

RECLAMATION

Managing Water in the West

Funding & Control Activities for Invasive Mussels in LC Region Water Systems



U.S. Department of the Interior
Bureau of Reclamation

FUNDING LEVELS

- DEPARTMENT OF INTERIOR FY 2009 BUDGET REQUESTS \$63 MILLION FOR INVASIVE SPECIES ACTIVITIES PLANNED BY DEPARTMENTAL BUREAUS
- BUREAU OF RECLAMATION WILL SPEND \$1.5 MILLION ON RESEARCH ACTIVITIES RELATED TO MUSSEL IN FY 2009
 - HOOVER DAM HAS BUDGETED \$ 250K FOR MONITORING
 - YTD EXPENDITURES FOR LC REGION: \$254K
- OTHER BUREAU'S WITHIN INTERIOR:
 - U.S. GEOLOGICAL SURVEY \$2.9 MILLION FOR AQUATIC INVASIVE SPECIES, WITH APPROX. \$200k FOR ADDRESSING INVASIVE MUSSELS
 - FISH & WILDLIFE SERVICE IS SPENDING \$5.3 MILLION WITH \$1.8 MILLION OF THAT ON INVASIVE SPECIES SPENT ON WESTERN WATERS

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LOWER COLORADO REGION RESEARCH ACTIVITIES

- MONITORING SUBSTRATE
- INSTALLING BIOBOXES
- EVALUATING ANTI-FOUL COATINGS AND MATERIALS TO RESIST MUSSELS
- EVALUATING ULTRA-VIOLET LIGHT TREATMENT
- TESTING 50 & 100 MICRO FILTRATION SYSTEMS
- EVALUATION OF BACTERIUM TREATMENT
- EVALUATING TREATMENT ALTERNATIVES (CHEMICAL, THERMAL, BIOLOGICAL)
- IDENTIFYING AND EVALUATING WATER JETTING SYSTEM FOR EXTERIOR CLEANING
- USING UNDERWATER INSPECTION TECHNOLOGIES FOR MONITORING AND IDENTIFYING O&M REQUIREMENTS

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Davis Dam Penstock Gate Oct.07

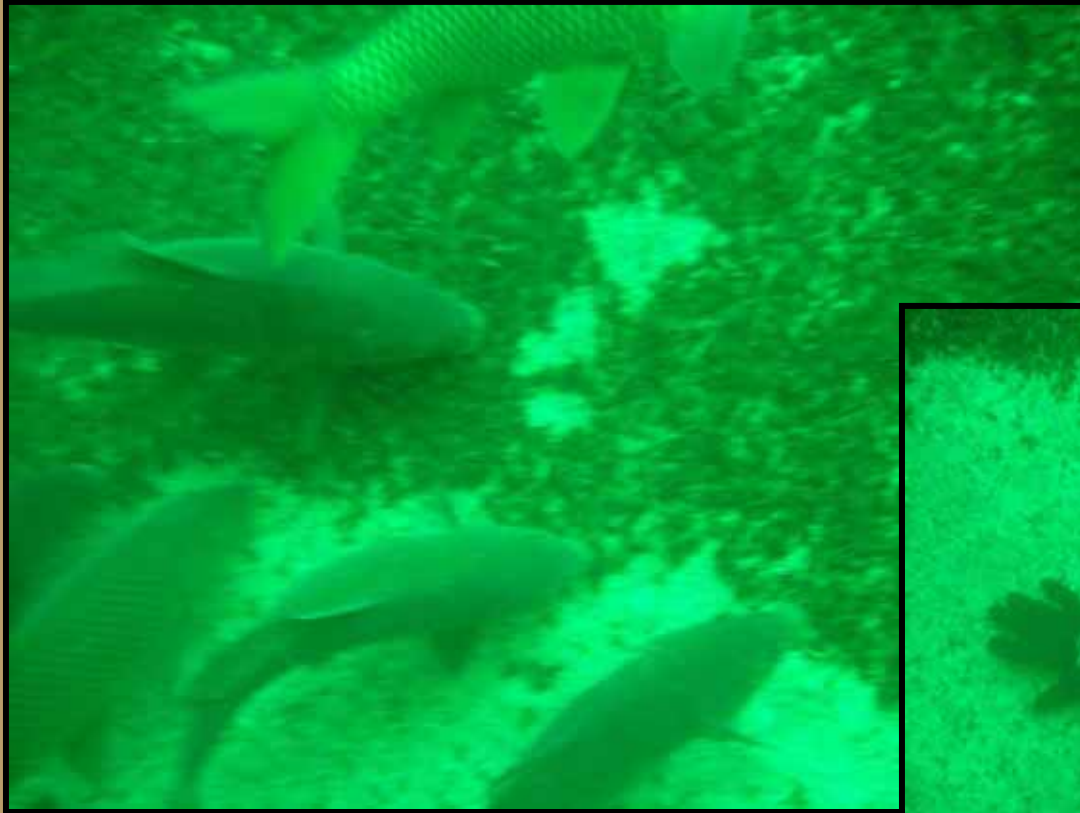


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**Drain hole plugged with
Quagga's**



Carp Feeding - Davis Dam



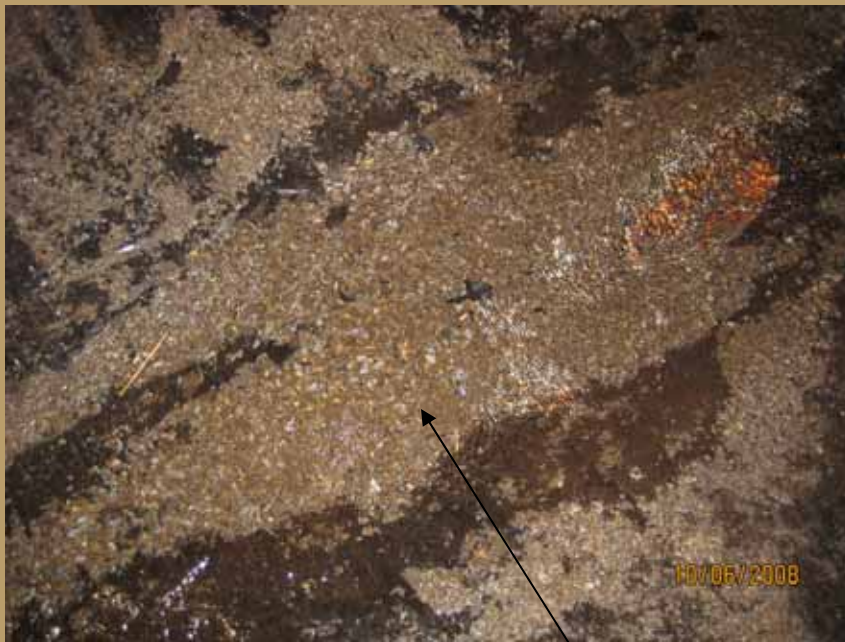
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Hoover Dam
N8 Cooling Water Supply Line
April 2008



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Shell Debris Inside Hoover Dam N4 Penstock – Oct 2008



Dead mussels' shells a couple inches deep in some areas on the bottom of the pipe

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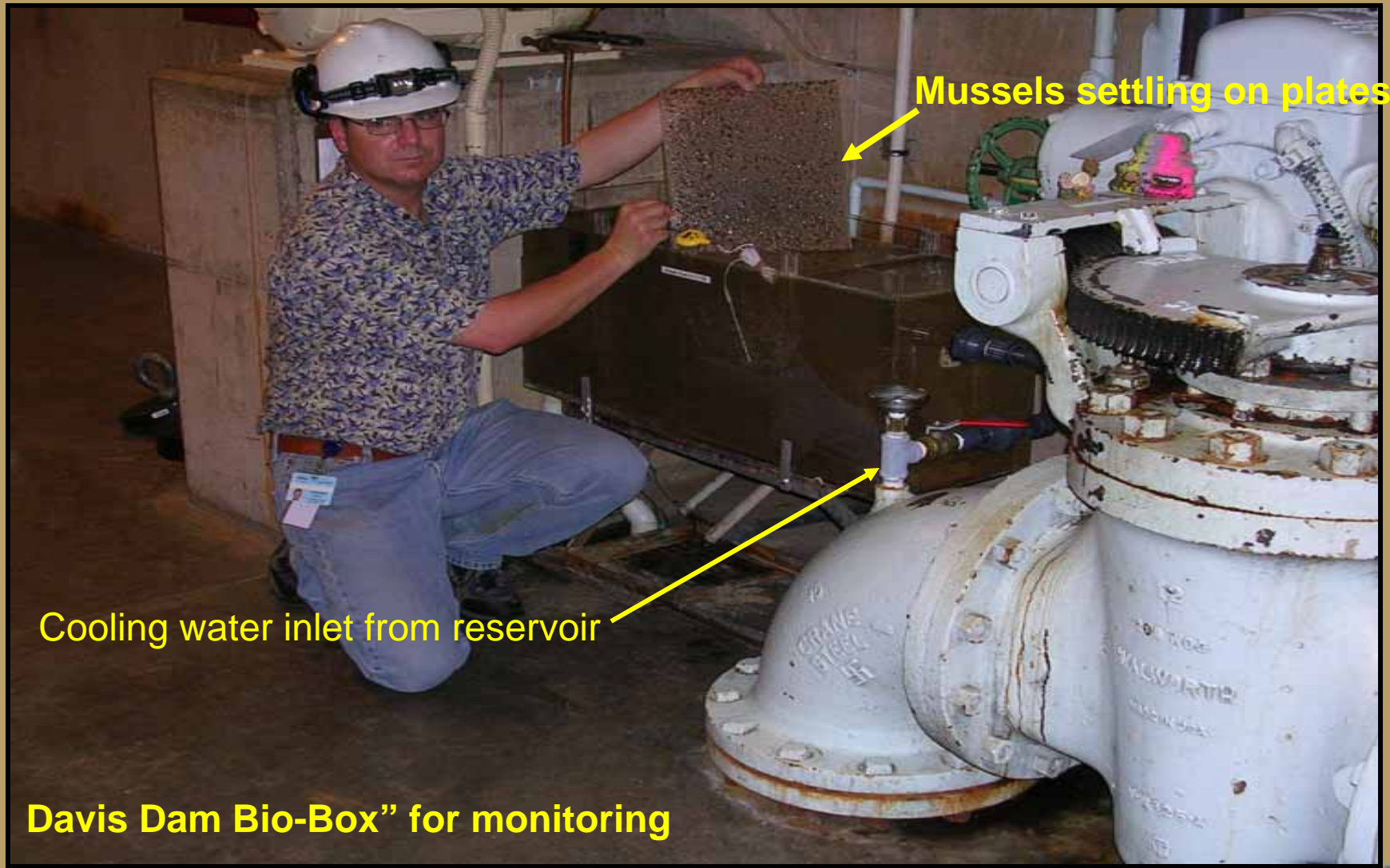


**CONTINUE
MONITORING USING
SETTLING PLATES**



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Installed Bio-Box Sampler for Plant Monitoring



Mussels settling on plates

Cooling water inlet from reservoir

Davis Dam Bio-Box" for monitoring

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ANTI-FOUL COATING RESEARCH – PARKER DAM

May 2008



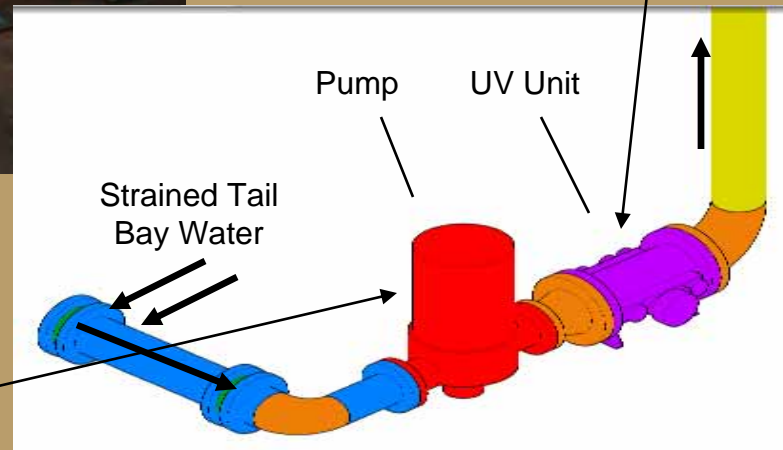
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Anti-fouling Panels – Parker Dam cont'd



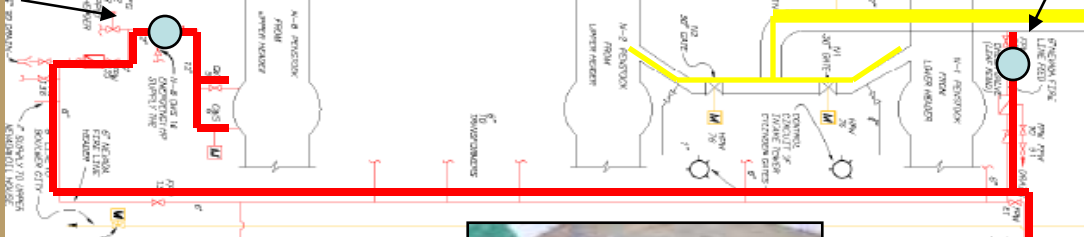
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Unit Cooling Water - Current Layout and New Design

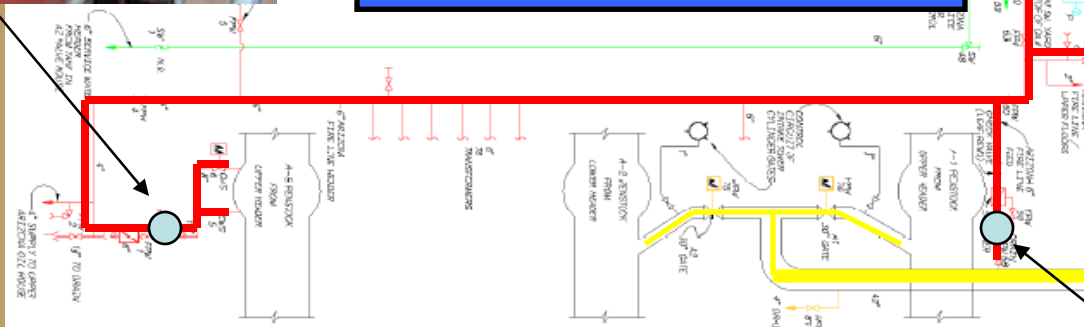
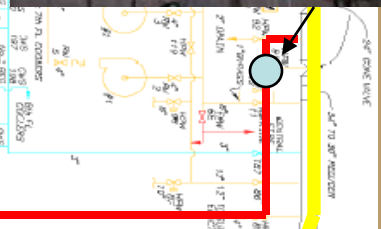
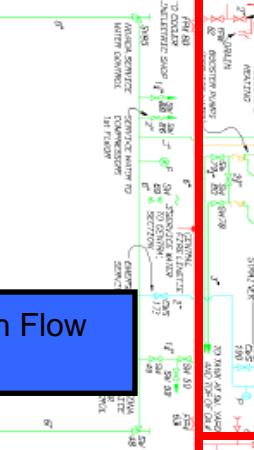


New design uses pumps using tail bay water supply instead of fore bay at Hoover Dam

Hoover Fire System (5) Water Supply Connections

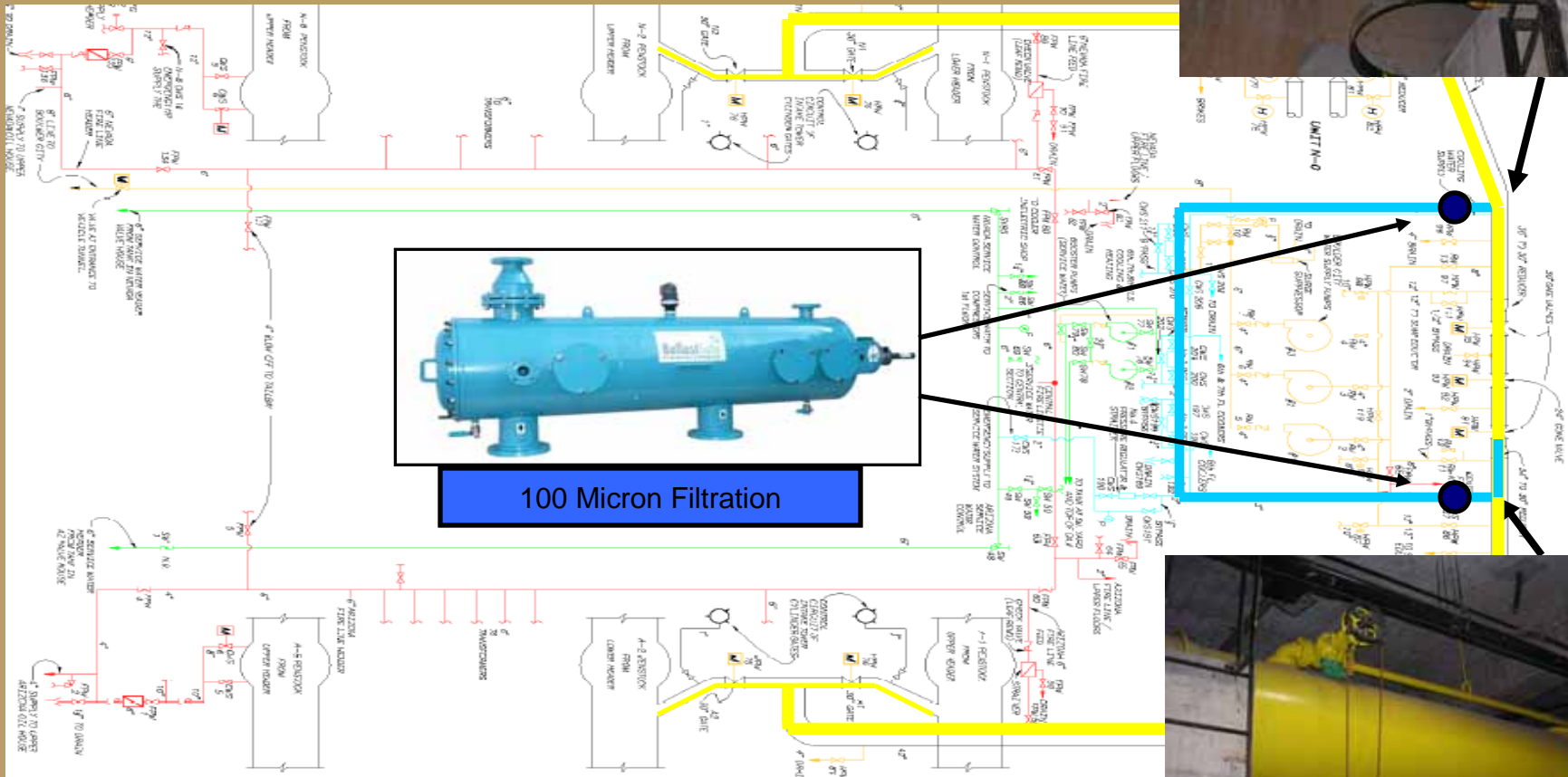


Medium Pressure UV Unit with Flow Sensor Switch



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Central Section Cooling Water Layout



100 Micron Filtration

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Initial Suggestions for Control

- Rapid Response Option (if settlement and shell transport increases dramatically and suddenly):

- Install portable chlorine skids to protect critical areas

Needs NPDES Permit or Emergency Approval from State Agency



- Use thermal treatment where possible

- 32°C for 48 hours (90° F)
- 40°C for 1 hour (104° F)

Use weak acids to dissolve shells and corrosion products

Mechanical cleaning as system performance deteriorates

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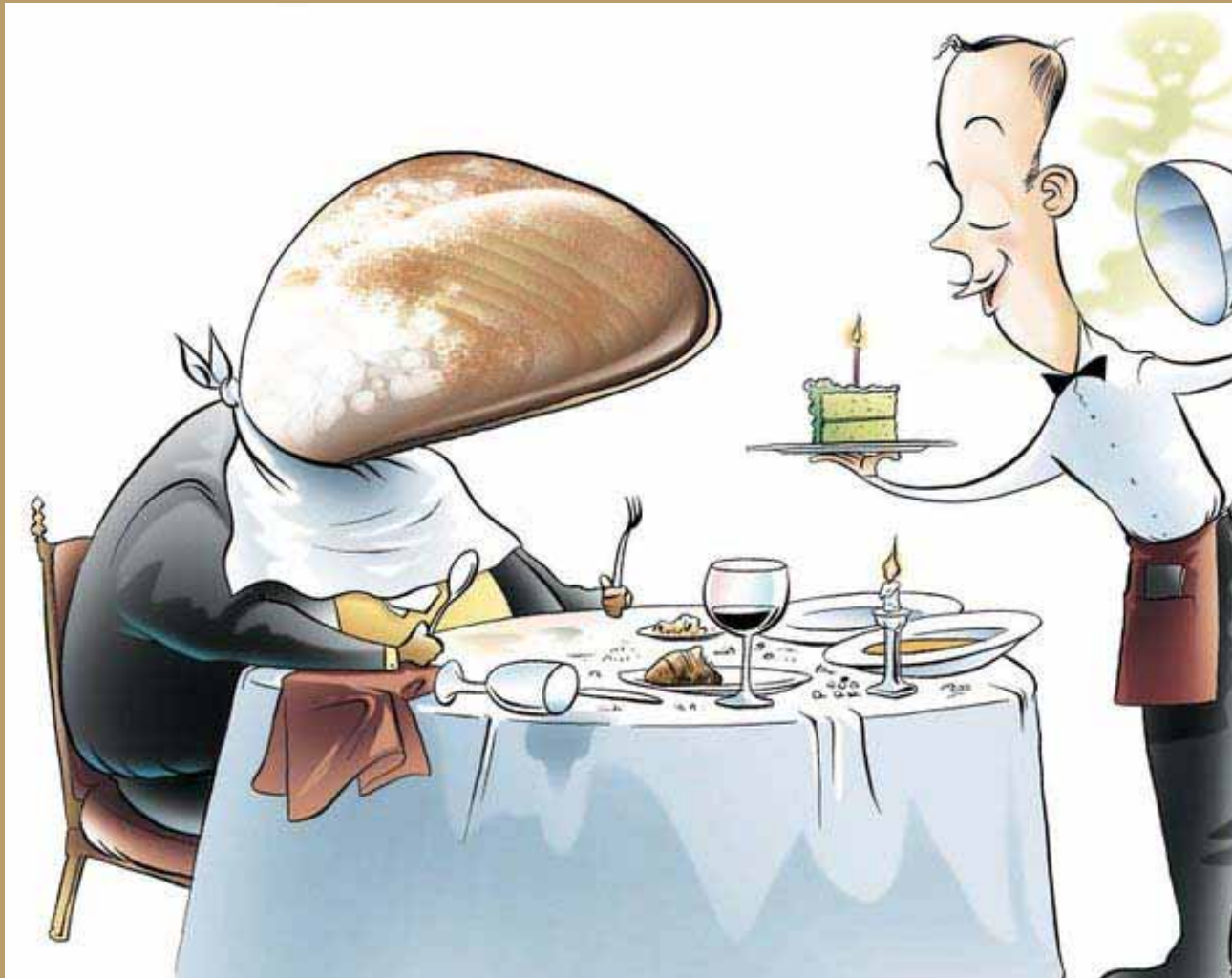
Oxidizing Chemical Treatment

- Chlorine
- Bromine
- Chlorine dioxide
- Chloramines
- Ozone
- Potassium permanganate



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Emerging Options – *Pseudomonas fluorescens*



Mussels' last meal - Scientists want to add bacteria that are lethal to invasive mollusks to water at Hoover or Davis dams

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Emerging Options

- Bacterial product (Developed at NY State Museum and commercially developed by Marrone Organic Innovations), zebra mussel specific chemical....being tested on Quagga now
- How does it work?

The bacteria produce natural compounds that kill the mussels when ingested. It destroys the mussels' digestive system.

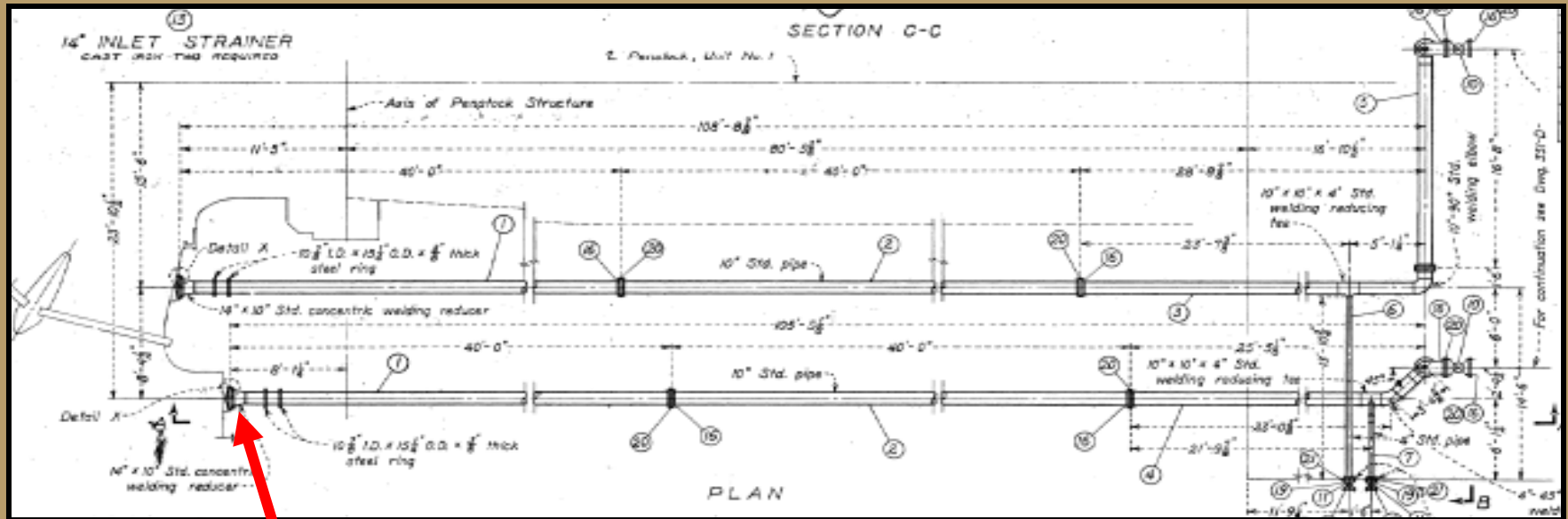


New York State Museum



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Domestic Intake – Davis Dam



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QUESTIONS

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