Update on Wetland Groundwater Treatment System

Former Sinclair Refinery

Wellsville, New York

May 14, 2010

Agenda

- Introductions
- Project Team
- Site Background Information
- Overview of Project History/Regulatory History/Remedial Design
- Basis of Design : Wetland Groundwater Treatment System (WGTS)
- Overview of Performance Monitoring Results (2009-2010) : WGTS
- Proposed Plan for 2010 Monitoring
- Q and A

Objectives of Meeting

- Provide update on Wetland Groundwater Treatment System
- Summarize recent SPDES sampling data since June 2009
- Proposed Plan for 2010 Monitoring, Maintenance and Operations

Project Team

- Atlantic Richfield : Eric Larson, Env Business Mgr
- URS : Design, Construction Oversight, Marty Schmidt
- NAWE : Wetland Design, Scott Wallace
- ENVIROCON : Phase II-2 Construction

Site Background Information

- Location
  - Wellsville, NY
  - Former Sinclair Refinery now occupied by Alfred State College campus on North Parcel
  - 110 acre site adjacent to Genesee River
  - Majority of site within 100 yr floodplain

Site Layout

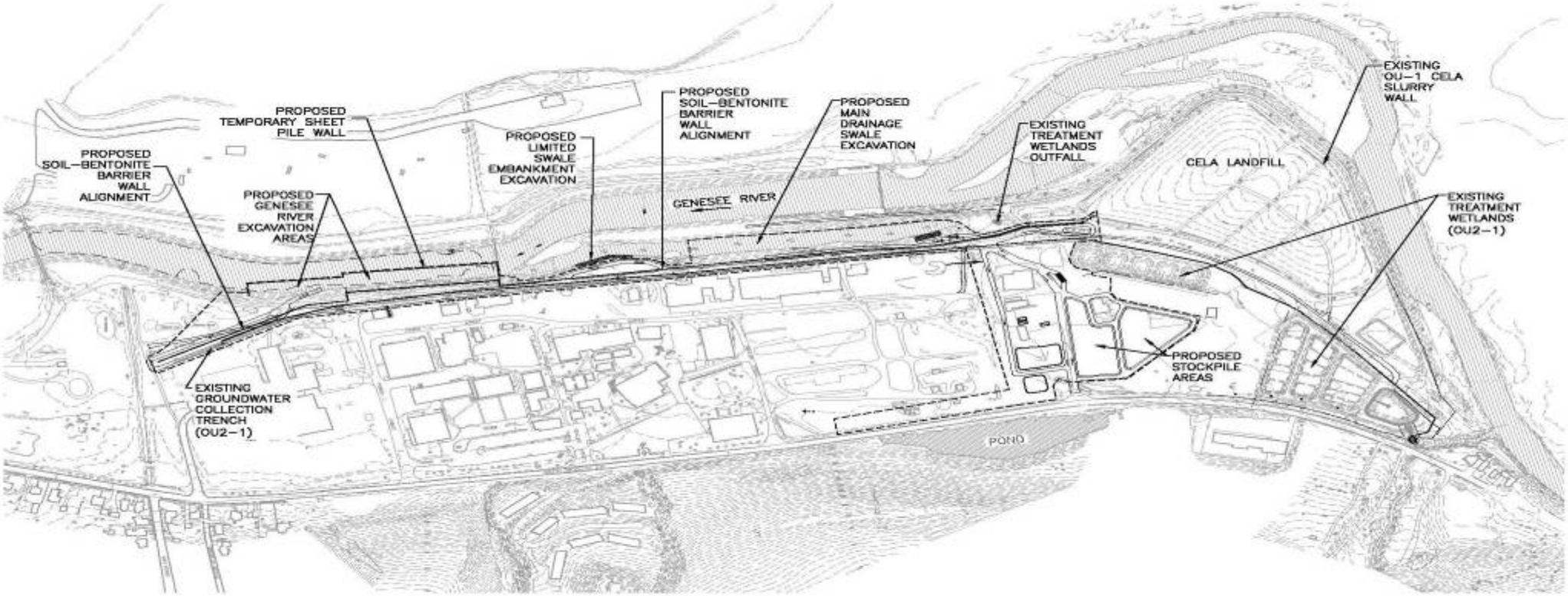
Project History/Regulatory History

- Project History
  - 1901 to 1958 : Operated as refinery (Sinclair Wellsville Refinery)
  - 1958 : Second major fire destroyed Sinclair Refinery
  - 1968 : Alfred State College begins operation
  - 1983 : Placed on National Priority List
    - Record of Decisions (1985 and 1991)
    - Operable Unit 1 : Central Elevated Landfill Area
    - Operable Unit 2 : Site Wide Subsurface Groundwater

Project History/Regulatory History

- Operable Unit 1 : CELA Landfill
  - 1992 : Closure of landfill (slurry wall, multi media cap)
- Operable Unit 2 : Site Wide Subsurface Groundwater
  - 1990s : Air sparge/Soil Vapor Extraction
  - 1999 – 2008 : Groundwater extraction/treatment using GAC
  - December 2008 : Groundwater Treatment using wetlands
    - USEPA approves Phase II-2 (April 2009)
  - 2009-2011 : Implementation of Phase II-2

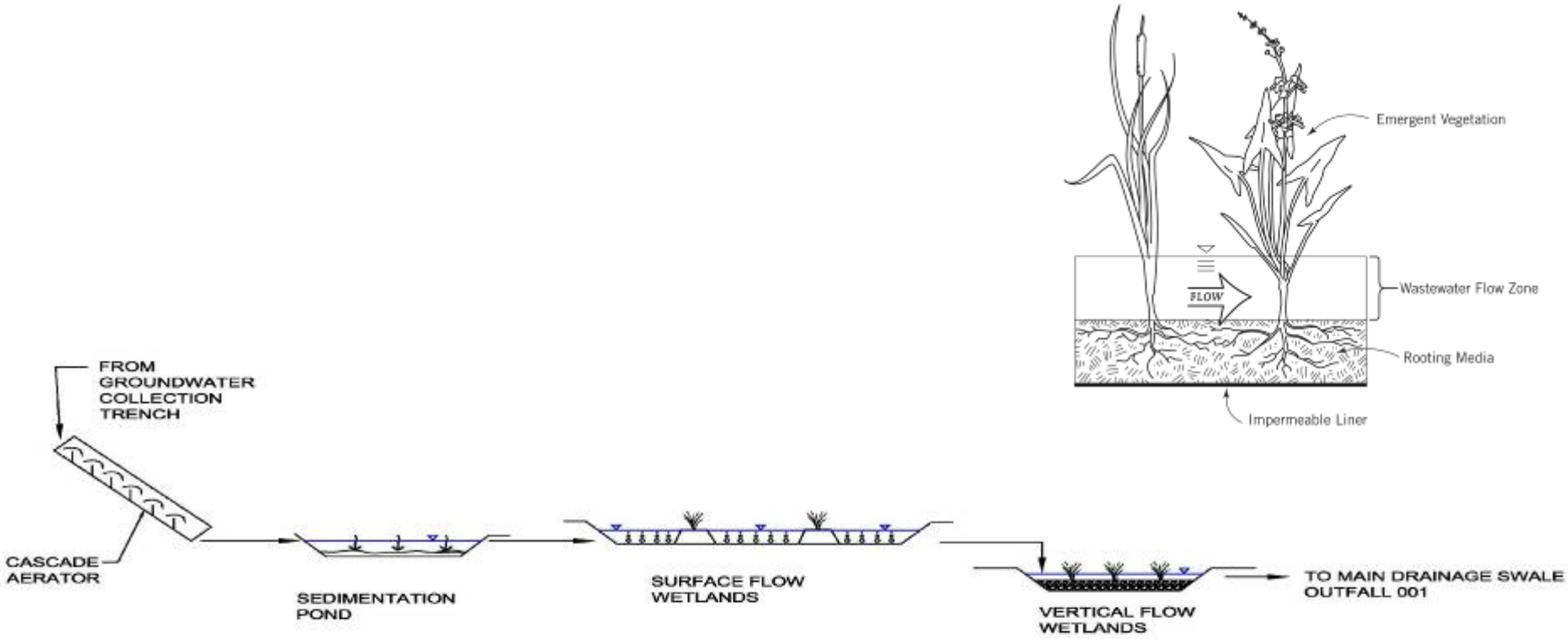
Operable Unit 2 :Remedial Design Components



Wetland Groundwater Treatment System

- Basis of Design:
  - Multi stage aerobic process to remove organics and metals in extracted groundwater
  - Constituents of Interest (COI) from site wide groundwater analytical data
  - Use of site layout and topography to facilitate hydraulic profile
  - Design flow rate : 80-150 gpm, 14 day retention time
  - 2-3 year growth period for optimal wetland plant development
- Design Components:
  - Cascade Aerators
  - Sedimentation Pond
  - Surface Flow Wetlands (3 ponds)
  - Vertical Flow Wetlands (5 ponds)

Wetland Design Schematic Drawings



Cascade Aerators

- Purpose :
  - Oxidize metals (Fe , Mn) and allow precipitate to settle out
  - Gas exchange for organic removal (Volatile and Semi-volatile cpds)

- Design Features :
  - Divides flow equally from conveyance line discharge and splitter structure
  - 4 - 18 inch diameter, corrugated metal pipes
  - Discharges into sedimentation pond

Cascade Aerators Summer 2008

Cascade Aerators Summer 2009

Cascade Aerators Spring 2010

Biofilter Summer 2009

Biofilter Summer 2009

Biofilter Spring 2010

Sedimentation Pond

- Purpose :
  - Allow settling of oxidized metal precipitates
  - Periodic removal of iron sludge for drying/disposal

- Design Features :
  - 60 mil lined pond, rip rap edges, concrete bottom
  - 18,000 sq ft
  - Discharges to surface flow wetlands via gravity feed drain

Sedimentation Pond Spring 2009

Sedimentation Pond Summer 2009

Sedimentation Pond Spring 2010

Open Water, Surface Flow Wetlands (SFW)

- Purpose :
  - Aeration to remove organic compounds
  - Biodegradation to remove organic compounds
  - Supplemental metals precipitation and filtering of suspended solids
- Design Features :
  - 3 pond structures, each having :
    - 3 active aeration basins
    - 2 benches for microbial growth, plant rhizosphere development
    - SFW-1: 33,000 sq ft
    - SFW-2: 29,000 sq ft
    - SFW-3: 29,000 sq ft
  - 60 mil lined pond bottom/slopes, soil benches, vegetated edges
  - Discharges to vertical flow wetlands via gravity feed drain
  - Benches planted with cattails (Typha angustafolia), 1 plant each 4 sq ft
  - 50-60 % growth expected year 1
  - 80 % growth expected year 2
  - 100 % growth expected year 3

SFW Bench Planting Fall 2008

SFW Bench Replanting Spring 2009

SFW Bench Replanting Spring 2009

SFW Summer 2009

SFW Spring 2010

SFW Aeration Spring 2009

SFW Aeration Summer 2009

SFW Aeration Spring 2010

SFW–1 Spring 2010

SFW–2 Spring 2010

SFW–3 Spring 2010

Open Water, Vertical Flow Wetlands

- Purpose :
  - Restoration of alkalinity lost from metal precipitation
  - Supplemental suspended solids removal
  - Supplemental biodegradation
- Design Features :
  - 5 pond structures, each having :
    - 1 passive limestone gravel aeration basin
    - Gravel surface planted for microbial growth/rhizosphere development
    - 60 mil lined bottom/slopes, vegetated edges
    - Discharges to outfall 001 via siphon drains, pulsation
    - Main Drainage Swale receiving body which drains to Genesee River
  - 29,000 sq ft
  - Limestone beds planted with cattails (Typha sp), 1 plant each 4 sq ft
  - 50-60% growth expected year 1
  - 80 % growth expected year 2
  - 100 % growth expected year 3

Vertical Flow Limestone Bed Planting Fall 2008

Vertical Flow Wetlands Spring 2009

VFW Summer 2009

VFW Spring 2010

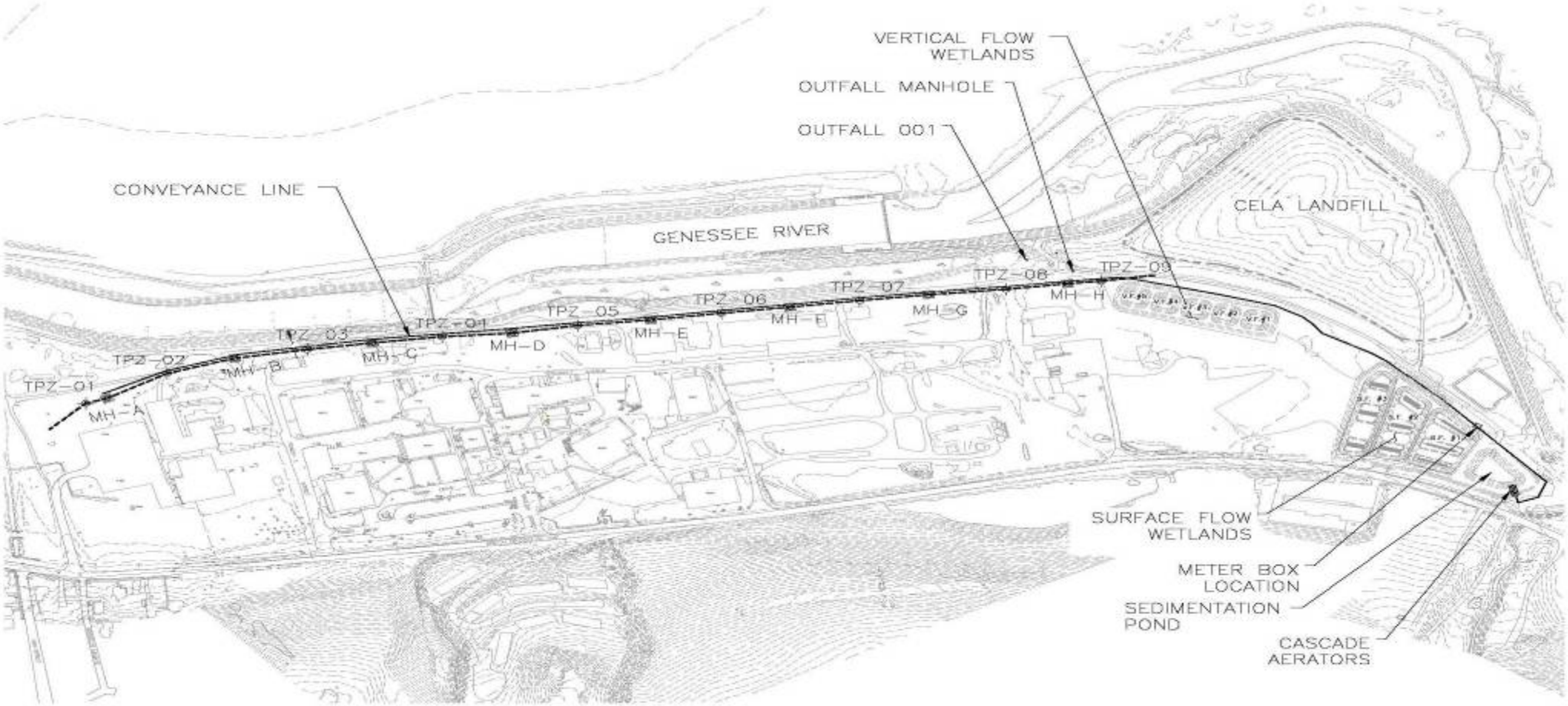
Construction of Wetland Treatment System

- Sequence of Work Completed
  - April – October 2007: Groundwater collection trench/sumps and sedimentation pond
  - April – August 2008: Wetland Treatment System construction
  - September 2008: Surface and Vertical flow wetland plantings (dormant cattail root stock only)
  - December 5, 2008: System Start Up and optimization
  - March 2009: Aeration system installed in Surface flow wetlands
  - May 2009: Surface flow wetland supplemental plantings (transplant live plantings from local source) and conveyance line cleanout/upgrades
  - June 2009 - current: System Restart and Fully Operational

Current Operational Status of Wetland Groundwater Treatment System

- December 2008 :
  - Start up
    - weekly influent/effluent sampling for current parameters and proposed SPDES parameters
    - weekly discharge flow monitoring
- Dec 2008 – April 2009 :
  - Pumping system optimization
- April 16, 2009 :
  - System shut down for maintenance and repairs:
    - Wetland planting, conveyance line repair, aeration line repairs
- May 2009
  - Meeting with NYSDEC
- June 2009 :
  - System restart
    - Weekly influent and effluent sampling, flow monitoring
- August 2009 :
  - NYSDEC Letter granting 12 month extension
    - Weekly influent and effluent sampling for Attachment A, flow monitoring (July- August)
    - Weekly influent and effluent sampling for Attachment A, flow monitoring (September –June)
    - Annual sampling for Attachment B

Conveyance / Wetland Treatment System



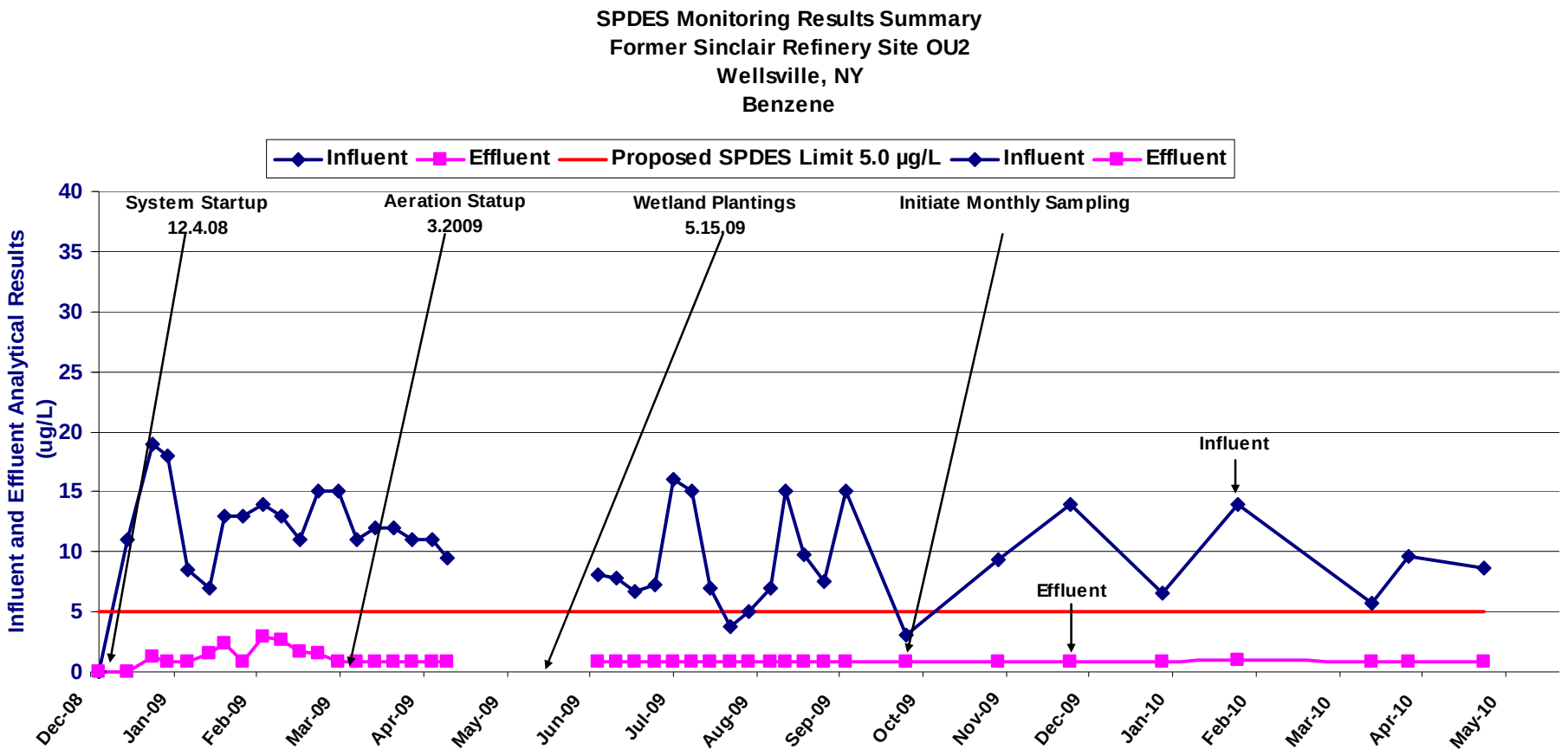
Performance Monitoring Data Review May 2010

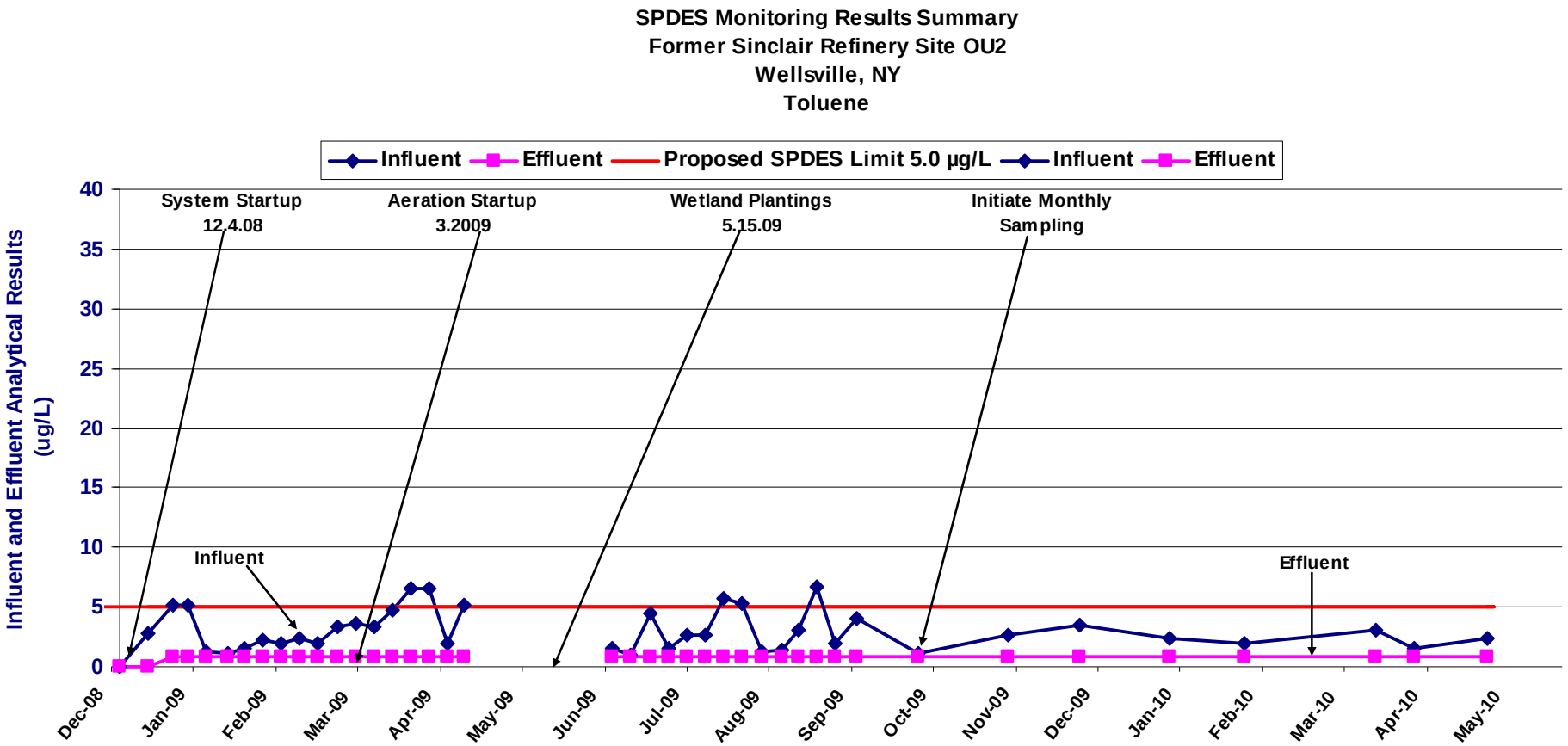
- Data collected:
  - Weekly and monthly grab samples
  - Proposed parameters (Attachments A and B)
  - Reported to USEPA and NYSDEC

- Summary of Data Trends (Extension period):
  - COI concentrations in effluent above Proposed SPDES limits:
    - VOCs: None
    - SVOCs: Nitrobenzene (120 and 23 ug/L) and Aniline (33 and 27 ug/L) January-February
    - Metals: Iron (.3 to 1.77 mg/L) and Manganese (.3 to 3.2 mg/L) December- April

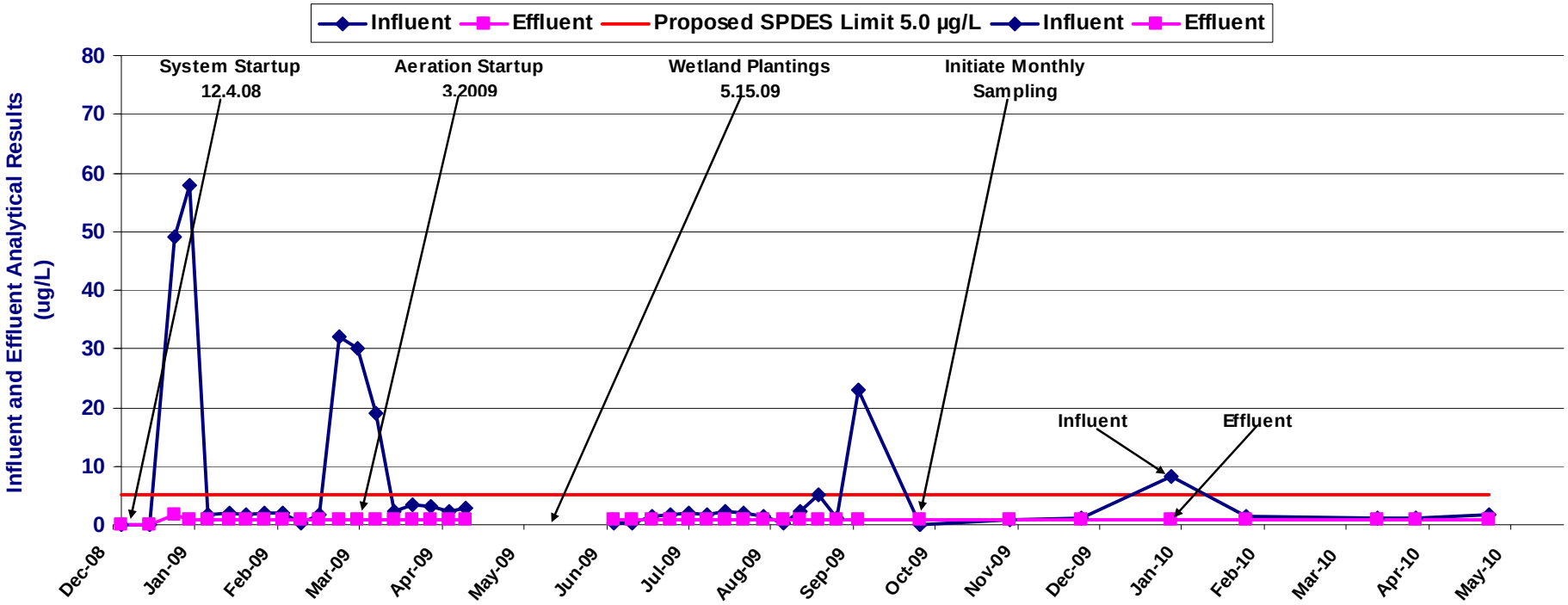
TREND MAPS

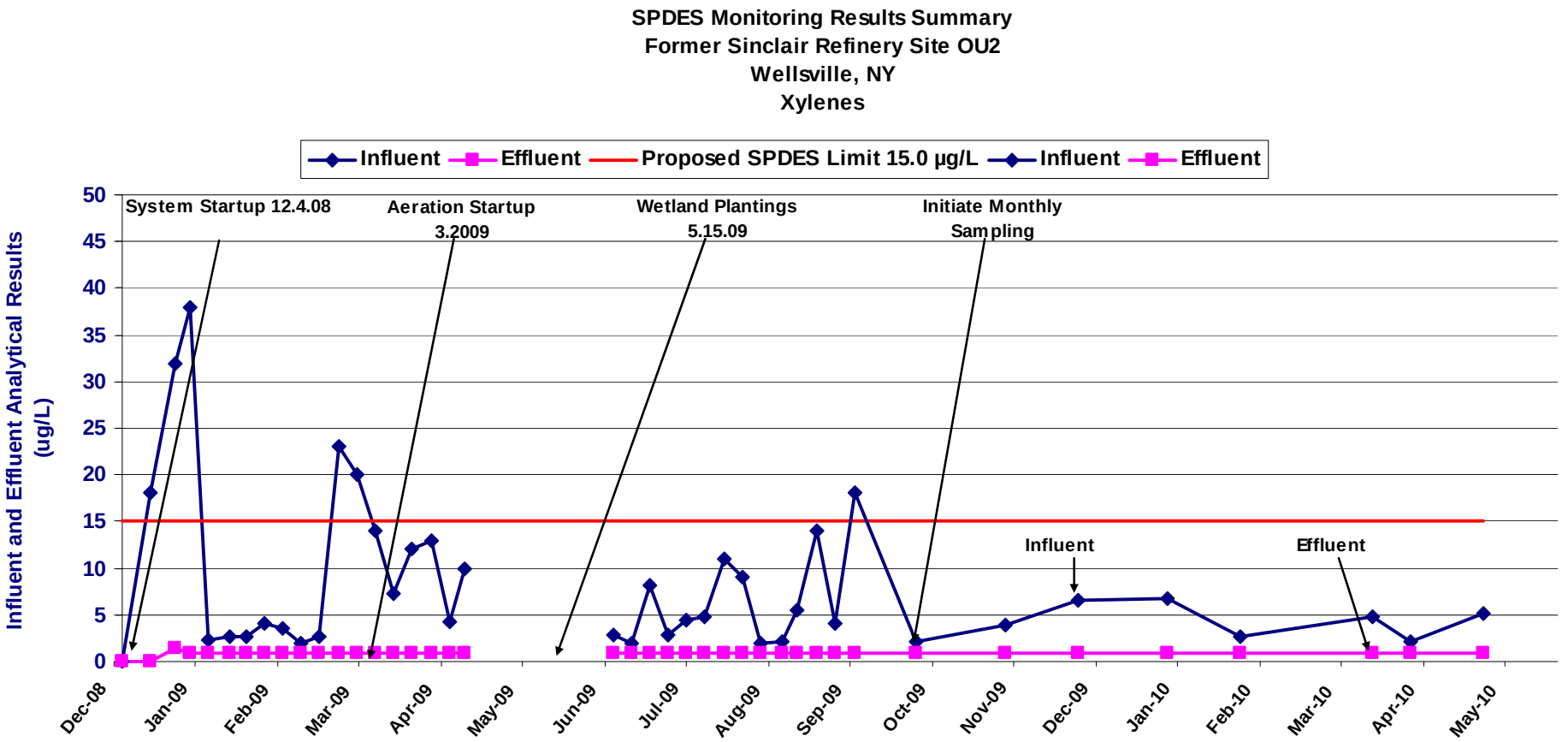
- Benzene
- Toluene
- Ethylbenzene
- Xylenes
- Aniline
- Nitrobenzene
- 2-Methylnaphthalene
- Iron
- Manganese
- pH

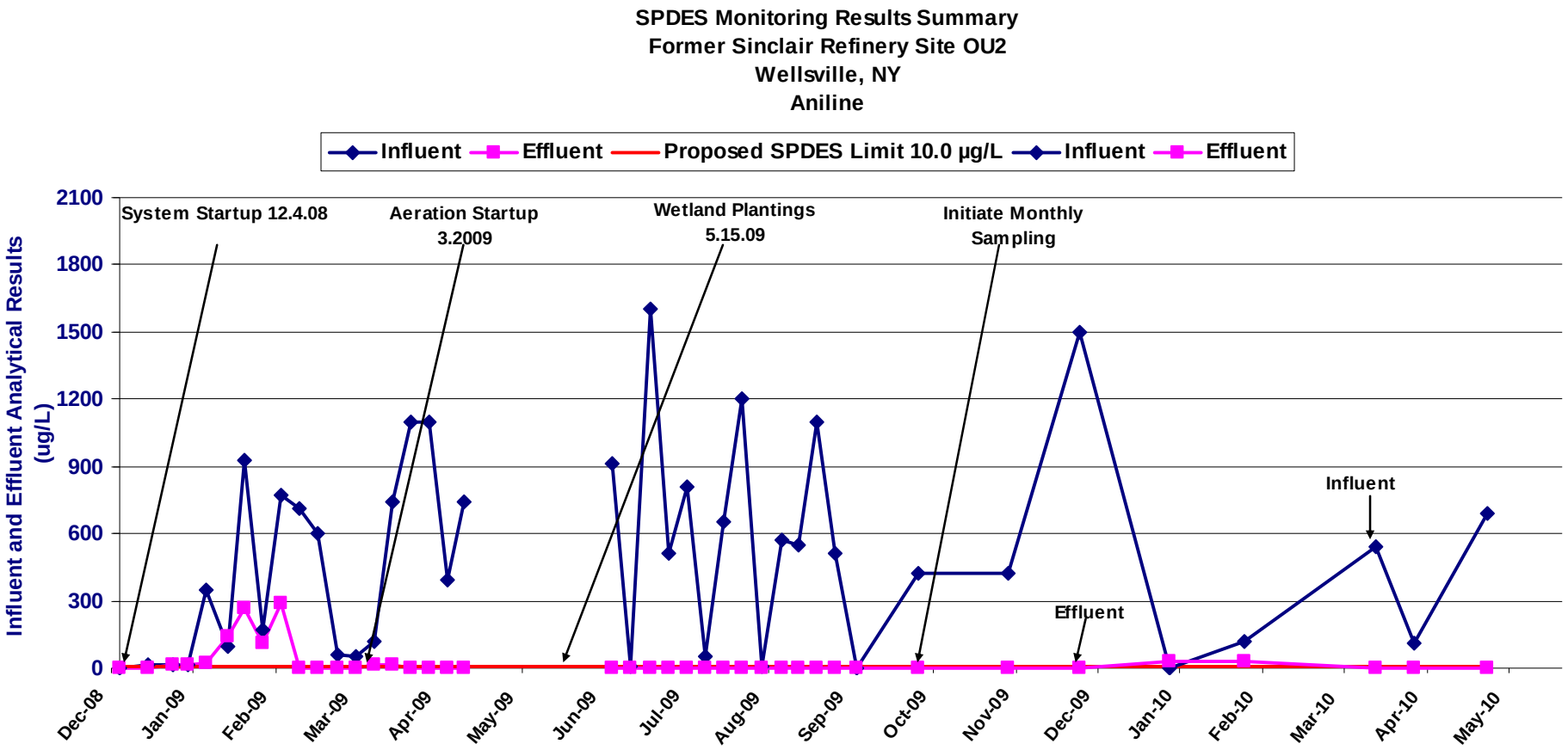

SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Benzene
Influent
Effluent
Proposed SPDES Limit 5.0 µg/L
Influent
Effluent
Influent and Effluent Analytical Results (ug/L)
System Startup 12.4.08
Aeration Statup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
0
5
10
15
20
25
30
35
40
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Toluene
Influent
Effluent
Proposed SPDES Limit 5.0 µg/L
Influent
Effluent
Influent and Effluent Analytical Results (ug/L)
40
35
30
25
20
15
10
5
0
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10

SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Ethylbenzene




SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Xylenes
Influent
Effluent
Proposed SPDES Limit 15.0 µg/L
Influent
Effluent
Influent and Effluent Analytical Results (ug/L)
50
45
40
35
30
25
20
15
10
5
0
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Aniline
Influent
Effluent
Proposed SPDES Limit 10.0 µg/L
Influent
Effluent
Influent and Effluent Analytical Results (ug/L)
2100
1800
1500
1200
900
600
300
0
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
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Oct-09
Nov-09
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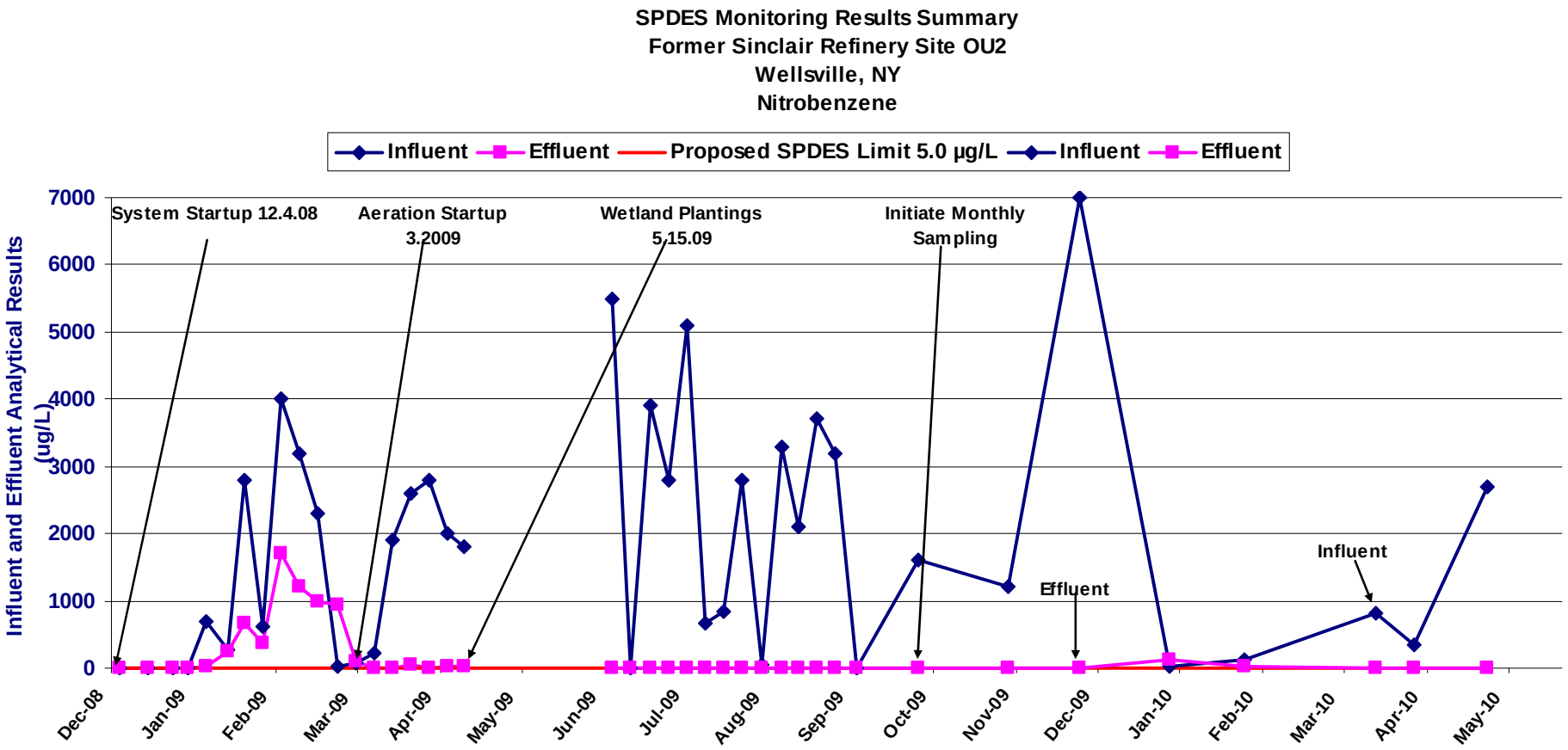
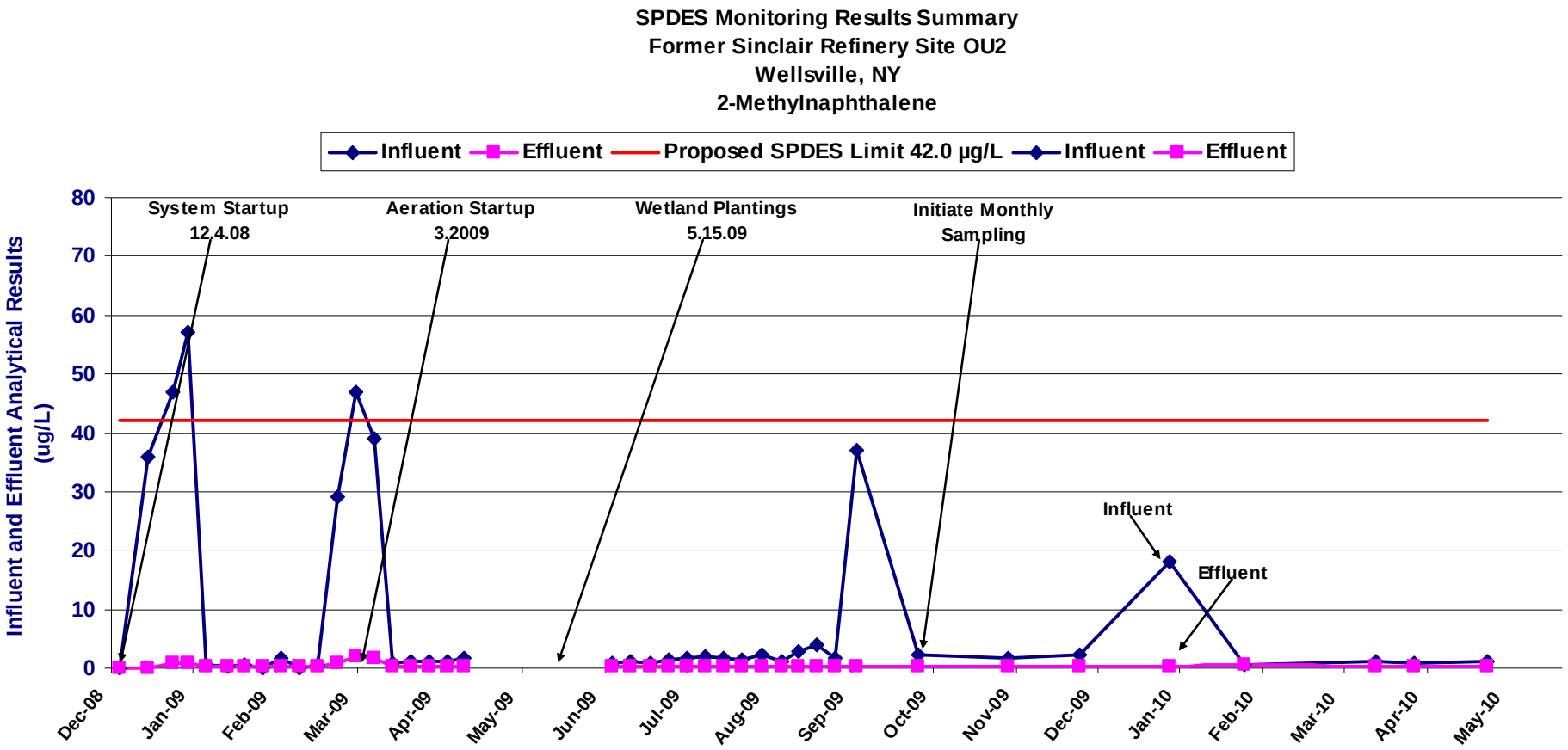
Jan-10
Feb-10
Mar-10
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Nitrobenzene
Influent
Effluent
Proposed SPDES Limit 5.0 µg/L
Influent
Effluent
Influent and Effluent Analytical Results (ug/L)
7000
6000
5000
4000
3000
2000
1000
0
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Effluent
Influent
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
2-Methylnaphthalene
Influent
Effluent
Proposed SPDES Limit 42.0 µg/L
Influent
Effluent
Influent and Effluent Analytical Results (ug/L)
80
70
60
50
40
30
20
10
0
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
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Dec-09
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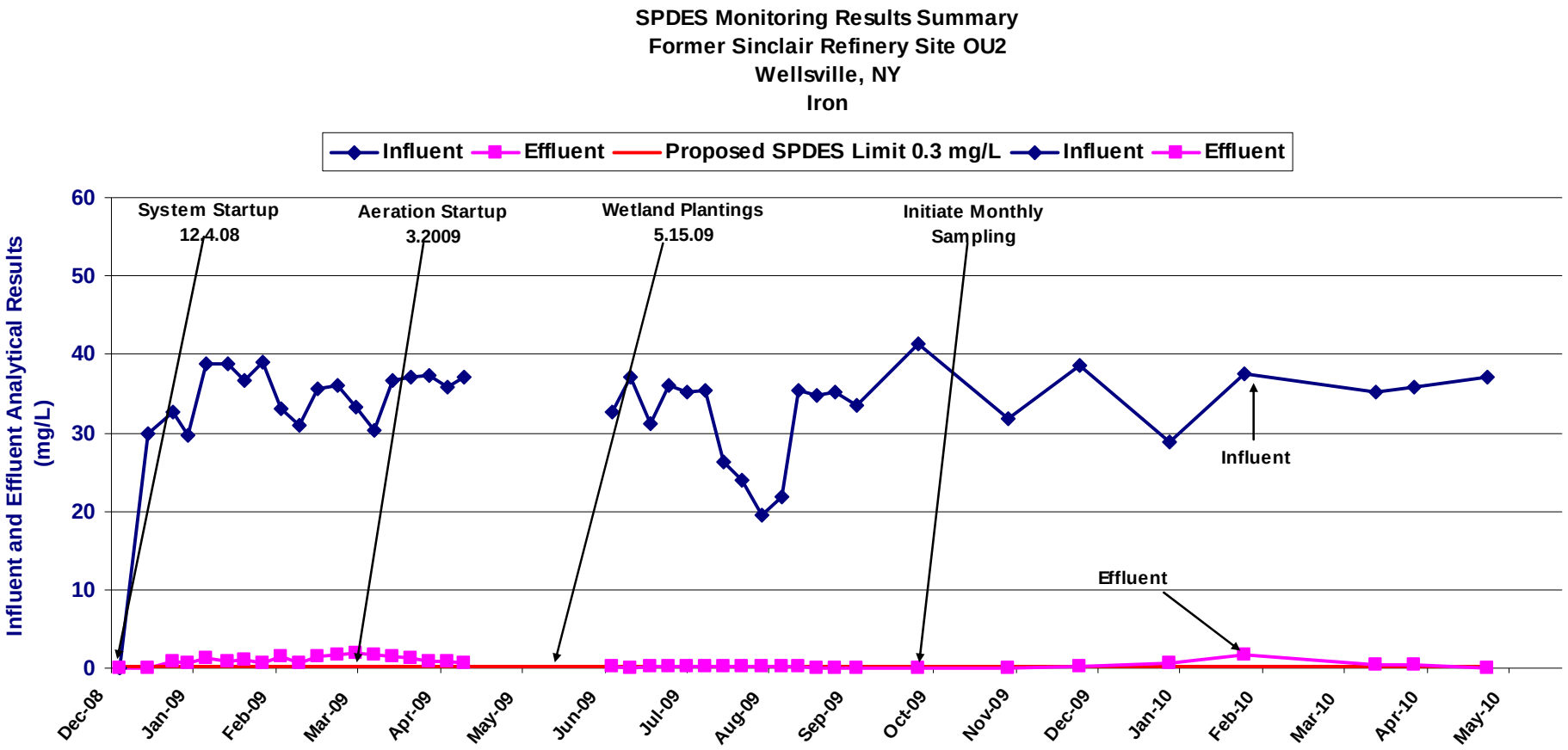
Mar-10
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Iron
Influent
Effluent
Proposed SPDES Limit 0.3 mg/L
Influent
Effluent
Influent and Effluent Analytical Results (mg/L)
60
50
40
30
20
10
0
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
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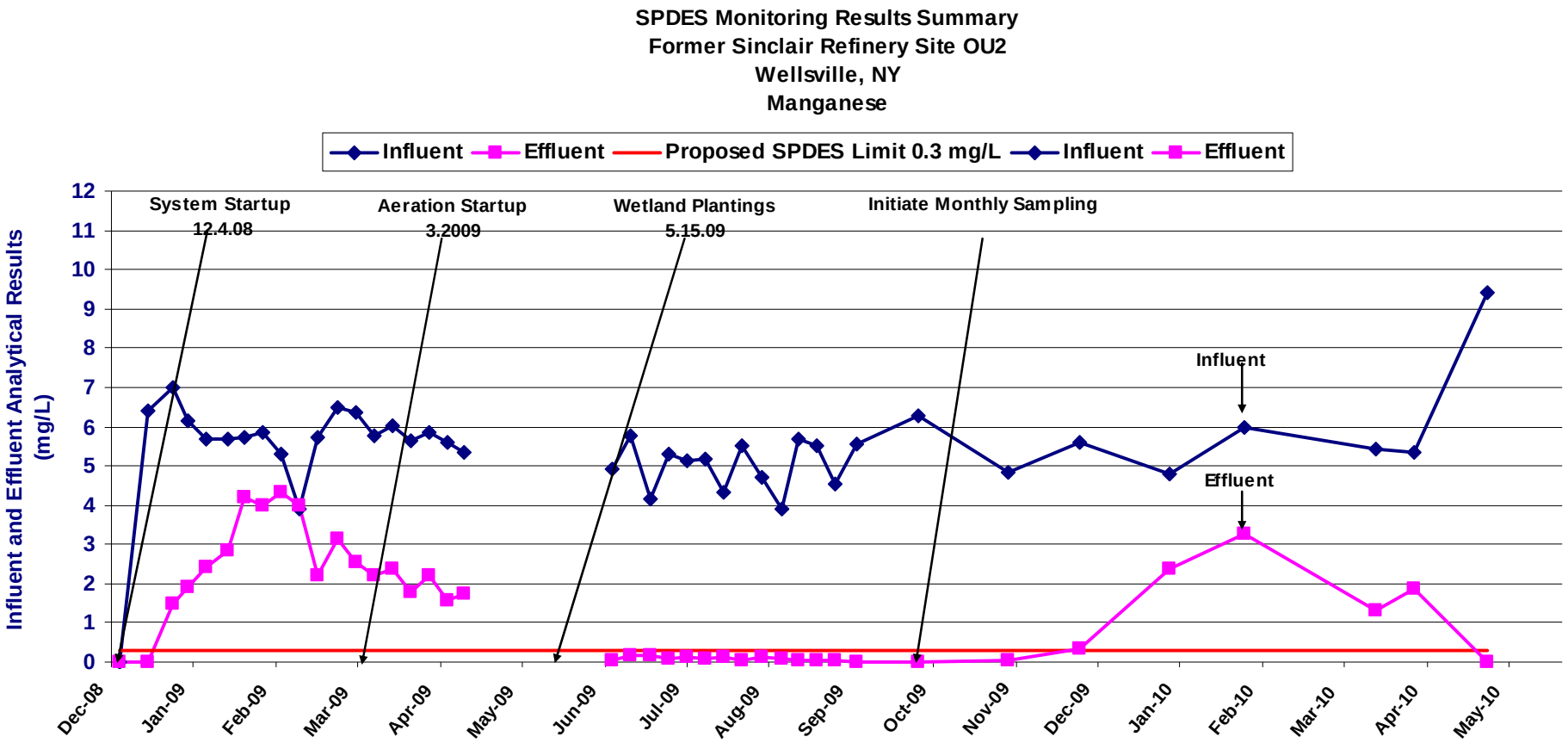
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
Manganese
Influent
Effluent
Proposed SPDES Limit 0.3 mg/L
Influent
Effluent
Influent and Effluent Analytical Results (mg/L)
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Influent
Effluent
0
1
2
3
4
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6
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12
Dec-08
Jan-09
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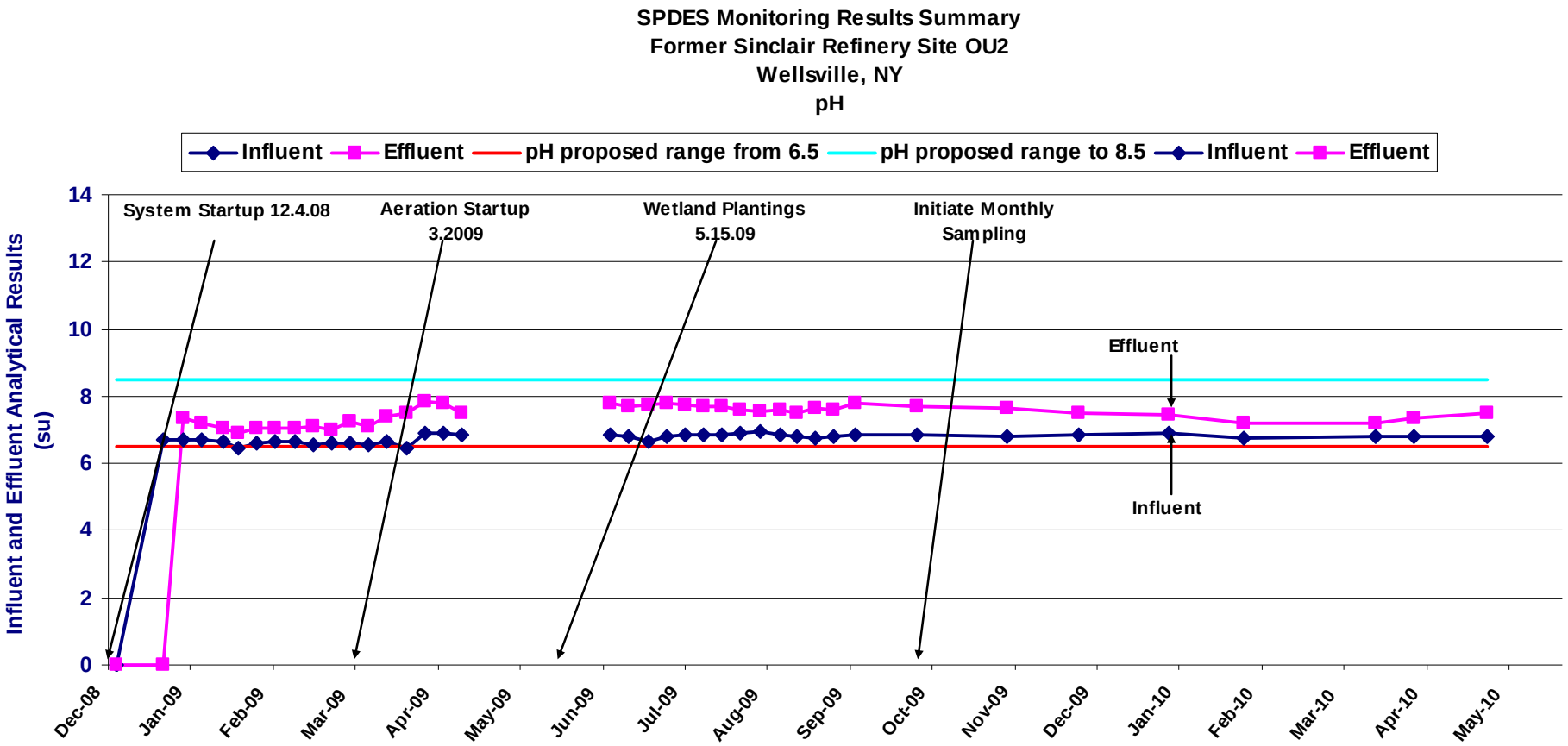
Apr-10
May-10


SPDES Monitoring Results Summary
Former Sinclair Refinery Site OU2
Wellsville, NY
pH
Influent
Effluent
pH proposed range from 6.5
pH proposed range to 8.5
Influent
Effluent
Influent and Effluent Analytical Results (su)
System Startup 12.4.08
Aeration Startup 3.2009
Wetland Plantings 5.15.09
Initiate Monthly Sampling
Effluent
Influent
0
2
4
6
8
10
12
14
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
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Apr-10
May-10

Performance Monitoring Results May 2010

- Proposed Permit :
  - VOCS treated to permit limits
  - SVOCs treated to permit limits (except Aniline and Nitrobenzene, two months in winter)
  - Metals treated to permit limits (except Iron and Manganese, four months in winter)

- SVOCs treatment issues :
  - Wetland plant growth dormant and not fully established in portions of wetlands in January 2010
  - Variable groundwater flow and discharge from sumps due to system response to groundwater fluctuations
  - Partial ice and snow covering surface of sedimentation pond and surface flow wetlands (January- February 2010)
  - Treatment efficiency for SVOCs improved in March 2010 (method detection limits)
  - Aniline and Nitrobenzene treated to permit limits in March 2010. Proposed SPDES Limit 10.0 and 5.0 ug/L

Proposed Plan for 2010 Monitoring

- SVOC Treatment Improvement Plan
- Wetland Plantings
  - Additional cattail plantings to fill-in low density growth areas (May 2010)
- Aeration System
  - Modify tie down system for aeration lines in SFW ponds
  - Modify aeration blower pulleys to increase flow rate during winter months (December – March)
- Surface Flow Wetlands water levels
  - Raise water level in surface flow wetlands to prevent from freezing (December –March)

Proposed Plan for 2010 Monitoring

- Proposed sampling
  - Extend existing monthly monitoring one to two more years, same parameter list

- Sedimentation Pond Cleaning
  - Remove iron sludge from sedimentation pond (May- June 2010)
  - Temporary shut down for 2 weeks to allow for settling and access to pond
  - Removal of iron sludge and transport off site for disposal

Q and A