Dairy Impacts to Water Quality

- **Aquatic Life**
  - Ammonia toxicity
  - Dissolved oxygen depletion

- **Drinking Water**
  - Nitrates - blue baby syndrome
  - Salts – taste problems

- **Agriculture**
  - Nitrates and salts – sensitive crops
Dairy Impacts to Water Quality

- **Surface Water Impacts**
  - 70 Notices of Violation since 2004

- **Groundwater Impacts**
  - 5 dairies in Stanislaus County
    » Elevated salts and nitrates at all
Dairy Impacts to Water Quality

- **Groundwater Impacts**
  - 425 supply wells at 88 dairies
    - 39% of wells polluted with nitrate
    - 63% of dairies polluted with nitrate
  - Monitoring at 68 dairies
    - Nitrate and salt pollution
Order Development

- December 2002
  - State: Waiver Program expired
    » Dairies under waiver for 20 years
  - Federal: new USEPA regulations
    » NPDES permit required
    » Nutrient Management Plan required
Order Development

- Dec 2002: New Waiver Program
- Jan 2003: 1\textsuperscript{st} Draft NPDES Permit
- Mar 2003: New Waiver Rescinded
- Sep 2004: 2\textsuperscript{nd} Draft NPDES Permit
Order Development

- Feb 2005: Court Decision
  - Vacated NPDES requirement for all large CAFOs unless actual discharge
  - Upheld agricultural storm water exemption

- April 2005: Informed Board of Change in Direction

- Mar 2006: Draft Waste Discharge Requirements General Order
Order Development

- Nov 2006: Tentative Waste Discharge Requirements General Order
- Mar 2007: Tentative Waste Discharge Requirements General Order
Proposed Order

- Considers
  - Comments on 4 previous drafts
  - Historical Compliance
  - California Water Code, Basin Plans, State regulations (Title 27)
Proposed Order

- Considers
  - USEPA CAFO Regulations
    » Order prohibits
      - Discharges of waste/storm water from production area (NPDES required)
      - Discharges of storm water from land application area unless management consistent with a Nutrient Management Plan
Proposed Order

- Considers
  - Dairies are existing
    » Not historically regulated
    » Documented water quality impacts
  - Improvements needed
    » Facility evaluations
    » Planning and time
      - Reasonable to phase in reports
Order Requirements

- Existing Conditions Report
  - Preliminary Facility Assessment
- Waste Management Plan
- Nutrient Management Plan
- Monitoring and Reporting
Order Requirements

- **Existing Conditions Report**
  - Simple Evaluation
  - Preliminary Facility Assessment
    » Existing wastewater storage capacity
    » Existing whole farm nutrient balance
  - Merced County Software
    » Internet access
    » Simplify Existing Conditions Report
Order Requirements

- Waste Management Plan
  - Wastewater storage capacity
  - Flood protection
  - Runoff controls
  - Operation and Maintenance
Order Requirements

- Nutrient Management Plan
  - Control runoff
  - Budget and manage nutrients
    » application rates
    » application timing
Order Requirements

- Improvements will be needed
  - Phases in Waste Management and Nutrient Management Plans
  - California Dairy Quality Assurance Program
    » Training sessions throughout Region
    » Provide assistance
Order Requirements

- 7 months: Existing Conditions Report
- 1 year: Propose Interim Facility Modifications
  Complete first portions of Waste and Nutrient Management Plans
- 2 years: Complete Interim Facility Modifications
  Nutrient Management Plan with Retrofitting Plan
  Waste Management Plan with Retrofitting Plan
- 4 years: Complete all modifications
- 5 years: Completely implement Nutrient Management Plan
Order Requirements

- Monitoring
  - Visual Inspections - immediately
  - Surface Runoff – begin Oct 2007
  - Groundwater – begin in 2007
  - Nutrients – begin in 12 months
Order Requirements

- Visual Inspections
  - Production Area
    » Weekly during wet season
      ■ waste storage areas
    » During/after significant storm events
      ■ storm water containment structures
  - Land Application Area
    » Daily during wastewater applications
      ■ field conditions
Order Requirements

- Nutrient Monitoring
  - Wastewater
  - Manure
  - Soil
  - Irrigation Water
  - Plant Tissue
Order Requirements

- Surface Runoff Monitoring
  - Unauthorized Discharges
    » Discharge and surface water monitoring
  - Storm Water Discharges
    » Production Area
      ■ Discharge (prohibited) and surface water monitoring
    » Land Application Area
Order Requirements

- Groundwater Monitoring
  - Onsite supply wells, subsurface drainage

- Additional Groundwater Monitoring
  - Monitoring wells
Order Requirements

- Prioritize Monitoring Wells by
  - Proximity to offsite supply wells
  - Artificial recharge areas and Groundwater Protection Areas
  - Nitrate in neighbor’s domestic well
  - Number of crops per field per year
  - Whole Farm Nitrogen Balance
  - Nutrient Management
Order Requirements

- Reporting
  - Priority Significant Events
    » Discharges to surface water
    » Endangers human health or environment
  - Annual reports
    » All monitoring results
    » Update Facility Assessment
    » Number of cows
    » Estimate nutrients generated, applied, removed
Required Reports

- Section 13267 Water Code
  - Evaluate Burden for Reports
    » Costs versus needs and benefits
    » Evidence to support requiring reports
Evidence to Support Required Reports

- Volume and character of waste
  - 1,000 cow dairy
    » 21,000 tons manure/year
    » 365,000 pounds of nitrogen/year
    » 770,000 pounds salts/year

- Documented Impacts
  » Surface water and groundwater
Need for Reports

- Existing Conditions Report, Waste and Nutrient Management Plans will demonstrate:
  - Existing facility conditions
  - Need for improvements
Need for Reports

- Monitoring Reports
  - Information:
    » For nutrient budget
    » On existing groundwater conditions
    » Water quality impacts/compliance
    » Need for and result of improvements
Benefits

- Environmental Benefits
  - Existing Conditions Report
    » Identify initial conditions
    » Need for improvements
  - Monitoring Reports
    » Identify water quality impacts
    » Determine compliance with Order
    » Need for improvements
    » Proper waste applications
Benefits

- Environmental Benefits
  - Waste Management Plan/Nutrient Management Plan
    » Improved waste storage, flood protection, operation and maintenance, waste applications
    » Minimize runoff and leaching of pollutants
Benefits

- Additional Benefits
  - Avoid cost of noncompliance
    » Penalties or court orders
    » Remedial actions
Cost Estimate

Assumptions used

- Same used by CARES
  - 1,000 mature cows
  - 400 acres cropland
  - 3 supply wells, one irrigation canal
  - 4 monitoring wells
  - Groundwater less than 100 feet deep
  - No discharges to surface water
# Cost Estimate

## Labor Cost Assumption ($ per hour)

<table>
<thead>
<tr>
<th>Position</th>
<th>Cost ($ per hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Manager</td>
<td>75</td>
</tr>
<tr>
<td>Dairy Employee</td>
<td>30</td>
</tr>
<tr>
<td>Engineer</td>
<td>125</td>
</tr>
<tr>
<td>Certified Crop Advisor</td>
<td>125</td>
</tr>
<tr>
<td>Technician</td>
<td>80</td>
</tr>
</tbody>
</table>
# Cost Estimate

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Upfront</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Conditions Report</td>
<td>$2,100</td>
<td>$0.00</td>
</tr>
<tr>
<td>Waste Management Plan</td>
<td>$11,400</td>
<td>$0.00</td>
</tr>
<tr>
<td>Nutrient Management Plan</td>
<td>$800</td>
<td>$3,800</td>
</tr>
<tr>
<td>Monitoring and Reporting</td>
<td>$27,400</td>
<td>$29,500</td>
</tr>
<tr>
<td><strong>Total Costs:</strong></td>
<td><strong>$41,700</strong></td>
<td><strong>$33,300</strong></td>
</tr>
<tr>
<td><strong>Cost Range:</strong></td>
<td>$12,000 to $56,000</td>
<td>$30,000 to $36,000</td>
</tr>
</tbody>
</table>
### Total Cost Estimate

<table>
<thead>
<tr>
<th>Description</th>
<th>Upfront</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARES estimate of 2006 General Order</td>
<td>$89,000</td>
<td>$58,000</td>
</tr>
<tr>
<td>CARES estimate for proposed revisions</td>
<td>$49,850</td>
<td>$33,550</td>
</tr>
<tr>
<td>Staff estimate for General Order (range of costs)</td>
<td>$41,700</td>
<td>$33,300</td>
</tr>
<tr>
<td></td>
<td>($12,000 to $56,000)</td>
<td>($30,000 to $36,000)</td>
</tr>
</tbody>
</table>
Required Reports Summary

- **Evidence to Support**
  - Waste volume and character
  - Documented impacts

- **Need for Reports**
  - Existing conditions
  - Need for and effect of improvements
  - Determine compliance
  - Budget nutrients
Required Reports Summary

- Costs
  - Reduced to minimum necessary
  - Are reasonable
Funding Resources

- Environmental Quality Incentives Program
- State Revolving Fund
- Dairy Water Quality Improvement Grant Program
Available Assistance

- University of California Cooperative Extension
- Natural Resources Conservation Service
- California Dairy Quality Assurance Program
  - Environmental Stewardship
- Merced County Environmental Health
Comments

- NPDES Permit
- CEQA
- Groundwater Monitoring
- Pond Liners
- Third Party Use of Solid Manure
Comment - Response

- Comment – NPDES Permit
  - Necessary
    » Protect discharger
    » Allow enforcement options for public

- Response
  - Waste Discharge Requirements
    appropriate first step
  - Will draft NPDES permit next
Comment - Response

- **Comment – CEQA**
  - Categorical exemptions not appropriate
  - Environmental Impact Report needed

- **Response**
  - Categorical exemptions appropriate
    » Existing water quality conditions will improve
Comment - Response

- **Comment - Groundwater Monitoring**
  - Monitoring wells needed at each dairy soon

- **Response**
  - Impractical to install monitoring wells at 1,600 dairies within short time
Comment - Response

- Comment – Groundwater Monitoring
  - Land Application Area primary source of groundwater nitrate pollution
  - Whole Farm Nitrogen Balance critical to where monitoring wells required

- Response
  - Whole Farm Nitrogen Balance
    » Only an estimate
    » Does not guarantee field nitrogen balance
Comment - Response

- Pond Design
  - Two tier option
    » Tier 1 - Double synthetic liner with leachate collection and removal system
    » Tier 2 - Natural Resources Conservation Service Practice Standard 313 + Demonstration
- Maximum seepage rate $10^{-6}$ cm/sec
- Synthetic liner when vulnerability/risk high
- Other alternatives for very high vulnerability/risk
Comment - Response

- Comment - Pond Design
  - Remove Tier 1

- Response
  - Tier 1 minimal review time and protects groundwater
  - Tier 1 not required
Comment - Response

- **Comment - Pond Design**
  - Remove Tier 2 model demonstration requirement

- **Response**
  - Tier 2 model demonstration necessary to show compliance with Anti-Degradation Policy
Comment - Response

Comment – Pond Design
- Pond design standard same for existing ponds and new or reconstructed ponds

Response
- Groundwater monitoring will determine if existing ponds need retrofitting
Comment - Response

- Comment – Third Party Use of Solid Manure
  - A written agreement is not needed

- Response
  - Late revision has removed this requirement
Comment - Response

- Comment – Third Party Use of Solid Manure
  - Waste Discharge Requirements needed

- Response
  - Coverage will be under the Irrigated Lands Waiver Program
Late Revisions

- Revisions Insignificant
  - Order
    » Findings, Specifications, Provisions
    » Table 1 - Schedule
  - Monitoring and Reporting Program
  - Attachments C, D, and E
  - Information Sheet
Summary

- 5 years in development
- Order will
  - Apply to 1,600 existing facilities
  - Impose more stringent requirements
  - Improve water quality conditions
- Monitoring and Reporting costs are reasonable and necessary
Recommendation

Adopt Proposed Order with Late Revisions