

# Nitrate & Nitrite

## Regulatory Requirements & Health Concerns

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## **Topics of Presentation**

- **CDPH Role as Regulatory Agency**
- **CDPH Role - Technical Assistance**
- **Data on Nitrate violations statewide**
- **Regulatory requirements for nitrate monitoring**
- **Notification Requirements**
- **Health concerns**

# CDPH Role as Regulatory Agency (for Public Water Systems)

- **Decentralized regulatory program**
- **Carried out by CDPH Districts and Local Primacy Agencies**
- **Philosophy of Regulatory program is based on prevention :**
  - ✓ **Identification and Correction of sanitary hazards**
  - ✓ **Effective working relationship with water system personnel**
  - ✓ **Regular, detailed inspections and evaluation of system facilities**
  - ✓ **Permitting of water system, sources and treatment**
  - ✓ **Evaluation of monitoring data**
  - ✓ **Enforcement action**

# CDPH Role – Technical Assistance

- **Support water systems to provide safe water and comply with standards**
- **Technical support and consistency statewide**
- **Evaluate alternative treatment technologies**

## CDPH – Technical Operations Section Role

- **Support of District Offices and LPAs**
  - **Water Treatment Technologies**
  - **Operator Certification Program**
  - **Development of Drinking Water Regulations**
  - **Water Treatment Device Certification**
    - **Point of Use and Point of Entry Devices**
  - **Safe Use of Recycled Water**
    - **Partnership with the SWRCB and Regional Boards**

# Centralized Treatment Plants

- **Treatment of ALL water is more protective of public health (compared to Point of Use or Point of Entry)**
- **Reliable process control**
- **Safe water piped to your house is super-convenient!**
  - **Point of Use requires extra work and inconvenience**
  - **Bottled water is inconvenient**
  - **Bottled water is not allowed as permanent solution under State or Federal Safe Drinking Water Act**

# Best Available Technology (BAT) for Nitrate and Nitrite

- **Nitrate**

- Ion Exchange
- Reverse Osmosis
- Electrodialysis

- **Nitrite**

- Ion Exchange
- Reverse Osmosis

# Compliance Statistics for Nitrate

- **205 community water systems have one or more wells above the MCL** (Based on the AB 2222 Report)
- **96 public water systems exceeded the MCL for Nitrate** (based on 2011 CDPH Annual Compliance Report)
  - ✓ **Median population of these systems is less than 100**

# Regulatory Requirements for Nitrate and Nitrite

- **Source Monitoring**
  - **Minimum sampling specified by regulation**
  - **Additional sampling as required by regulatory agency**
- **Monitoring of Treatment Process**
  - **As required by regulatory agency**
- **Distribution System Monitoring**
  - **As required by regulatory agency**

# Regulatory Requirements (Source Water Monitoring)

- **Sampling frequency for community water systems:**
  - **Groundwater** - annual sampling is required
  - **Surface water** - quarterly initially but may be reduced to annually if results are low
- **Maximum Contaminant Level (MCL)**
  - **Nitrate** - 45 mg/L as NO<sub>3</sub>
  - **Nitrite** - 1 mg/L as N

# Follow-up sampling requirements for Nitrate

(If sample is above the MCL)

- **If results are greater than the MCL,**
  - **Water system must require the laboratory to contact water system personnel within 24 hours of result**
  - **Collect repeat sample within 24 hours of notice**
  - **If unable to resample, issue Tier 1 public notification**
- **Consult with regulatory agency**

# Follow-up sampling requirements

(If source water quality results reach  $\frac{1}{2}$  of the MCL)

- **Quarterly samples are required for one year**
- **Review results with regulatory agency for ongoing sampling requirements**

# Notification Requirements If MCL is exceeded

- **Consult with Regulatory Agency within 24 hours of notification of exceedance**
- **Provide public notice as soon as possible but within 24 hours**
- **Review CDPH notification templates:**

*<http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Notices.aspx>*

# CDPH Tier 1 Notification Template for Nitrate

## IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Este informe contiene información muy importante sobre su agua potable.

Tradúzcalo o hable con alguien que lo entienda bien.

### DRINKING WATER WARNING

[System] water has high levels of nitrate

DO NOT GIVE THE WATER TO  
INFANTS UNDER 6 MONTHS OLD OR PREGNANT  
WOMEN  
OR USE IT TO MAKE INFANT FORMULA

Water sample results received [date] showed nitrate levels of [level and units]. This is above the nitrate standard, or maximum contaminant level (MCL), of 45 milligrams per liter. Nitrate in drinking water is a serious health concern for infants less than six months old.

#### What should I do?

- **DO NOT GIVE THE WATER TO INFANTS.** *Infants below the age of six months who drink water containing nitrate in excess of the MCL may quickly become seriously ill and, if untreated, may die because high nitrate levels can interfere with the capacity of the infant's blood to carry oxygen. Symptoms include shortness of breath and*

# Disclaimers (& Helpful tips)

- **See regulations for full details of ALL sampling requirements for nitrates**
- **There are special requirements for standby wells and other situations**
- **Talk to your water system regulator 😊**

# More resources on the topic

- 1. SWRCB Report to the Legislature – Recommendations Addressing Nitrates in Groundwater**

➤ [http://www.waterboards.ca.gov/water\\_issues/programs/nitrate\\_project/docs/nitrate\\_rpt.pdf](http://www.waterboards.ca.gov/water_issues/programs/nitrate_project/docs/nitrate_rpt.pdf)

- 2. AB 2222 Report – Communities that Rely on Contaminated Groundwater**

➤ [http://www.waterboards.ca.gov/water\\_issues/programs/gama/ab2222/index.shtml](http://www.waterboards.ca.gov/water_issues/programs/gama/ab2222/index.shtml)

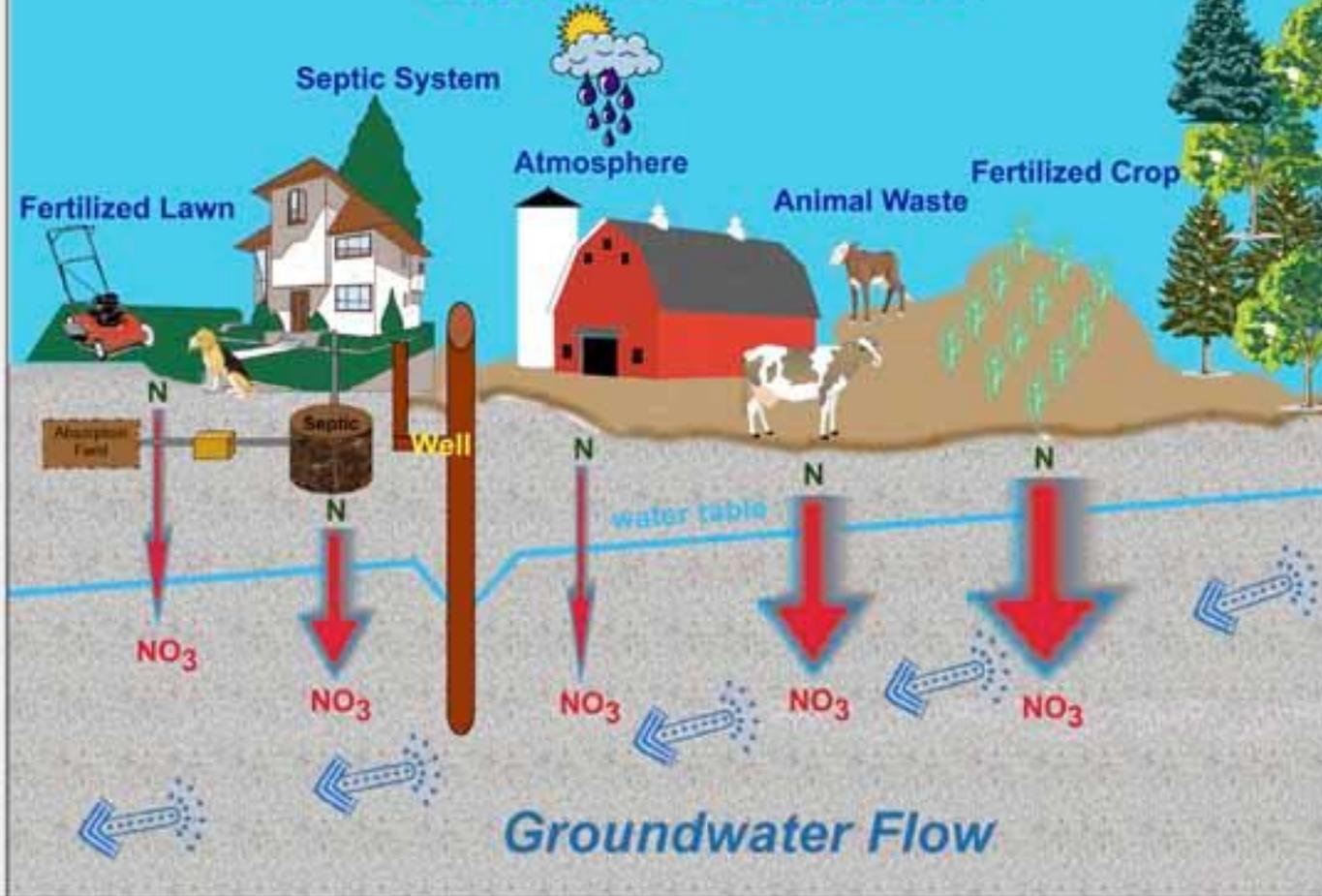
- 3. Draft Report by Tulare County – Management and Non-infrastructure Solutions**

➤ [http://www.tularecounty.ca.gov/cao/assets/File/Management%20and%20Non-Infrastructure\\_DRAFT.pdf](http://www.tularecounty.ca.gov/cao/assets/File/Management%20and%20Non-Infrastructure_DRAFT.pdf)

# Drinking Water, Nitrates and Public Health

- **Multi-barrier approach to protect public health**
- **Acute versus Chronic Health Effects**
- **Health effects of nitrates**
- **Importance of public notification**

# Nitrate Sources



# Multi-barrier approach

- **Proper well location and construction**
- **Monitoring of source water quality**
- **Effective water treatment**
- **Proper distribution and storage**
- **Monitoring of water quality delivered**
- **Public information and education**

# Acute versus Chronic Health Effects

- **Acute effects appear shortly after ingestion of contaminated water**
  - **Hours, days or weeks**
- **Chronic effects appear months or years after ingestion of contaminated water**
- **Some contaminants exhibit both chronic and acute effects**
  - **Depending on dose and toxicity**

# Health effects of nitrates

- **Vulnerable population:**
  - **Infants(greater fluid intake relative to body weight; higher gastric pH in gastrointestinal system; fetal Hb)**
- **Especially vulnerable sub-groups:**
  - **Dehydrated or otherwise weakened infant**
  - **Pregnant woman and their unborn children (nitrosatable drugs and neural tube defects)**
- **Exposure mode (i.e. mixing of formula)**
- **Symptoms: cyanosis (Blue Baby Syndrome), irritability, stupor from cerebral anoxia**

# Methemoglobinemia

- **Infantile methemoglobinemia is a condition in which infants develop a blue or gray hue to their skin as the result of insufficient amounts of oxygen getting into their bloodstreams which could lead to serious conditions even death.**
- **Nitrite oxidize the iron in hemoglobin, the oxygen carrying component of red blood cells, and forms methemoglobin. Methemoglobin is incapable of oxygen transportation.**
- **Methemoglobin , also known as Blue Baby Syndrome, mostly effects children less than six months of age because of their specific susceptibility:**
  - **Ingestion of baby formula**
  - **Gastrointestinal physiology**
  - **Infants have lower MetHb reductase activity.**



# Public Notification Requirements

## Tier 1 Public Notice :

Nitrate	Infants below the age of six months who drink water containing nitrate in excess of the MCL may quickly become seriously ill and, if untreated, may die because high nitrate levels can interfere with the capacity of the infant's blood to carry oxygen. Symptoms include shortness of breath and blueness of the skin. High nitrate levels may also affect the oxygen-carrying ability of the blood of pregnant women.
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# Common questions

- Health concerns with chronic nitrates at 'lower levels'?
- Carcinogenic concerns?
- Concerns related to breast-feeding?
- Synergistic effects with other contaminants?

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