Potential Nutrient Reduction by Treatment Optimization and Treatment Upgrades – An Update

BACWA Membership Meeting
Oakland
30 Jan 2015
Drivers for Study
Watershed Permit

San Francisco Bay Regional Water Quality Control Board

ORDER No. R2-2014-0014
NPDES No. CA0038873

WASTE DISCHARGE REQUIREMENTS FOR NUTRIENTS FROM MUNICIPAL WASTEWATER DISCHARGES TO SAN FRANCISCO BAY

The following dischargers are subject to waste discharge requirements (WDRs) set forth in this Order, for the purpose of regulating nutrient discharges to San Francisco Bay and its contiguous bay segments:

Table 1. Discharger Information

<table>
<thead>
<tr>
<th>Discharger</th>
<th>Facility Name</th>
<th>Facility Address</th>
<th>Minor/Major</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>454 Marina Rd.</td>
<td></td>
</tr>
</tbody>
</table>

April 9, 2014
Study Results will Provide the Basis for Nutrient Reduction Strategies for the Bay

- Scoping Plan
- Evaluation Plan
- Data Collection & Analysis

Plant Optimization
- Sidestream Treatment
- By Other Means
- Facility Upgrades

Synthesis

$/lb N & P

Graph showing costs for different methods:
- By Other Means
- Sidestream Treatment
- Upgrades (Conventional)
- Upgrades (Enhanced)
BACWA Group Report

- Consultant Management Group (CMG) oversees project
- Engaged HDR / BC team to conduct the study
- 37 plants
- Study in three phases
  - Scoping and Evaluation Plan
  - Execute plan and report
  - Annual reporting (through 2018)
Status

- Draft Scoping and Evaluation Plan
  - Presented to Water Board 15 Dec 2014
  - Responded to WB comments 19 Jan 2015
  - Waiting for final approval

- Initiated Data Collection
  - Questionnaire distributed in two parts
  - Part A due 21 Jan 2015 – Received 36 of 37 surveys
  - Part B due 18 Feb 2015
Scoping and Evaluation Plan
Scoping and Evaluation Plan Discussion Points

- List of participating facilities
- Schedule
- Nutrient Removal Levels
- Questionnaire
- Site Visits
- Plant Optimization
- Sidestream Treatment
- Plant Upgrades
- Nutrient Reduction by Other Means
- Economic Analysis
37 Participating Plants
Schedule

Project Start
Project Management
Scoping & Evaluation Plans
Data Collection and Synthesis
Site Visit by Operator/Engineer Teams
Optimization & Sidestream Treatment
Nutrient Reduction by Upgrades
Nutrient Reduction by Other Means
Nutrient Reduction Report
Group Annual Report

Report to Regional Water Board due 1 July 2018
## Questionnaire

<table>
<thead>
<tr>
<th>Questions to Understand Plant:</th>
<th>Value</th>
<th>Units/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANT BACKGROUND:</td>
<td>INFO FROM POTW</td>
<td>Comments from POTW (optional)</td>
</tr>
<tr>
<td>Plant Footprint acres or square feet =</td>
<td>Ballpark provide units</td>
<td></td>
</tr>
<tr>
<td>Submit a Plant Process Flow Diagram and mark off areas planned for future projects =</td>
<td>As a separate file (marked up scan is OK)</td>
<td></td>
</tr>
<tr>
<td>SERVICE AREA DESCRIPTION:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Service Connections =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area covered by the Discharger =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior Reports:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide any planning reports on nutrient removal (send separately) =</td>
<td>Example, master plan</td>
<td></td>
</tr>
<tr>
<td>Provide information on Capital Improvement Projects planned for nutrient removal (send separately) =</td>
<td>Example, aerotan basin expansion for nitrification</td>
<td></td>
</tr>
<tr>
<td>Provide any reports completed related to By Other Means (send separately)</td>
<td>Example, nutrient trading, water recycling, wetlands treatment, biosolids export, source control, and non-point source</td>
<td></td>
</tr>
<tr>
<td>Provide any reports completed related to Sea Level Rise and Climate Change (send separately) =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLOW LIMITS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permitted Flow (ADWF), mgd =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permitted Flow (Peak Flows), mgd =</td>
<td>If listed on NPDES Discharge Permit</td>
<td></td>
</tr>
<tr>
<td>Rated Capacity (ADWF), mgd =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current ADWF Flows, mgd =</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Questionnaire

- Issued to Plants on 12/2/2014
- Series of webinars to assist plants with filling out
- Worksheet A deadline = 1/21/2015
  - Requests historical Influent, Effluent, and Sidestream data
  - Questions to Identify candidate plants for sidestream treatment
- Worksheet B deadline = 2/18/2015
  - Requests historical plant performance data
  - Series of questions to understand how plant operates
  - Requests prior reports on nutrient removal and by other means
Site Visits
Tactical Site Visits for Each Plant
(Each Visit Includes a Process and Operations Expert)

Rion Merlo / Eric Wahlberg
- Hayward
- Las Gallinas Valley
- San Jose / Santa Clara
- Vallejo
- Union Sanitary District
- San Mateo
- Palo Alto
- Dublin San Ramon

Mike Falk / Ken Abraham
- Burlingame
- Benicia
- Palo Alto
- San Mateo
- American Canyon
- Delta Diablo
- City of Richmond
- Millbrae

Linda Sawyer / Eric Wahlberg
- City of Livermore
- Napa Sanitation
- San Francisco (Airport)
- Treasure Island
- South San Francisco / San Bruno
- Silicon Valley Clean Water
- Treasure Island

Mallika Ramanathan / Scott Joslyn
- Central Marin
- East Bay Municipal Utility District
- Petaluma
- Sausalito - Marin
- Pinole
- Sonoma Valley
- Fairfield – Suisun
- Rodeo Sanitary
- West County Agency
- Sunnyvale
Typical Site Visit Schedule

- Site visits schedule: spring through summer
- 2 person Operator/Process Engineer teams
- Spend several hours at each plant
- Meet with operation staff
Site Visit Expectation from Plant

- Team will contact Point of Contact (POC) to set up appointment with appropriate staff
- Team will explain additional information needs (example drawings, flow diagrams, SOPs, etc.)
- Day of visit:
  - Have the key staff available that day (1-2 staff)
  - Plan to spend 3-6 hours – depending size and scope
  - Include other appropriate staff (laboratory, process analyst, etc.)

THIS IS A COLLABORATIVE EFFORT – BE PREPARED TO DISCUSS NUTRIENT REDUCTION IDEAS YOU ALREADY HAVE
Post Site Visit Expectations

- Site Visit Report
  - Expect to receive short report within 2 weeks
  - Review and comment
  - Respond to questions noted in report

- Plant Nutrient Reduction Report
  - Schedule: Fall 2015
  - Review and provide written comments on Draft Report
  - Review Final Report
  - Obtain official signatory to acknowledge
Nutrient Removal Levels
## Treatment Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Study</th>
<th>Ammonia</th>
<th>TN</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1*</td>
<td>Optimization</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Level 2*</td>
<td>Upgrades</td>
<td>2 mg N/L</td>
<td>15 mg N/L</td>
<td>1.0 mg P/L</td>
</tr>
<tr>
<td>Level 3*</td>
<td>Upgrades</td>
<td>2 mg N/L</td>
<td>6 mg N/L</td>
<td>0.3 mg P/L</td>
</tr>
</tbody>
</table>

* The seasonal impacts will be considered for all three treatment levels:
  Dry Season = May 1 to September 30
  Wet Season = October 1 to April 30
Plant Optimization
Overview of Plant Optimization

- Identify available facilities that can be used for nutrient reduction
  - Facilities not in normal use
  - Abandoned facilities/Empty tankage
- Identify strategies that can reduce nutrient discharge
- Determine cost, implementation requirements & plant impacts
- Consider innovative technologies/techniques
- Discuss ideas with plant staff and get feedback
Optimization Strategies – Low Cost

- Use offline tankage
- Modify operational mode, such as raising the solids residence time
- Modify blower operating set points
- Operate in split treatment mode
- Change to simultaneous nitrification/denitrification operation
- Shut down aeration to create anoxic zones
Add instruments for nutrient removal in ammonia based aeration control mode
Add chemicals for phosphorus removal
Add chemicals to reduce load, unlock capacity
Add anoxic and/or anaerobic zones for biological nutrient removal
Add internal recycle for denitrification
Add mixers for unaerated zones
Side Stream Treatment
Sidestream Nutrient Load Contributions

Nutrient Discharge Load Distribution

- Sidestream Contribution
- Main Stream Contribution

Nitrogen Phosphorus
EPA Sidestream Grant – Piloting Efforts

EBMUD:
Deammonification
- Suspended growth
- Attached growth
Ongoing

SFPUC:
Deammonification
- Suspended growth
- Attached growth
- Biozeolite
Operated for 3-5 months

CCCSD:
Zeolite anammox
Started

DD: CANDO
Schedule extended

OLSD:
Zeolite anammox
Started

USD: Krüger Anita™ Mox
Completed
Decision Tree to Identify Candidate Plants

Anaerobic Digestion & Dewatering?
- No: Not Applicable
- Yes
  - Water Quality
    - Temperature > 30 C
    - NH4 > 500 mg/L
    - Alk ~ 50% needed
      - No
        - Ammonia Recovery Process (ARP)
        - Conventional Nitrification to NO3*
        - Conventional Nit/Denit*
      - Yes
        - Deammonification
        - Nitrite Shunt
        - CANDO
        - Ammonia Recovery Process (ARP)
        - Conventional Nitrification to NO3*
        - Conventional Nit/Denit*
* May require alkalinity and/or carbon addition
Plant Upgrades
Overview of Plant Upgrades

- Evaluate masterplan and CIP for future upgrades
- Identify strategies that can reduce nutrient discharge to Level 2 and Level 3
- Select appropriate technology (next slides)
- Determine cost, implementation requirements & plant impacts
- Consider innovative technologies/techniques
- Discuss ideas with plant staff and get feedback
Determining Requirements for Plant Upgrades

- Determine capital and O&M costs as well as footprint requirements
- Summary of adverse and ancillary benefits (e.g., GHG emissions impacts)
- Estimates of nutrient reduction and unit costs (e.g., $/lb nutrient; lb GHG/lb nutrient)
- Existing evaluations (e.g. Master Plans) will be used, where appropriate
- Provide recommendations for consideration of emerging technologies in the future
Distilling Complexity Down to Simplicity
Distilling Complexity Down to Simplicity
Distilling Complexity Down to Simplicity
A Step-Wise Approach to Nitrogen Removal

**High Purity Oxygen Activated Sludge**
- EBMUD
- SEP

**Activated Sludge**
- Benicia
- Burlingame
- CCOSD
- DSRSD
- Livermore
- Millbrae
- Oro Loma/Castro Valley
- Pinole

**Activated Sludge**
- Richmond
- Rodeo
- San Mateo
- San Francisco Airport
- South San Francisco/San Bruno
- USD

**Trickling Filter/Solid Contact**
- Delta Diablo
- Hayward

**Trickling Filter**
- Sausalito-Marin
- Southern Marin
- Treasure Island

**Trickling Filter/Activated Sludge**
- CMSA
- SVGW
- San Leandro
- West County
- Vallejo

**Pond System**
- Napa (has small BNR)

**Ammonia Removal**
- Nitrifying activated sludge
  - Novato
  - Sonoma Valley

- Integrated fixed film activated sludge

- Oxidation ditch

**Membrane Bioreactor**
- American Canyon

**Denitrification**
- Denitrification filter
- Moving bed biofilm reactor

**Tertiary Nitrification**
- Nitrifying trickling filter
- Biological aerated filter

- Mt. View
- Las Gallinas
- Sunnyvale (Pond System)

**Modified Ludwick-Ettinger**
- Step feed activated sludge
- Oxidation ditch

- San Jose
- Petaluma

**4-stage Bardenpho**
- Oxidation ditch

**Membrane Bioreactor**

**Level 2**
- Nitrogen Removal (minimal carbon added)

**Level 3**
- Nitrogen Removal (carbon added)
Step-Wise Approach for Phosphorus Removal

**Level 1: High Purity Oxygen Activated Sludge**
- Benicia
- Burlingame
- CCCSD
- DSRSD
- Livermore
- Milbrae
- Novato
- Oro Loma/Castro Valley
- USD

**Level 2: Activated Sludge**
- Pinole
- Richmond
- Rodeo
- San Mateo
- San Francisco Airport
- Sonoma Valley
- South San Francisco/San Bruno

**Level 3: BNR**
- San Jose
- Petaluma
- Delta Diablo
- Hayward

**Level 2: Trickling Filter/Soils/Contact**
- CMSA
- SVCW
- San Leandro
- West County
- Vallejo

**Level 2: Trickling Filter/Activated Sludge**
- Fairfield-Suisun
- Palo Alto

**Level 3: Trickling Filter/Activated Sludge**
- Las Gallinas
- Mt. View
- Sausalito-Marin
- Southern Marin
- Treasure Island

**Level 2: Oxidation ditch**
- American Canyon
- Sunnyvale
- Napa (has small BNR)

**Level 3: Direct Filtration**
- Sedimentation/Filtration
- Membrane filtration
Utilize Established Technologies to Determine Cost and Footprint Sizing

First Generation
- MLE & Bardenpho: 40-yr
- TF/SC : 34-yr
- Membrane bio-reactors: 32-yr
- Classifying Selector (foam elimination)
- Demon® Side-Stream
- BioMag™
- Nereda®
- Anita™ Mox Side-Stream
- In-Line MLSS Fermentation
- Mainstream Anammox

Second Generation
- Denitrification Filters: 40-yr
- BAFs: 35-yr
- TF/SC: 34-yr
- Mature Technology

Final Generation
- Denitrification MBBR
- Nitrate Recirculation to HW
- CoMag™
- Integrated Fixed Film Activated Sludge (IFAS)
- Biofilm Controlled Nitrifying Trickling Filter
- Demon® Side-Stream
- Classifying Selector (foam elimination)
Nutrient Reduction by Other Means
Approach to Reduction by other Means

- Nutrient Removal by Other Means Includes
- Compile results from prior utility reports
- Summarize from reports
  - Reduction
  - Secondary impacts

Other Means (examples)
- Effluent Management (e.g. water recycling, trading)
- Effluent Polishing: (wetlands treatment)
- Nutrient recovery
- Source Control: (e.g. urine separation)
Impacts of Sea Level Rise
Impacts of Sea Level Rise and Climate Change

- Adaptation Plan: Identify the planned upgrades or modifications to address sea level rise and climate change for each discharger
- Plant Upgrades: Consider the impacts of planned nutrient upgrades on the Adaptation Plan
- Plant Optimization: Consider how any recommended nutrient optimization strategies might conflict with the Adaptation Plan
- By Other Means: Consider how any identified nutrient reduction strategies by other means strategies might conflict with the Adaptation Plan
Economic Evaluation
Capital/Construction Costs

- Class 4 Estimate: -20% to +40%
- Use Several Sources in Combination:
  - HDR Water Cost Model (Parametric estimate)
  - Equipment cost and layout estimates
  - Estimates from existing reports
  - Estimates from comparable projects
- Add Contingencies
  - Undefined items
  - Professional services
  - Soil conditions, etc.
- Exclude: Real estate
Operating Costs

- Chemical usage (lb/yr)
- Power consumption (kWh/yr)
- Labor (hr/yr)
- Assign unit rates
Life Cycle Cost

- Present worth of Capital and Operating Costs
- Inflation rate
- Interest rate
- Period
Annual Reporting
Annual Reporting

- Ongoing effort documents nutrient loading to SF Bay
- Determine changes and trends and causes for change
- Annually collect data for plants (CIWQS program)
- Verify data
- Compile trends and report
- Due Sep 1 each year
Nutrient Reduction Report
Study Results will Provide the Basis for Nutrient Reduction Strategies for the Bay

- Scoping Plan
- Evaluation Plan
- Data Collection & Analysis

- Plant Optimization
- Sidestream Treatment
- By Other Means
- Facility Upgrades

Synthesis

Nutrient Reduction Plan
Potential Nutrient Reduction by Treatment Optimization and Treatment Upgrades

BACWA Membership Meeting Update
30 January 2015
Worksheet B – General Info/Sidestream Treatment Questions

- General Plant Info
- Prior Reports (Nutrient Removal, CIP, By Other Means)
- Flows (Current and Permitted Capacity)
- Constituent Limits
- Energy Demand
- Chemical Demand
- Info on Recycled Water
- Unit Process Questions
# Worksheet B – General Info/Sidestream Treatment Questions

<table>
<thead>
<tr>
<th>Questions to Understand Plant:</th>
<th>Value</th>
<th>Units/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANT BACKGROUND:</td>
<td>INFO FROM POTW</td>
<td>Comments from POTW (optional)</td>
</tr>
<tr>
<td>Plant Footprint, acres or square feet =</td>
<td>Ball park; provide units</td>
<td></td>
</tr>
<tr>
<td>Submit a Plant Process Flow Diagram and mark off areas planned for future projects =</td>
<td>As a separate file (marked up scan is OK)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SERVICE AREA DESCRIPTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Service Connections =</td>
</tr>
<tr>
<td>Area covered by the Discharger =</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prior Reports:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide any planning reports on nutrient removal (send separately)</td>
</tr>
<tr>
<td>Example, master plan</td>
</tr>
<tr>
<td>Provide information on Capital Improvement Projects planned for nutrient removal (send separately)</td>
</tr>
<tr>
<td>Example, aeration basin expansion for nitrification</td>
</tr>
<tr>
<td>Provide any reports completed related to By Other Means (send separately)</td>
</tr>
<tr>
<td>Example, nutrient trading, water recycling, wetlands treatment, biosolids export, source control, and non-point source</td>
</tr>
<tr>
<td>Provide any reports completed related to Sea Level Rise and Climate Change (send separately)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLOW LIMITS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permitted Flow (ADWF), mgd =</td>
</tr>
<tr>
<td>Permitted Flow (Peak Flows), mgd =</td>
</tr>
<tr>
<td>Rated Capacity (ADWF), mgd =</td>
</tr>
<tr>
<td>Current ADWF Flows, mgd =</td>
</tr>
<tr>
<td>BOD LIMITS:</td>
</tr>
<tr>
<td>Permitted BOD Discharge Limit (AVERAGE MONTHLY) =</td>
</tr>
</tbody>
</table>
### Worksheet B – Data Request Matrix

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Method Comment</th>
<th>Primary Effluent</th>
<th>Primary Solids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>Flow</td>
<td>Flowmeter info</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOD5 OR cBOD</td>
<td>5-day BOD OR carbonaceous BOD</td>
<td>Sample filtered through 0.45 um filter. Analyze BOD5 of filtrate.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>sBOD</td>
<td>Soluble BOD5</td>
<td>Sample filtered through 0.45 um filter.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>COD</td>
<td>Chemical Oxygen Demand</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>sCOD</td>
<td>Soluble COD</td>
<td>Sample filtered through 0.45 um filter. Analyze COD of filtrate.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>TSS</td>
<td>Total suspended solids</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>VSS</td>
<td>Volatile suspended solids</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>NH4</td>
<td>Ammonia</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>TKN</td>
<td>Total Kjeldahl Nitrogen</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Data Priority Numbering system:
1 = Required/Essential
2 = Would like to have numbers
Grey = Not needed

Data is Prioritized
# Worksheet B – Sample Data

<table>
<thead>
<tr>
<th>SamplePoint</th>
<th>Primary Clarifiers</th>
<th>Primary Effluent</th>
<th>Primary Effluent</th>
<th>Primary Effluent</th>
<th>Primary Effluent</th>
<th>Primary Effluent</th>
<th>Primary Effluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SampleName</th>
<th>Number of Units in Service</th>
<th>BOD</th>
<th>soluble BOD</th>
<th>COD</th>
<th>soluble COD</th>
<th>TSS</th>
<th>VSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sampling Type</th>
<th>No</th>
<th>Composite (Flow-Paced)</th>
<th>Composite (Flow-Paced)</th>
<th>Composite (Flow-Paced)</th>
<th>Composite (Flow-Paced)</th>
<th>Composite (Flow-Paced)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
<td>Unitless</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
</tr>
<tr>
<td>(OPTIONAL) Comment per Constituent</td>
<td>EXAMPLE, 6/30/2014</td>
<td>4.00</td>
<td>150.00</td>
<td>120.00</td>
<td>200.00</td>
<td>160.00</td>
</tr>
<tr>
<td></td>
<td>7/1/2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7/2/2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7/3/2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7/4/2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>