

ference of Public Health Officials

# ***Recycled Water for Agriculture: A Case History in Securing Grower Confidence***



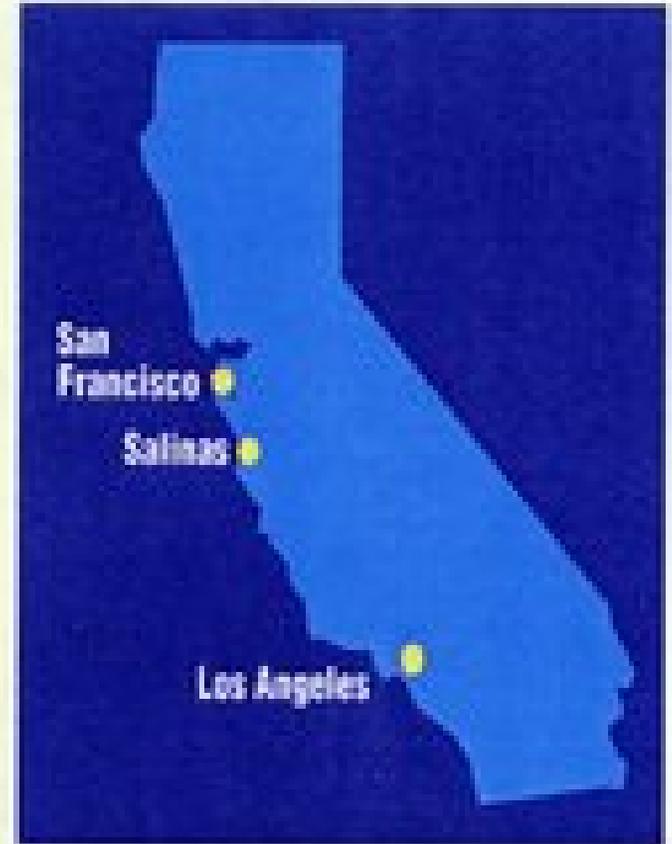
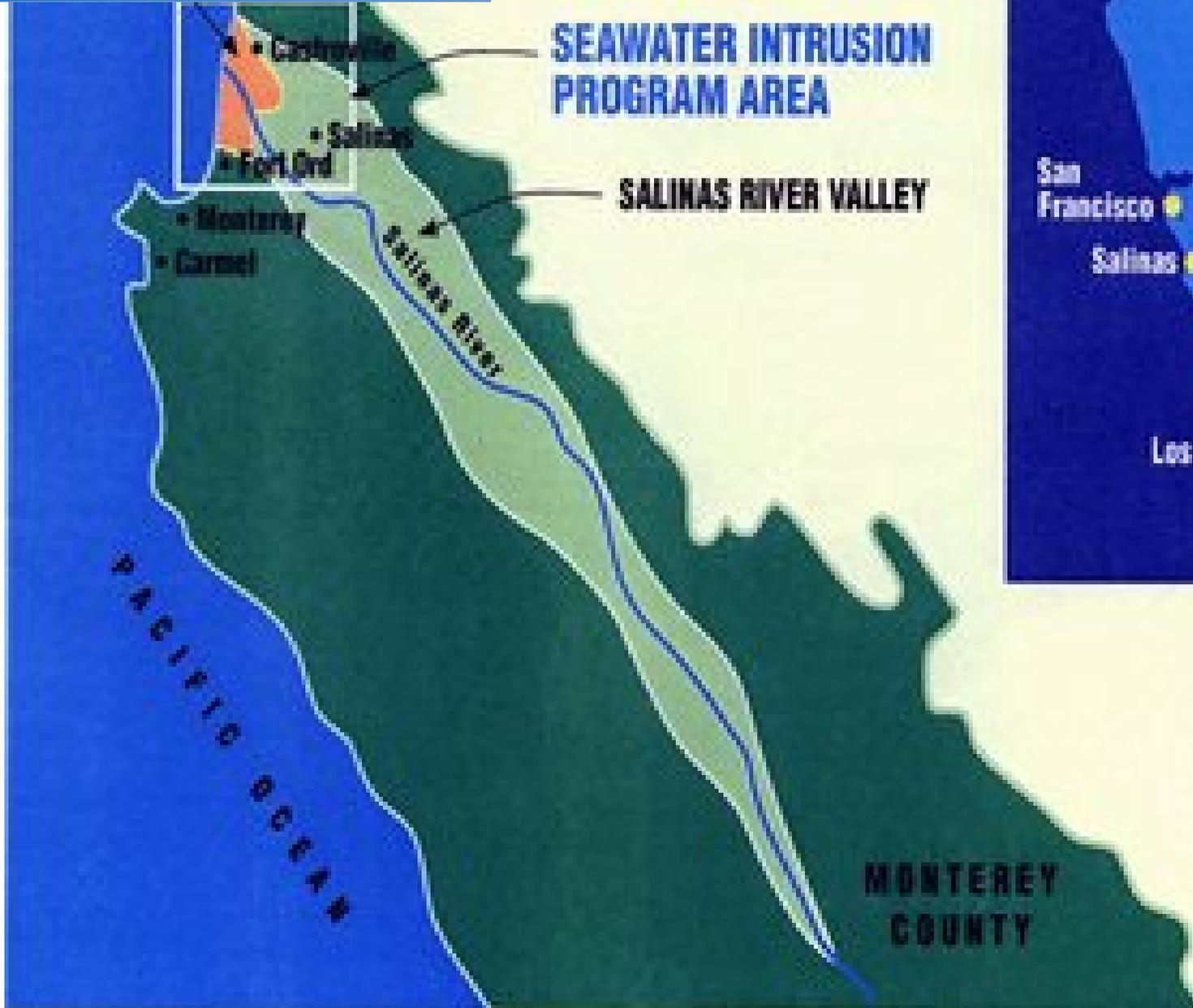
July 23, 2009

Monterey Regional Water Pollution Control Agency

# AREA OF SEAWATER INTRUSION

## SEAWATER INTRUSION PROGRAM AREA

### SALINAS RIVER VALLEY



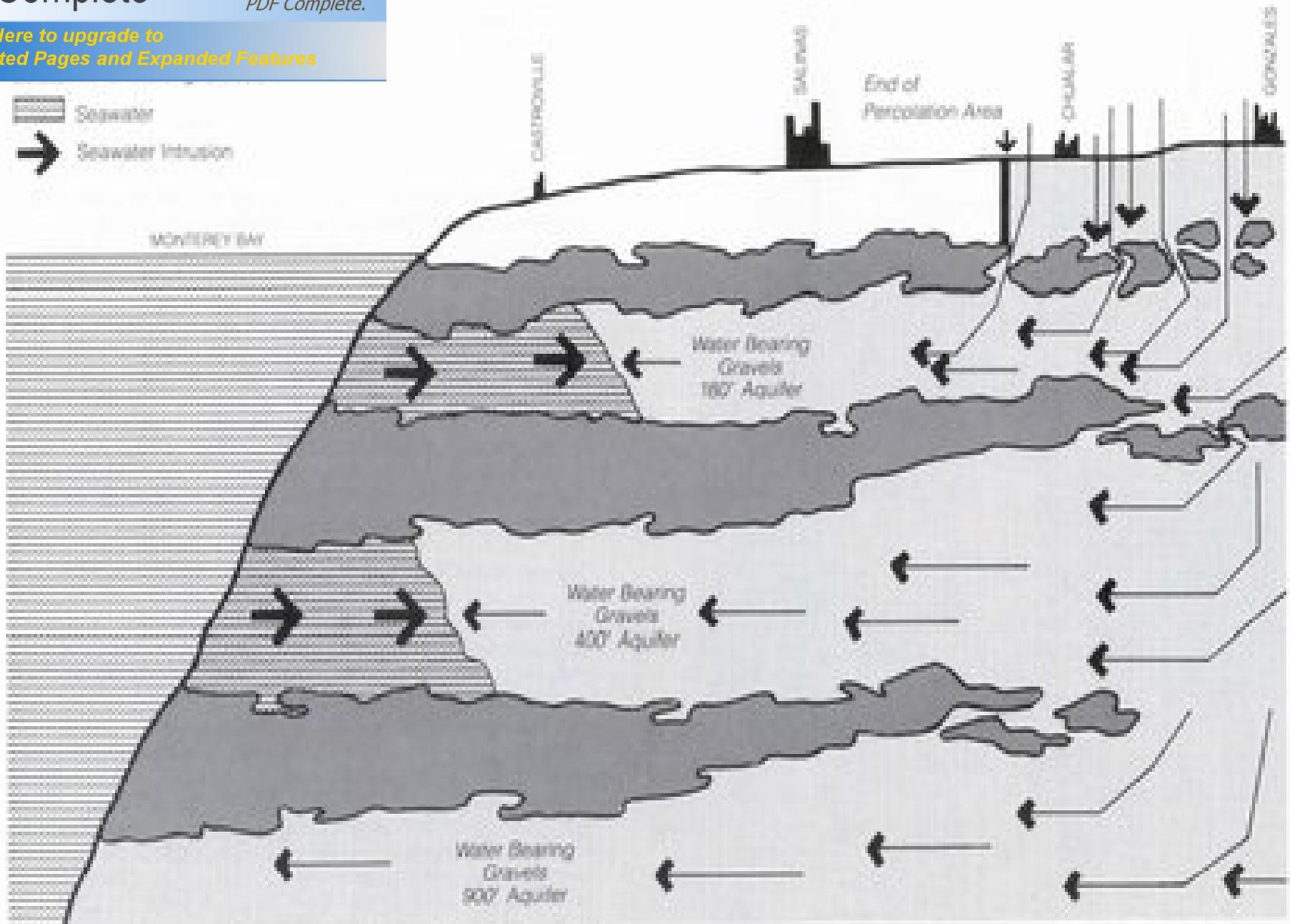
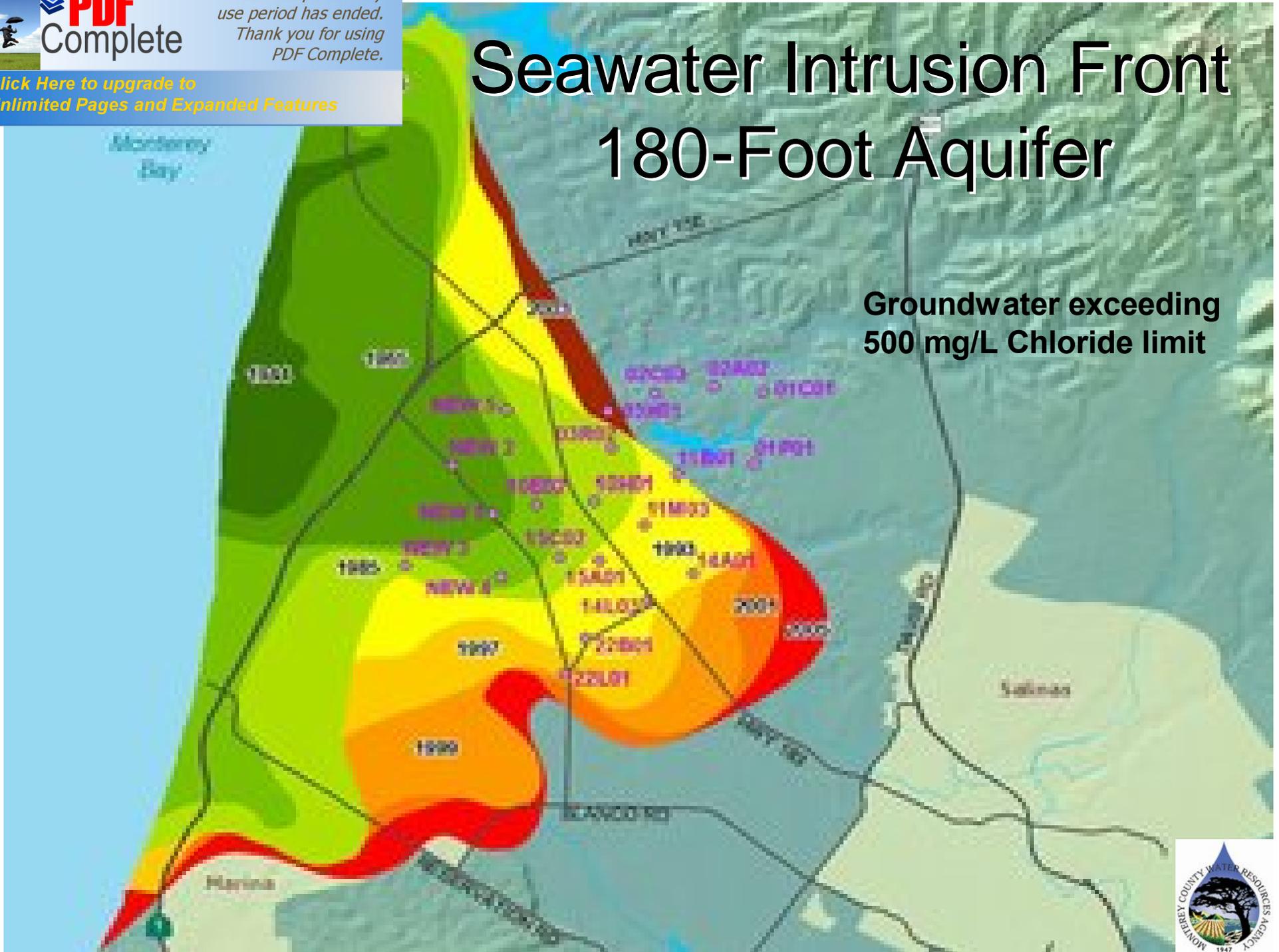


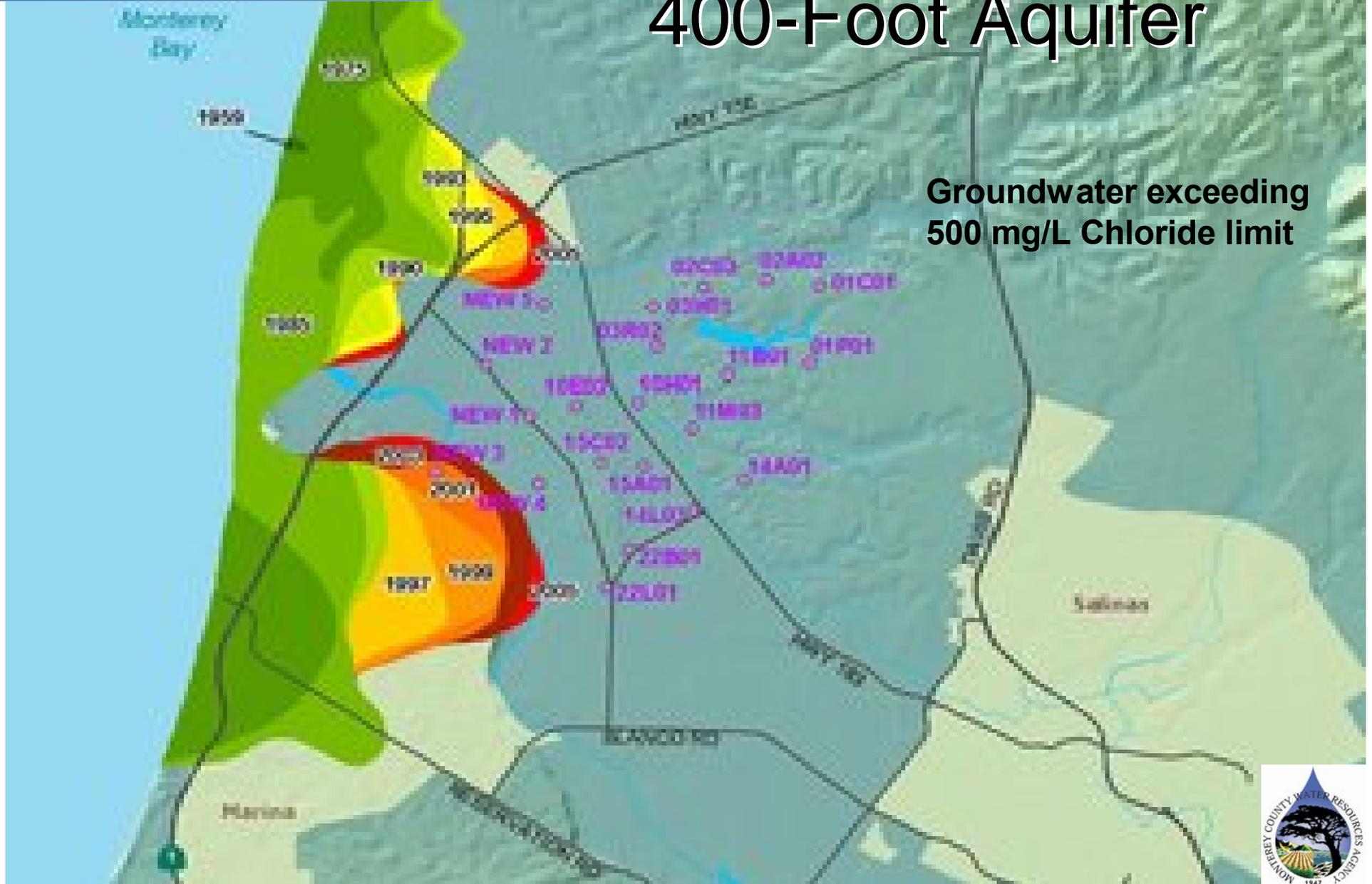
Figure 3 Movement of Groundwater in the North Salinas Valley

# Seawater Intrusion Front 180-Foot Aquifer

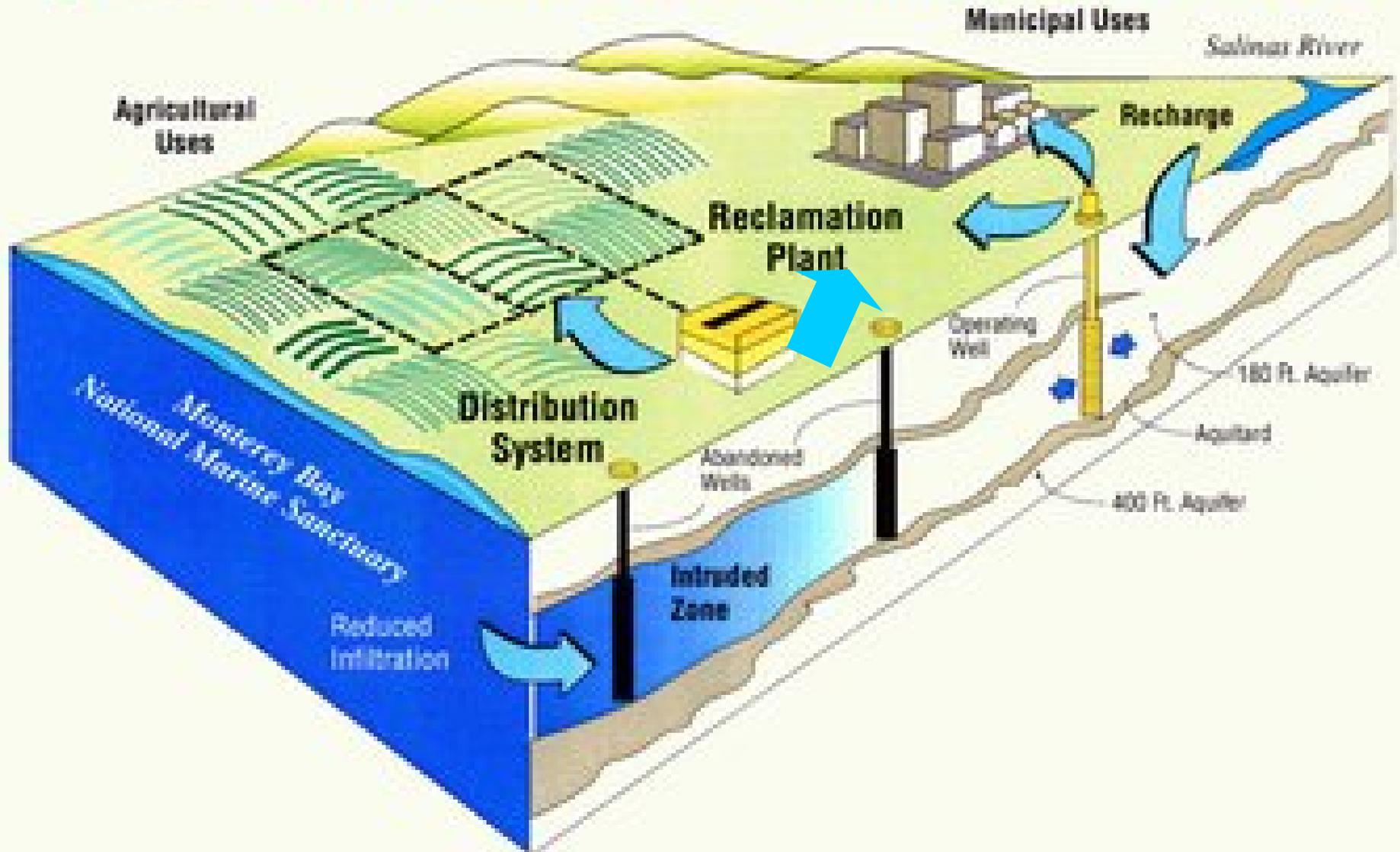
Groundwater exceeding  
500 mg/L Chloride limit



# Seawater Intrusion Front 400-Foot Aquifer



# Implementation of the Reclamation Concept



# GROWER ACCEPTANCE

## DATA

- Independent analysis
- Scientifically sound
- Expert review
- Use opposition

## COMMUNICATION

- Transparency
- Collaboration
- Monthly meetings
- Education

## VALUE

- Competitive/ cost effective
- Added value product
- High quality

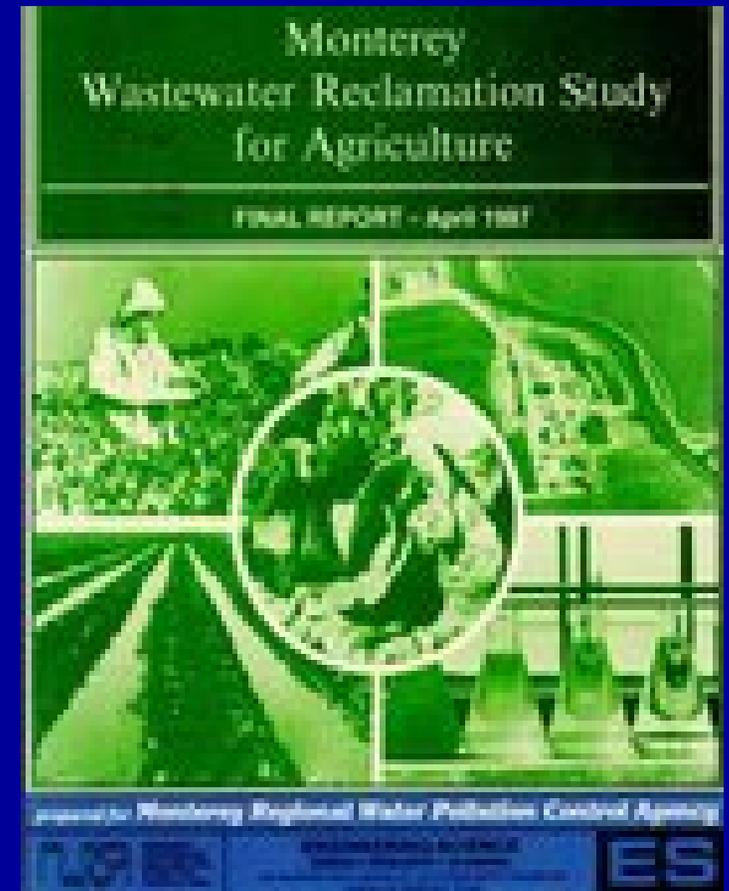
## CUSTOMER SERVICE

- Voluntary use
- On-going extra monitoring
- Special studies
- Crisis management support

# DATA

## Monterey Wastewater Reclamation Study for Agriculture (MWRSA )

- “ **11 year study: 1976 to 1987**
- “ **5 years of field testing**
- “ **Independent monitoring:  
UC Davis and UC Berkeley**
- “ **Team included state,  
local health officials, and ag  
stakeholders**
- “ **Pathogen, soil, plant  
tissue analysis**



# RESEARCH RESULTS

**No viruses detected**

**99.999% removal of seeded virus**

**No negative field worker health effects**

**Heavy metals not detected**

**Crop quality unaffected**

**Crop yields increased**

**Conclusion:  
Food Crops Safe To Be Eaten Uncooked**

# IMPLEMENTATION

**Regional Treatment  
Plant (RTP)  
1989**

Secondary Treatment  
Ocean outfall 2 miles  
250,000 population

**Monterey County Water  
Recycling Projects  
1997**

**3° TREATMENT  
Salinas Valley  
Reclamation  
Project (SVRP)**

Title 22 – Cl<sub>2</sub> Disinfection  
Unrestricted use

**DISTRIBUTION  
Castroville Seawater  
Intrusion Project  
(CSIP)**

12,080 Acres  
45 miles pipeline

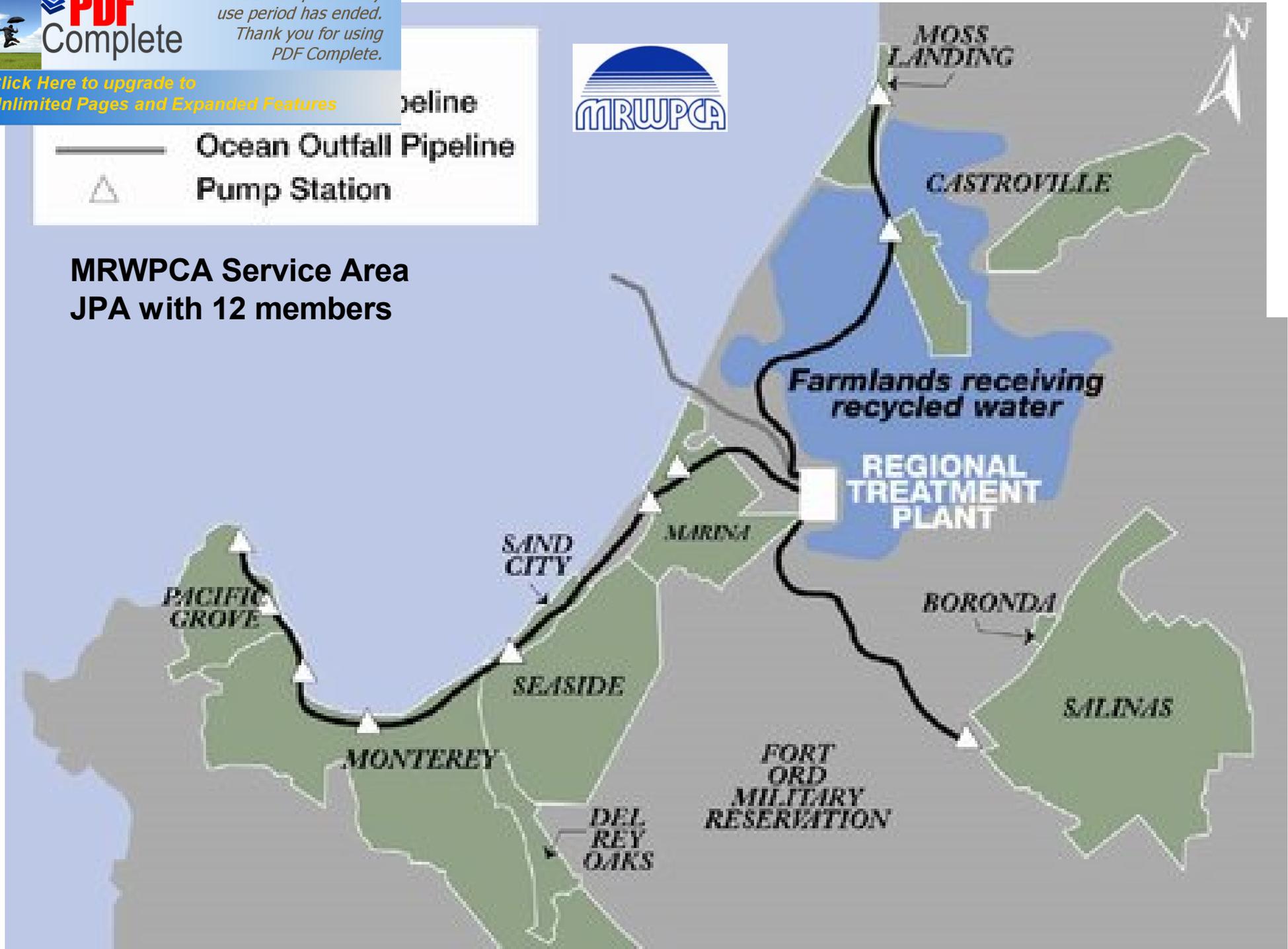
**New water supply for 19,450 AFY**



Legend

-  Ocean Outfall Pipeline
-  Pump Station

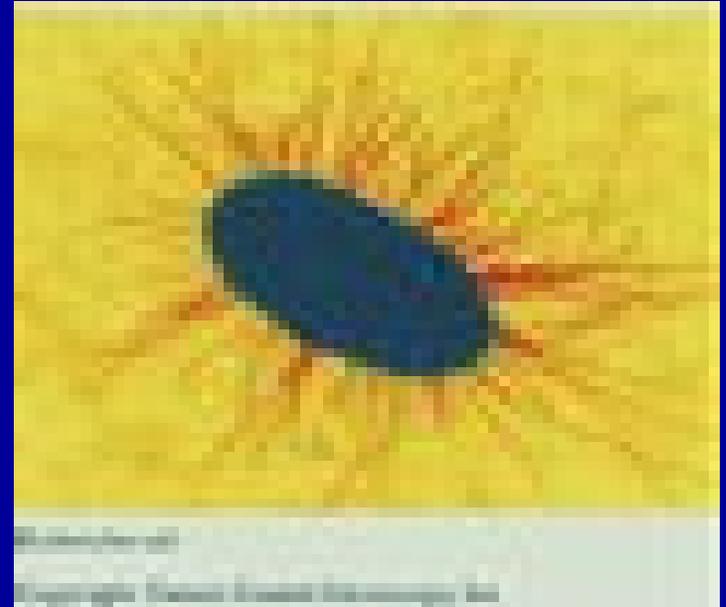
### MRWPCA Service Area JPA with 12 members



# Safety Study, 1997-1998

## Efficacy of Pathogen Removal Study 1997-2003

- “ *Salmonella*
- “ *Cyclospora*
- “ *E. Coli* 0157:H7
- “ *Legionella*
- “ *Giardia*
- “ *Cryptosporidium*
- “ Fecal Coli, Turbidity, Cl Residual



**Results:**

**No viable microbes of public health concern in rec ycl ed water**

# COMMUNICATION

## Maximizing Perceived Safety

### Transparency

Web data access

Grower webpage – daily updates

### Collaboration

Community leaders, ag industry,  
regulators & staff

Monthly meetings

### Education & outreach

Tours

School programs

Civic and professional group talks

Exhibits

Newsletters



**Build and maintain trust**

# Corporation Results

## Reasonable site labeling



# CUSTOMER SERVICE

## “ Voluntary Use

## “ Additional Studies

“ 3° Filter flow rate increase 50%

“ Soil salt monitoring 8+ years

“ Endocrine disrupting compounds

## “ On-going Data Collection

“ Agronomic

“ Food safety

## “ Crisis Management Support

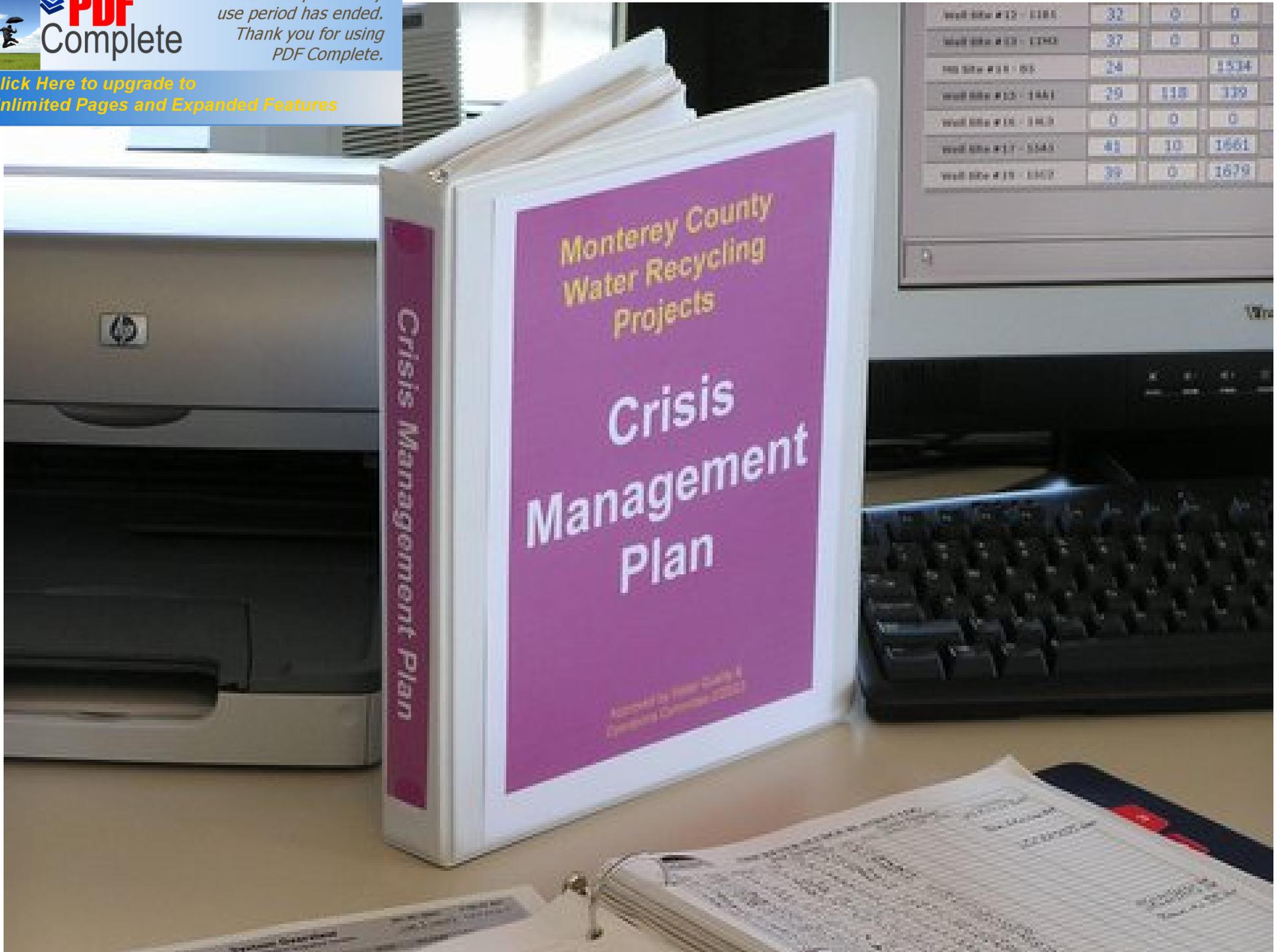


95% use project water



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September 2006

# Spinach *E. coli* Incident



**CNN arrives:  
What's the story?**

# VALUE

**Monitoring included**

**Nutrients (N, K, P)**

**Competitive cost**

**Quality assured water at reasonable cost**



# 2 Water Recycling For "Unrestricted Use"

## 1. Primary – gravity

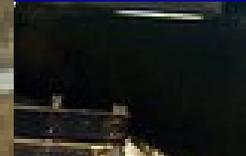
- 70-75% solids removed

## 2. Secondary – biological

- 95% solids removed

## 3. Tertiary – chemical filtration

- Alum polymer flocculation
- Filtration – anthracite, sand, gravel
- Disinfection - 2 hrs,  $\text{Cl}_2$
- < 98% solids removed



# California Water Recycling Criteria

## - Agricultural Uses -

Type of Use	Total Coliform Requirements	Treatment Required
Irrigation of fodder, fiber & seed crops, processed food crops, pasture for non -milking animals, orchards & vine yards (no contact with edible portion of crop)	None specified	" Secondary
Irrigation of pasture for milking animals	23/100 mL	" Secondary " Disinfection
Irrigation of food crops (no contact with edible portion of crop)	2.2/100 mL	" Secondary " Disinfection
Irrigation of any food crop where reclaimed water comes in contact with the edible portion of the crop, including root crops	2.2/100 mL	" Secondary " Filtration " Disinfection

# RWPCA Permit Requirements Recycled Water



**Daily avg flow < 29.6 MGD**

**Constituent limits:**

<u>Constituent</u>	<u>Mean</u>	<u>Max</u>	<u>2008 avg</u>
- BOD5 (mg/L)	10	25	2.4
- Turbidity (NTU)	2	5	1.5
- Suspended Solids (mg/L)	10	25	3.5
- Settleable Solids (mL/L/hr)	--	0.1	< 0.1
- Total Dissolved Solids (mg/L)	--	1,500	859
- Total Coliform (MPN/100mL)	2.2	23	100% Compliance
	(Weekly Median)	(in no more than 1 sample/month)	

**MONITORING PROGRAM 2008**  
**Yellow – Irrigation Suitability**

**White – Food Safety**

**Tertiary Plant**

**DISTRIBUTION SYSTEM**

CONSTITUENTS	Recycled Water	Storage Pond	Supplemental Wells (21)	Monitoring Stations (9)	Turnouts (112)
Metals & Organics	Yearly	--	--	--	--
Agronomic & Salinity	Bi-Weekly	--	Yearly	--	--
TDS	Bi-Weekly	--	Yearly		
Specific Conductance	Daily	Daily	Yearly	Continuous	5/wk
pH	Daily	Daily	Yearly	Weekly	5/wk
Total Suspended Solids	Daily	--	--	--	--
Turbidity	Continuous	Daily	--	Weekly	--
Settleable Solids	Daily	Weekly	--	--	--
Total Organic Carbon	Weekly	--	--	--	--
BOD	Weekly	--	--	--	--
Chlorine Residual	Continuous	Continuous	--	Continuous	5/wk
Total Coliform	Daily	Daily	Monthly	Daily	2/wk
Fecal Coliform	Daily	Daily	--	Daily	2/wk
Generic <i>E. coli</i>	Daily	Daily	Monthly	Daily	2/wk
Total and Fecal Coliform (County Health)	--	Bi-Weekly			
Parasites & viruses	--	4/Yr	--	--	--
<i>Clostridium P.</i> (Co Health)		Bi-Weekly	--	--	--

# 2008

# RECYCLED WATER QUALITY

## Agronomic Water Quality\*

TDS	863 mg/L
SAR	4.8
pH	7.1
Chloride	257 mg/L
Sodium	171 mg/L
Total Nitrogen	38 mg/L

\* Grab samples

# CONCEPT TO SALAD BOWL

**DATA**

Prove its safe

**COMMUNICATION**

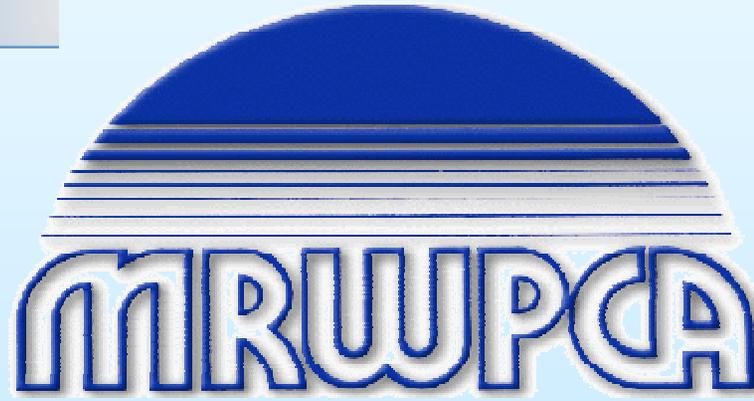
Get them to believe  
and trust.

**VALUE**

How can they say NO?

**CUSTOMER SERVICE**

Keep them happy



## *“Changing Wastewater To Safe Water”*

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