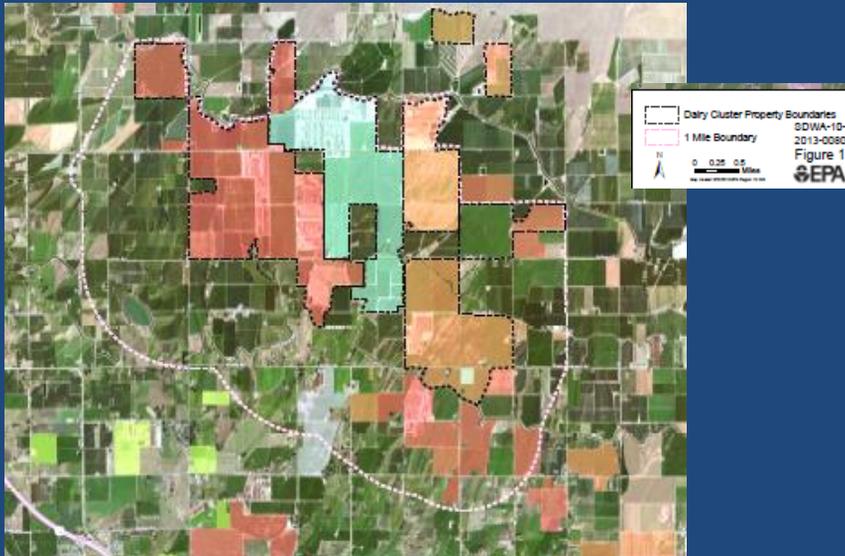


# Summary Yakima AOC Dairies Draft Data

## Yakima Valley, Washington



### The Dairies



## Presentation Overview

- AOC Requirements
- Conceptual site model
- Groundwater data
- Soil data
- Irrigation water management
- Lagoon evaluations
- Contaminated residential wells
- Source control actions
- Looking forward

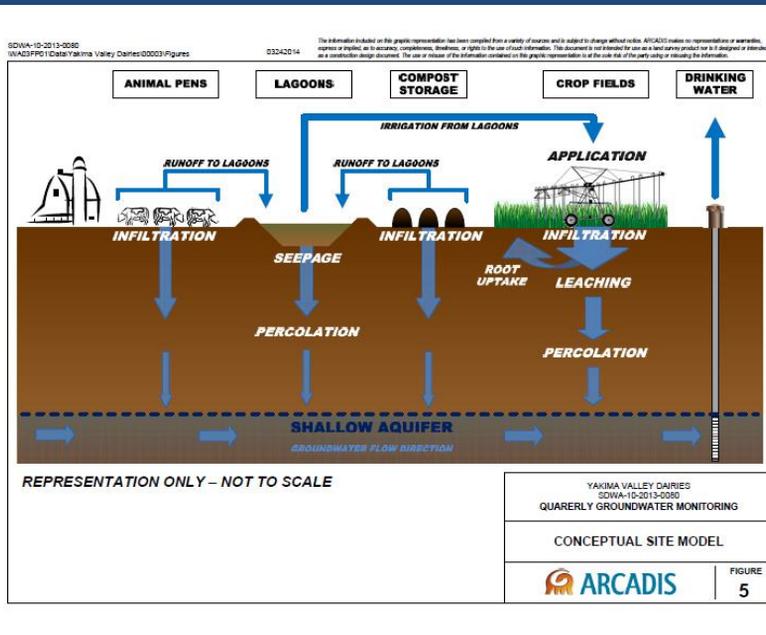
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## AOC Requirements

In signing the Consent Order the dairies agreed to:

- Provide an alternate source of drinking water for neighbors within one mile down gradient of the dairies whose wells have levels of nitrate above EPA's drinking water standard of 10 mg/L, or "parts per million" (ppm).
- Conduct soil and groundwater testing at each dairy to evaluate if nitrogen sources are being controlled.
- Take steps to control nitrogen sources (manure and commercial fertilizer) at their facilities.

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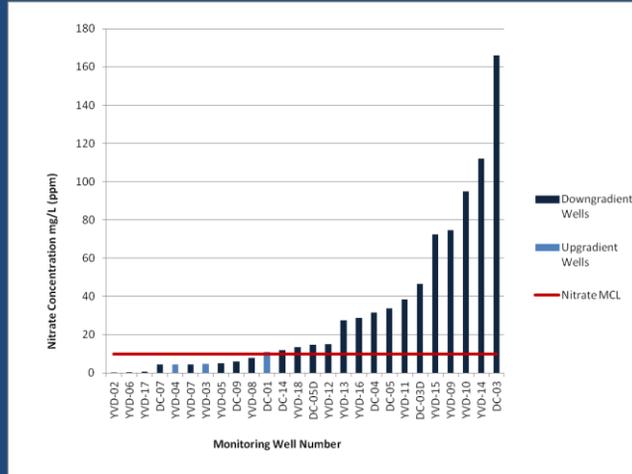
## Monitoring Wells

- **Monitoring well network** to assess effectiveness of source control actions
  - 16 wells in addition to EPA's 7 wells
  - Implement source control actions
  - 8 years of quarterly monitoring
  - Additional source assessment and control actions required if nitrate levels in wells do not decline
- **STATUS: WELLS INSTALLED, FIRST FOUR ROUNDS OF QUARTERLY SAMPLING COMPLETED**

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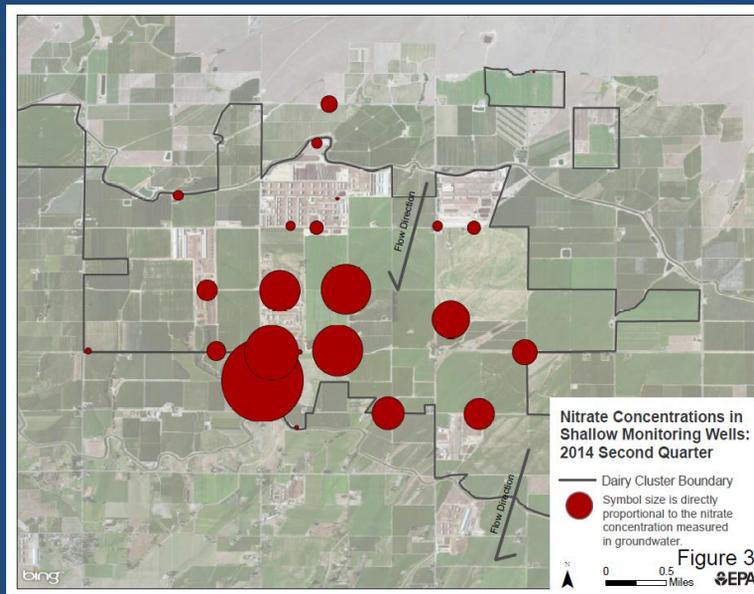
# Monitoring Well Sample Results

Third Quarter 2013

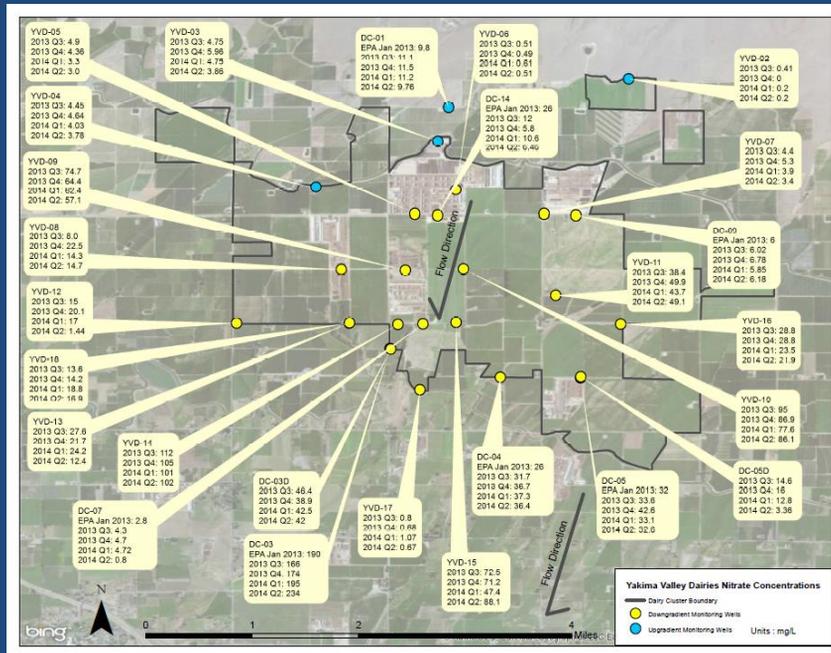


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## Nitrate Concentrations in Shallow Monitoring Wells: 2014 Second Quarter



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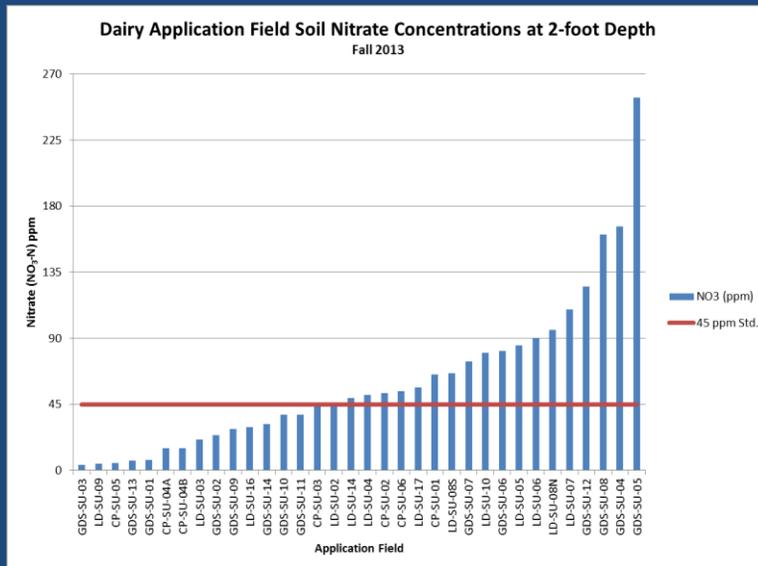
10

# Soil Nitrate Levels in Application Fields

- 34 application fields
- Goal stated in the Consent Order is to maintain soils below 45 ppm soil nitrate at the 2-foot depth
- Consistency with state
- Fall Post Harvest sampling: 1-foot, 2-foot, and 3-foot depth
- Spring Pre-plant: 1-foot and 2- foot depth

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# Soil Nitrate Levels in Application Fields



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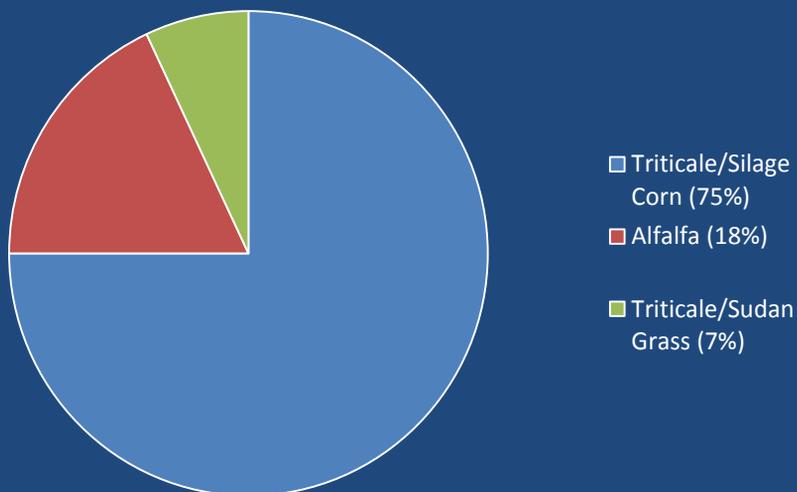
## Soil Data Summary

Soil data from 2-foot depth

	Fall 2013	Spring 2014	Both
Number of fields exceeding 45 ppm	20 of 34	15 of 34	12 of 34
Percent of fields exceeding 45 ppm	59%	44%	35%
Percentage of acreage exceeding 45 ppm standard in both Fall and Spring 2014: 52%			

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## Percent Acreage by Crop Type



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## Average Soil Nitrate Concentration by Crop Type

Fall Post-Harvest 2013 Soil Data

	Number of Fields	Percentage of Acreage	1-foot (ppm)*	2-foot (ppm)*	3-foot (ppm)*
Triticale/ Silage Corn	22	75%	99	97	99
Alfalfa	10	18%	20	26	28
Triticale/ Sudan Grass	2	7%	26	27	17
<b>Total</b>	34	100%	--	--	--

Units = parts per million (ppm) = milligrams per kilogram

\* Averages are weighted by field size

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## Pounds of Nitrate per Acre

Estimated averages by crop type

	Corn/Triticale	Alfalfa	Triticale/ Sudan Grass
1-foot depth	396	80	104
2-foot depth	388	104	108
3-foot depth	396	112	68

Units = Pounds per Acre  
Fall Post-Harvest 2013 Soil Data

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## Root Zone Nitrate

Estimated averages by crop type

- Corn/Triticale 784 lbs per acre
- Alfalfa 184 lbs per acre
- Triticale/Sudan Grass 212 lbs per acre

Fall Post-Harvest 2013 Soil Data

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## Fall 2013 Soil Summary

- Total acres: 2,306
- Total Nitrate-N
  - 1-foot 310 - 364 tons
  - 2-foot 310 - 365 tons
  - 3-foot 312 - 367 tons

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## Application Field Management

- Consent Order: Dairies have retained a “certified nutrient management planner, agronomist, or soil scientist with the goal of reducing the soil nitrate level to below 45 ppm at the 2-foot depth.”

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## Proposed Management Changes

- Alfalfa 10 fields
- Other Cropping changes 6 fields
- No application 5 fields
- Reduced application 4 fields

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## Irrigation Water Management

- Soil moisture sensors installed in all application fields below the root zone
- If water detected by sensors, irrigation on that field will stop
- Intended to impede the downward migration of nitrate to the drinking water aquifer

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## Lagoons to be Assessed

1 lagoon shown to comply with current NRCS standards

40 lagoons must be evaluated

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## Provision of Water Treatment

- 224 residences within 1 mile
- 181 residences tested
  - 63 residences exceeded the MCL
  - Additional 48 already had RO units
- 61% of assessed residences exceeded the MCL
  - Compared to 12 percent across Yakima County
- Water treatment was offered by the Dairies at no charge to all residents whose well exceeded the nitrate MCL

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## Status of Source Control Actions

Early **source control** actions to reduce nitrate loading to the aquifer

- Soil sampling - not to exceed 45ppm nitrate-N below the root zone  
**FALL/SPRING SAMPLING COMPLETE**
- Test lagoons to ensure they meet current state permeability standard – upgrade  
**PLAN UNDER EPA REVIEW**
- Automated irrigation water management – water metering and root-zone sensors  
**PLAN APPROVED, WATER SENSORS TO BE INSTALLED PRIOR TO 2015 IRRIGATION SEASON**

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## Source Control (cont.)

- Phase out furrow irrigated fields **COMPLETE**
- Minimize ponding of manure in pens **COMPLETE**
- Backflow prevention **COMPLETE**
- Actions to reduce infiltration from solid separator, silage storage **COMPLETE**
- Assessment of area upgradient of monitoring well DC-03 **UNDER DEVELOPMENT**

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## Looking Forward: Monitoring

- **8 years monitoring** to assess downward trend
  - Soil nitrate levels at depth
  - Monitoring wells nitrate

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- **Looking forward**

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## Looking Forward: Additional Source Control

Provision for **additional source control** measures if groundwater monitoring shows no improvement over time

- Source investigation
- Source control plan(s)

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