64,054,000	58,282,900	66,324,500	61,535,000
Aug.	66,707,120	45,289,000	58,212,940	62,074,750	52,002,140	49,970,000	64,621,000	55,335,900	65,168,620	56,446,670
Sept.	55,797,530	50,276,020	60,140,460	43,789,000	49,208,020	49,987,000	54,515,270	50,471,870	61,074,020	57,006,430
Oct.	60,424,720	50,660,840	54,485,871	52,869,290	59,601,690	52,807,000	57,610,030	50,086,330	58,666,300	55,830,000
Nov.	53,408,660	50,660,840	51,072,259	47,600,000	51,948,000	50,722,600	55,191,700	50,779,040	52,041,780	54,956,800
Dec.	56,414,870	53,464,780	56,034,000	56,413,080	56,770,000	54,904,400	60,486,900	53,716,210	55,727,260	54,542,700
Totals	771,981,650	637,189,171	711,629,410	674,924,650	640,863,030	634,436,000	732,502,510	678,729,418	747,322,519	699,025,321

KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2010-2019

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan.	55,503,180	61,797,170	58,434,610							
Feb.	50,819,910	54,556,227	57,763,170							
March	54,691,420	61,373,630	67,236,650							
April	56,255,340	65,687,340								
May	58,825,640	84,365,390								
June	56,770,200	79,985,540								
July	56,727,510	79,346,330								
Aug.	56,239,370	70,377,570								
Sept.	54,109,980	60,404,280								
Oct.	55,480,200	62,403,480								
Nov.	54,856,880	58,430,700								
Dec.	54,607,330	58,617,700								
Totals	664,886,960	797,345,357	183,434,430	0	0	0	0	0	0	0



Normal KT Water



KT Water - May 18, 2011



KT Water - May 19, 2011



Normal Sludge Pond Level



Sludge Pond Level – May 2011



Lime Demand

<u>Month</u>	<u>Lime Demand (g/L)</u>
May 2008	1.74
June 2008	1.13
May 2009	0.62
June 2009	0.54
May 2010	0.24
June 2010	0.25
May 2011	1.23
June 2011	0.98



Lime Usage

<u>Time Period</u>	<u>Lime Usage (tons/day)</u>
2005	2.59
2006	3.23
2007	2.76
2008 (incl. runoff event)	4.78
2008-09	3.14
2009-10	2.16
2010-11	4.31



2008 Action

1. Ordering 1-2 truckloads/day of lime
2. Increasing lime slurry concentration
3. Operating both slakers as needed
4. 24/7 staffing
5. Running one lime injection system continuously
6. Wasting sludge continuously
7. Monitoring Clarifier sludge depth with sludge gun
8. Increasing sludge recycle rate
9. Increasing floc dosage (2 ppm → 5 ppm)
10. 24-hr TA time on effluent samples



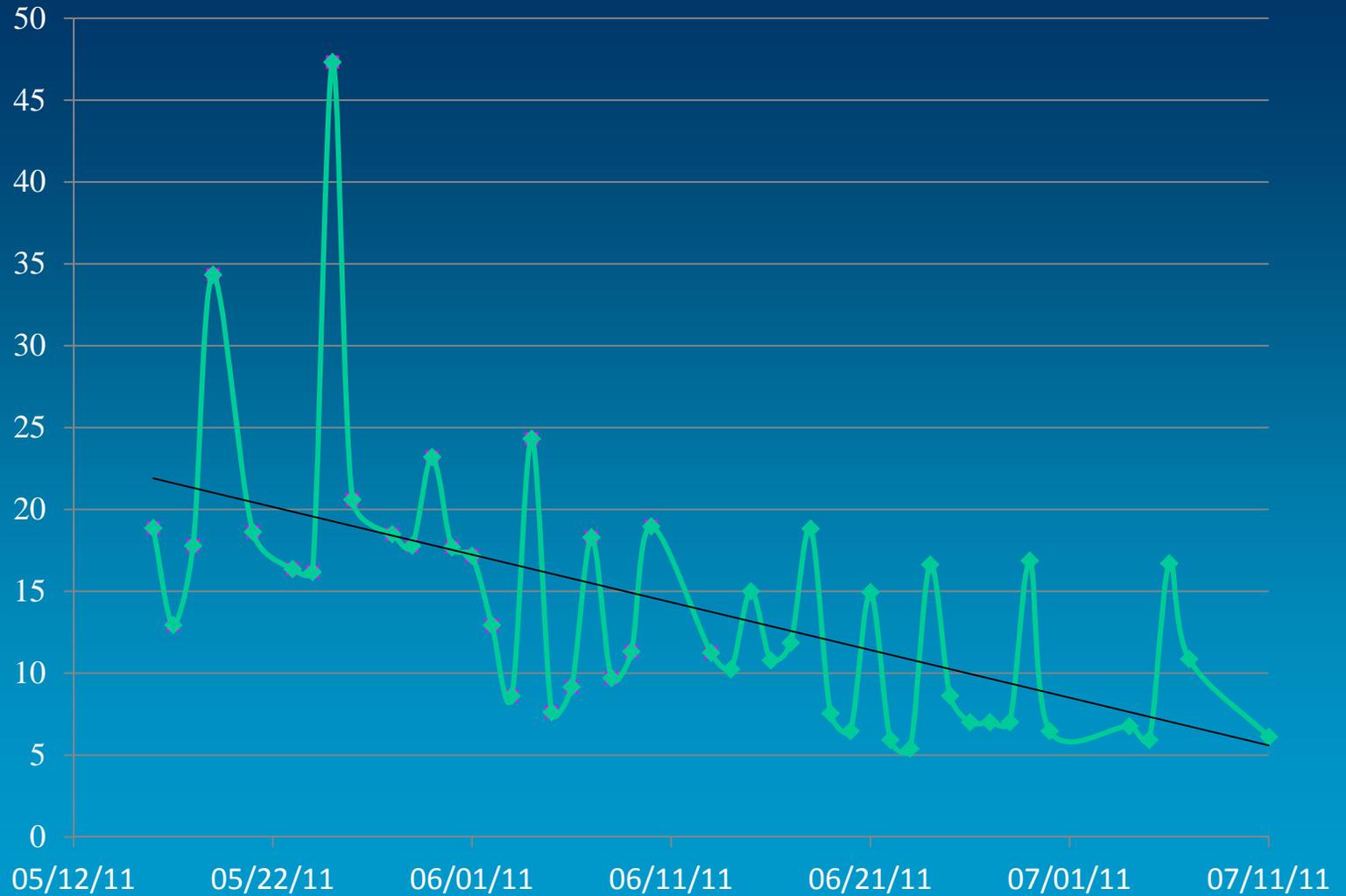
2011 Action

Same as 2008 plus:

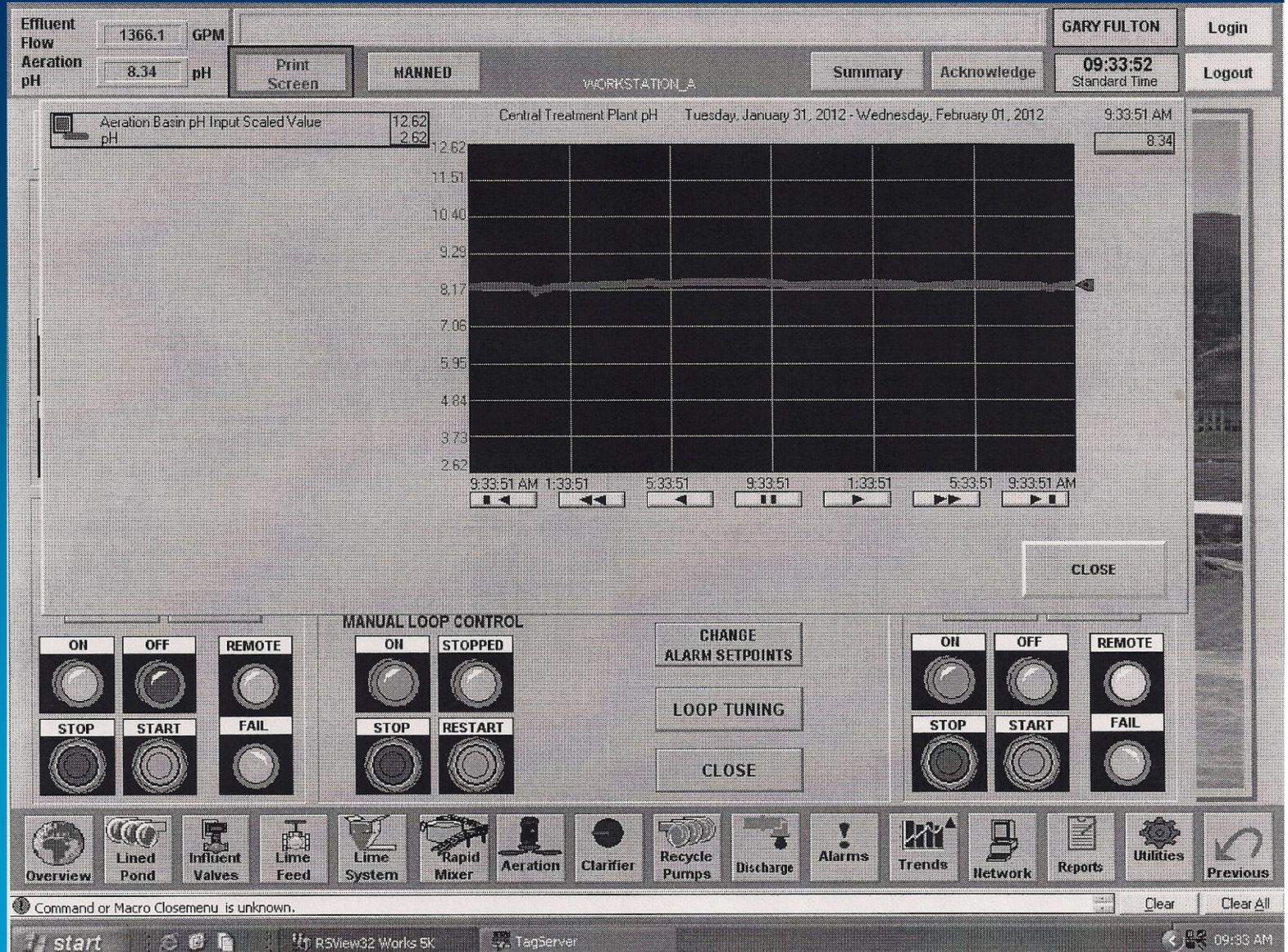
1. Raise pH set point from 8.6 to 8.8
2. Operators take readings every two hrs. rather than twice a day
3. Reduce sludge recycle rate somewhat
4. Take more samples for 24-hr TA
5. Sludge pumping protocol
6. Make arrangements for pumping sludge decant if necessary



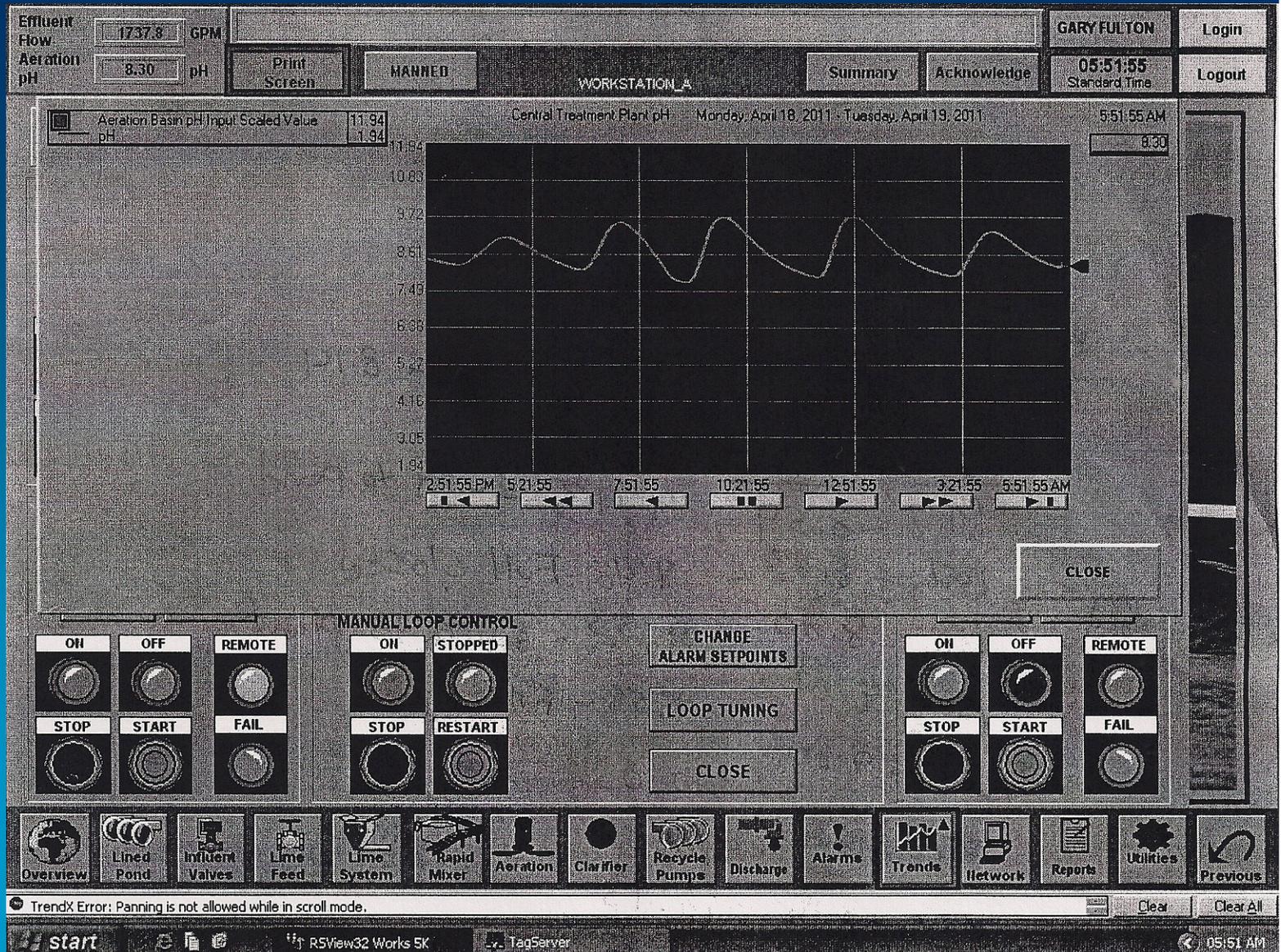
Estimated Lime Usage (tons/day)



Typical pH trend



pH trend in May 2011



Effluent Quality

<u>Month</u>	<u>Zinc Conc. (mg/L)</u>
May 2008	1.55
June 2008	1.83
May 2009	0.17
June 2009	0.12
May 2010	0.26
June 2010	0.31
May 2011	0.19
June 2011	0.29



Zinc Exceedances

2008: 15

2011: 1



Results of 2011 Action

1. Ordering 1-2 truckloads/day of lime
2. Increasing lime slurry concentration
3. Operating both slakers as needed
4. 24/7 staffing
5. Running one lime injection system continuously
6. Wasting sludge continuously
7. Monitoring Clarifier sludge depth with sludge gun
8. Increasing sludge recycle rate
9. Increasing floc dosage
10. 24-hr TA time on effluent samples
11. Raising pH set point to 8.8



Recommendations

1. Perform Milo Creek diversion work
2. Perform CTP upgrades recommended in Mine Water ROD Amendment
3. Raise height of inlet pipe to sludge pond
4. Prepare for similar event during the next high-snowpack year



Questions?

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