TREATMENT BMPS

HAVING DONE ALL – YET STILL HAVE DIRTY WATER!

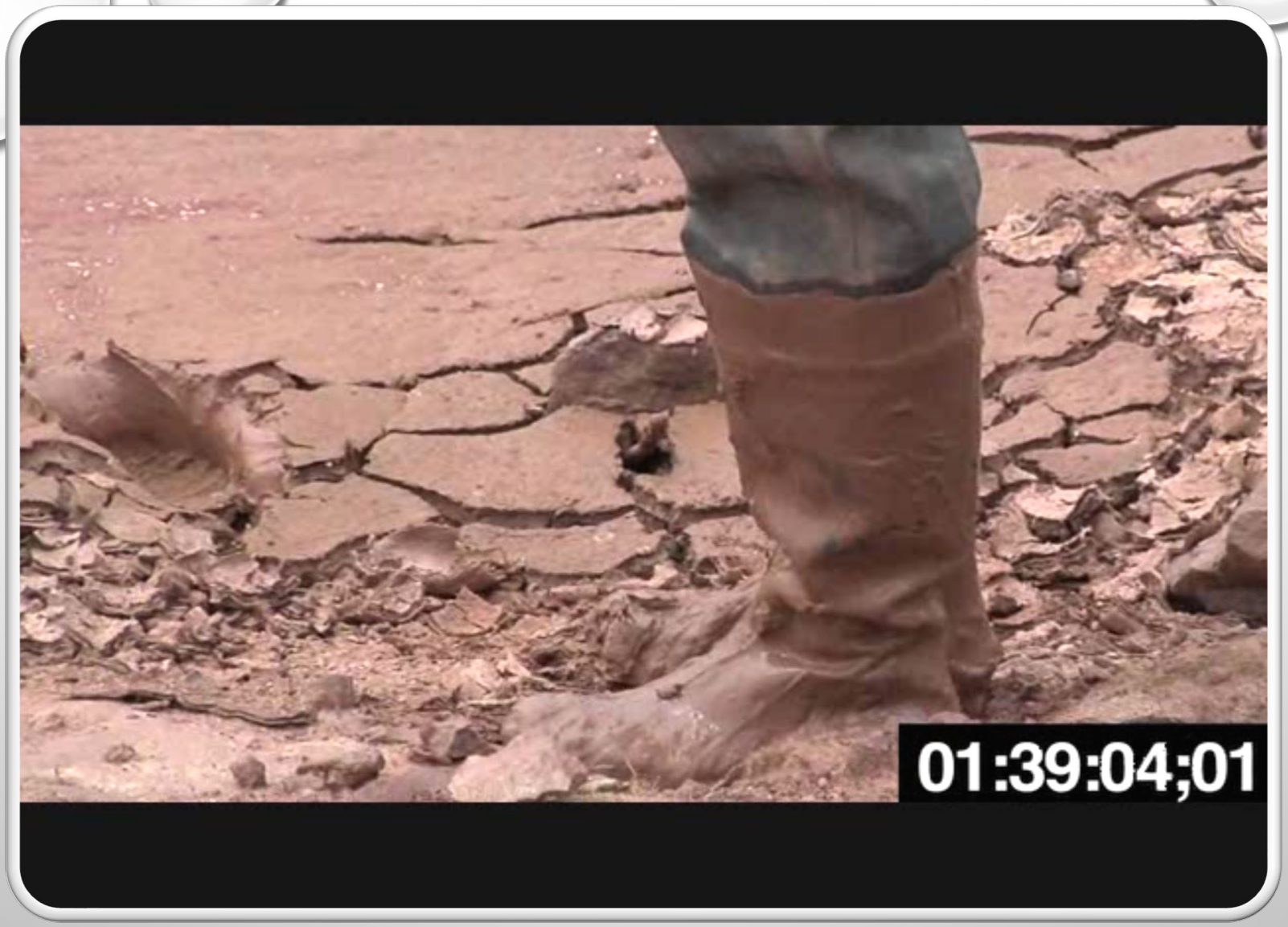
Section 6

WATER TREATMENT

Why would a project need water treatment?

Defining ATS & PTS

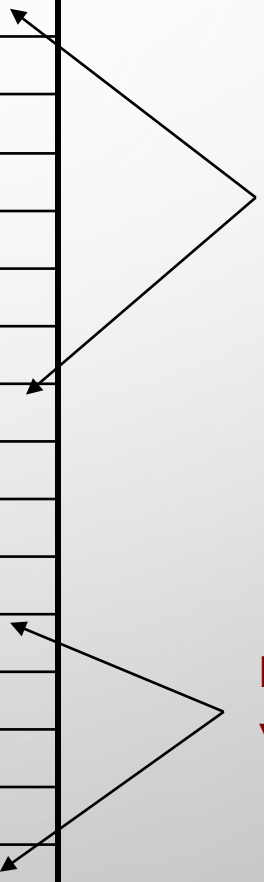
When is it applicable?



WHY TREATMENT IS OFTEN NEEDED

WHY ACTIVE TREATMENT IS OFTEN NECESSARY:

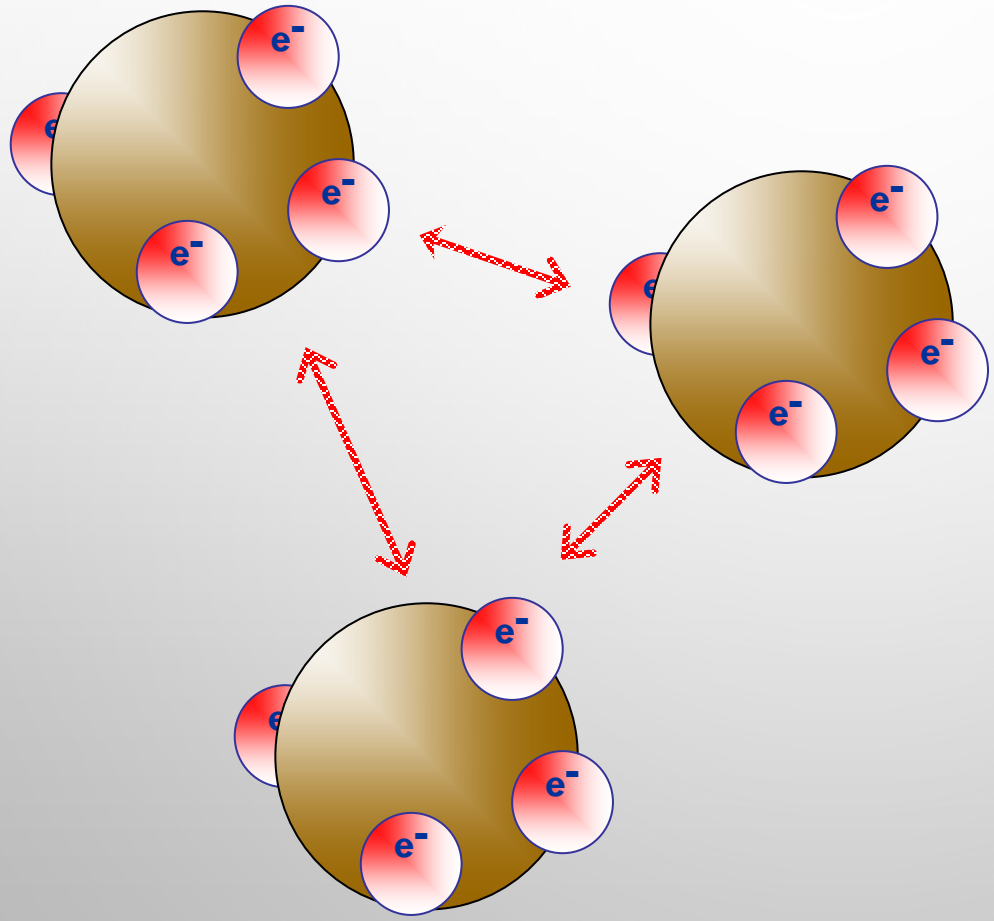
DESCRIPTION	SETTLING TIME
GRAVEL	1 SEC.
	9.8 SEC.
COARSE SAND	
	48 SEC.
FINE SAND	67 SEC.
	125 SEC.
	47.6 MIN.
SILT	107 MIN.
	7.2 HRS.
	20.1 HRS.
CLAY	
	180 HRS.
	754 DAYS
COLLOIDAL PARTICLES	207 YEARS



Sometimes soil particles will settle out quickly enough to achieve satisfactory discharge quality.

Frequently, however, they won't.

WHY FINE CLAYS AND COLLOIDAL PARTICLES DON'T SETTLE NATURALLY:

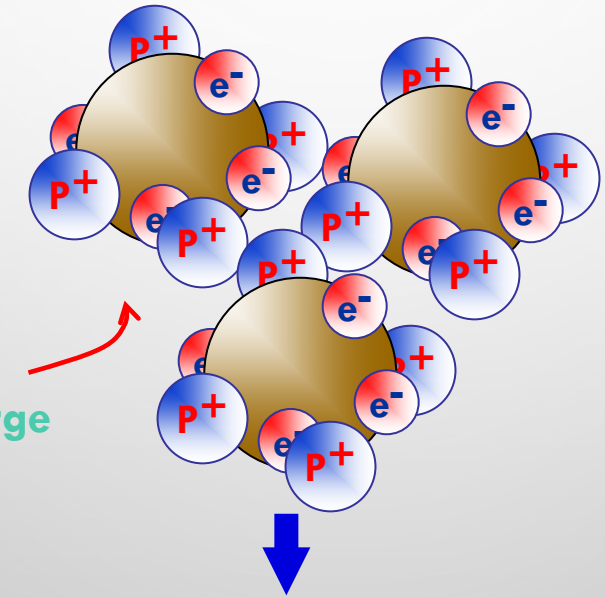


These small particles **remain suspended** in stormwater because of their repellent charges and small mass.

THE PROCESSES OF COAGULATION AND FLOCCULATION:

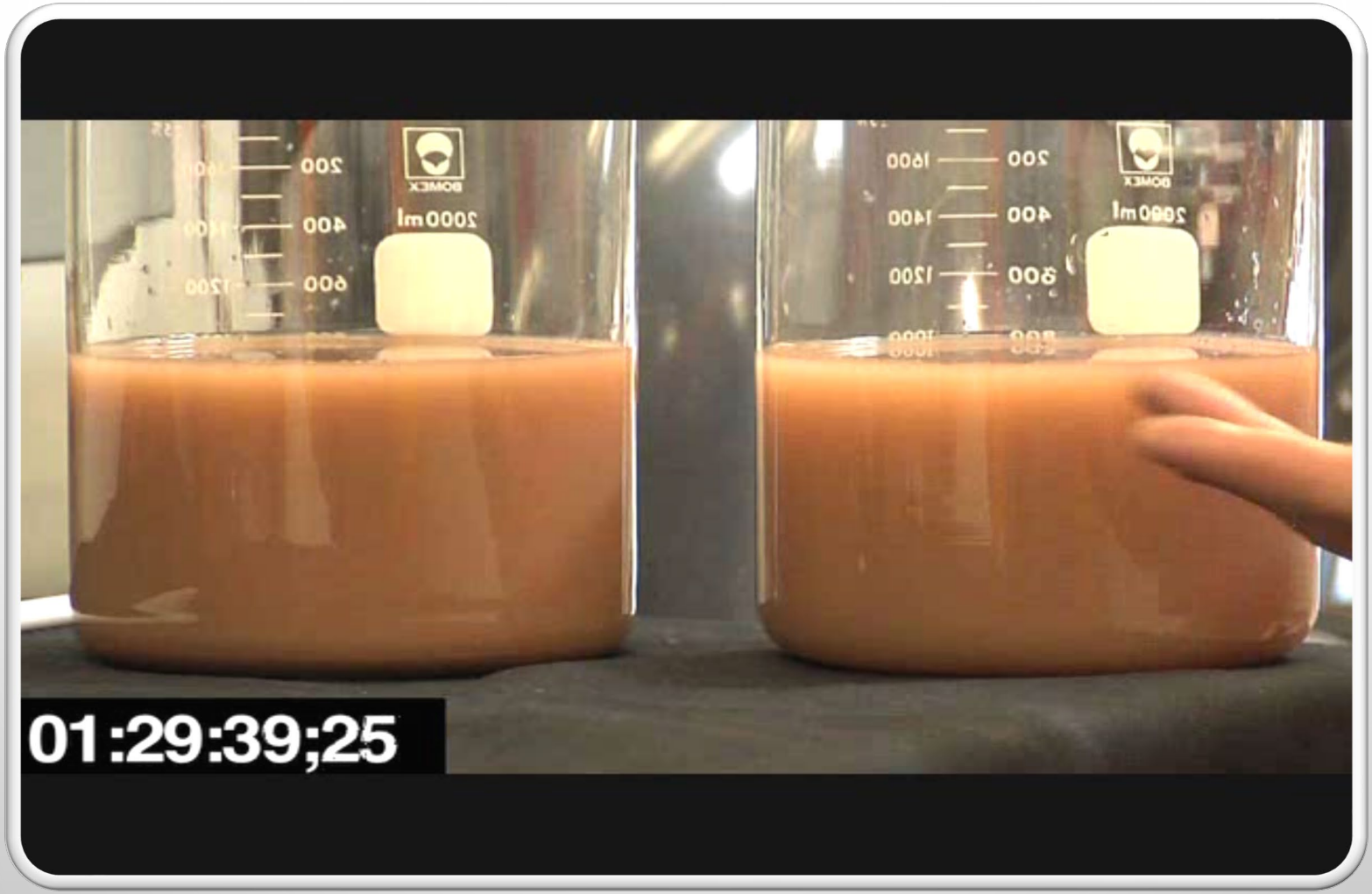
Add Coagulant

Neutralizes electrostatic charge



Flocculation

Once suspended particles are flocculated into larger particles, they can usually be removed from the liquid by settling, **filtering**, or centrifuging.



FLOCCULATION

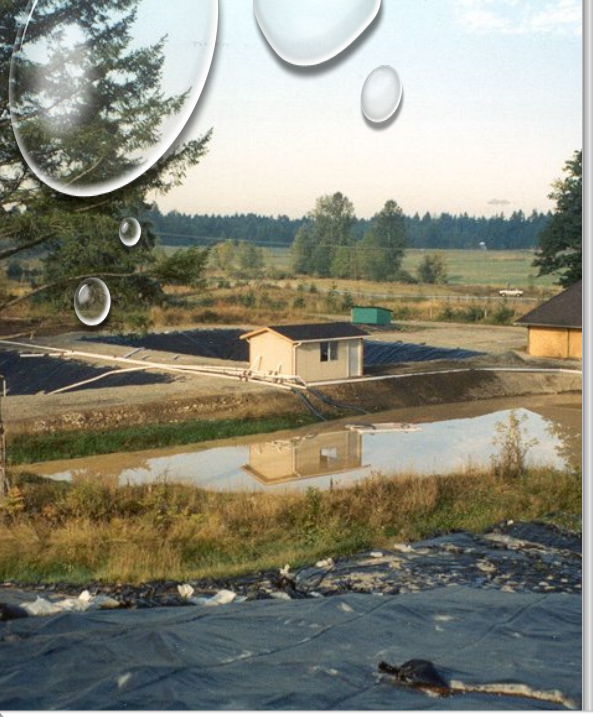
WATER TREATMENT

- **TYPES OF WATER TREATMENT**
  - BATCH TREATMENT (BMP C250)
  - CHITOSAN ENHANCED SAND FILTRATION (BMP C251)
  - ELECTRO-COAGULATION
- **THE PROCESSES**
  - COAGULATION
  - FLOCCULATION
  - CLARIFICATION
- **APPLICATION**
  - DOSAGE
  - PH

ADVANCED STORMWATER TREATMENT METHODS – ATS AND PTS

- PASSIVE TREATMENT - PTS
  - BATCH TREATMENT :
- VIA GRAVITY

- ACTIVE TREATMENT - ATS
  - FLOW-THROUGH TREATMENT:
- FILTERED



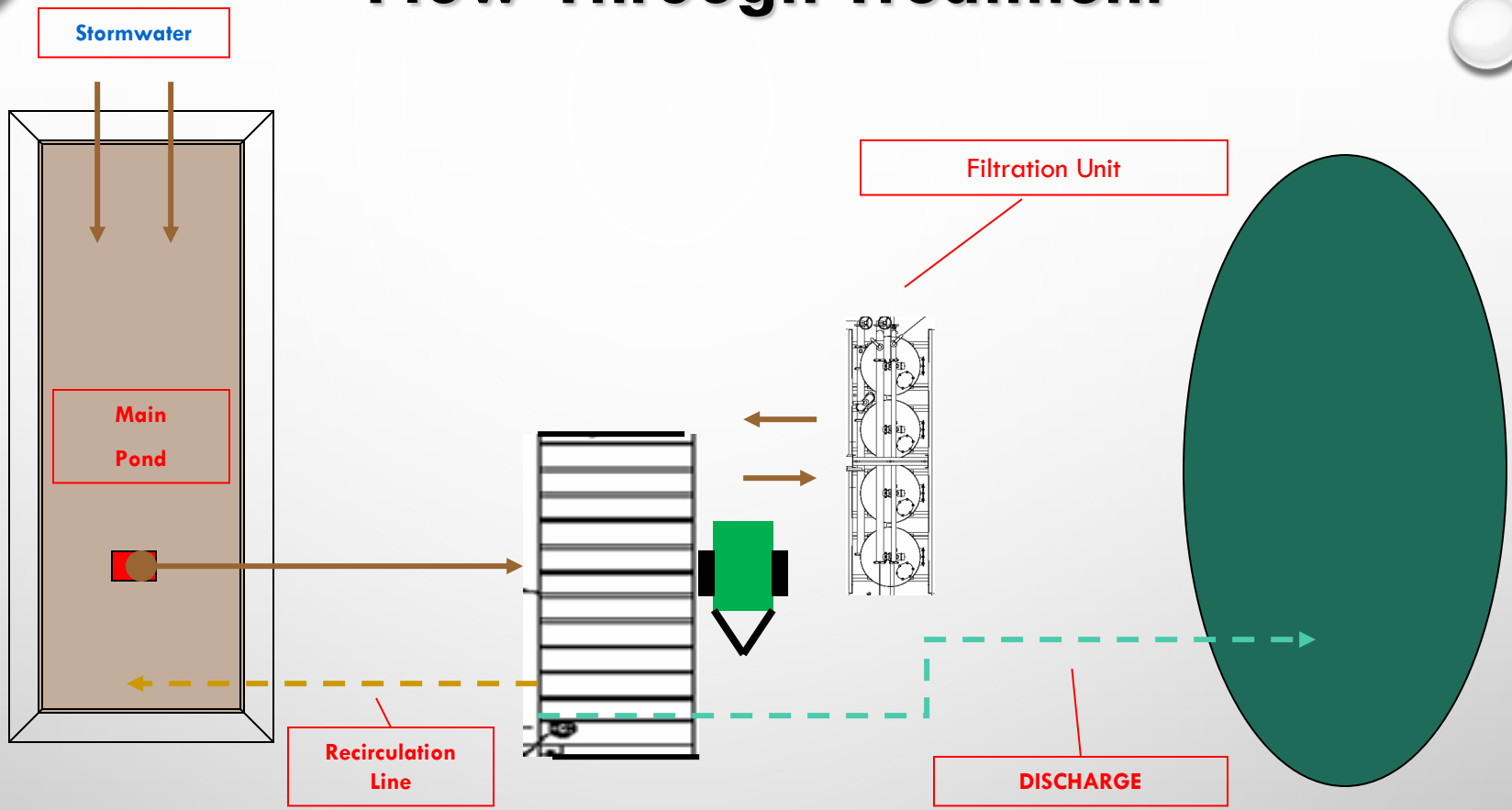
BATCH TREATMENT

- WATER IS TREATED AS A "BATCH" TO APPROPRIATE LEVELS AND THEN DISCHARGED ALL AT ONCE

- EFFECTIVE
- **TAKES LARGE FOOTPRINT**
- TAKES TIME

LARGE BATCH SYSTEM

Flow-Through Treatment



1. Water is pumped from a collection point
2. The pollutant is floc'd by chemical or current
3. The water passes through filtration media
4. Water is discharged or re-circulated

ATS Technologies–

- FLOW THROUGH ATS TECHNOLOGIES

- **Electrocoagulation**
- **Cartridge Filtration**
- **Chitosan Enhanced Sand Filtration (CESF)**

GENERAL USE DESIGNATION GULD FOCUS – C250

- DISCHARGE BENCHMARKS
  - 10 NTU, 5 NTU OVER BACKGROUND, 25 NTU MAX
  - PH: 6.5 – 8.5
- DOSE RATES
  - PRE TREAT > 600 NTU
  - 50-600 NTU; PRE-TREAT AND FILTER COMBINED DOSE RATE 1.0 PPM MAX
  - DO NOT EXCEED 1.0 PPM TO FILTER
  - RE-CALIBRATE CHEMICAL DELIVERY IF WATER QUALITY CHANGES BY 20% OR MORE
- RESIDUAL CHITOSAN TESTING FREQUENCY
  - FIRST ½ HOUR OF DISCHARGE, 2 HOURS AFTER AND WHENEVER WATER QUALITY CHANGES BY 20% OR MORE
- DESIGN CRITERIA


ELITE
TRAILERS
AIRMAN
60


GRAHAM

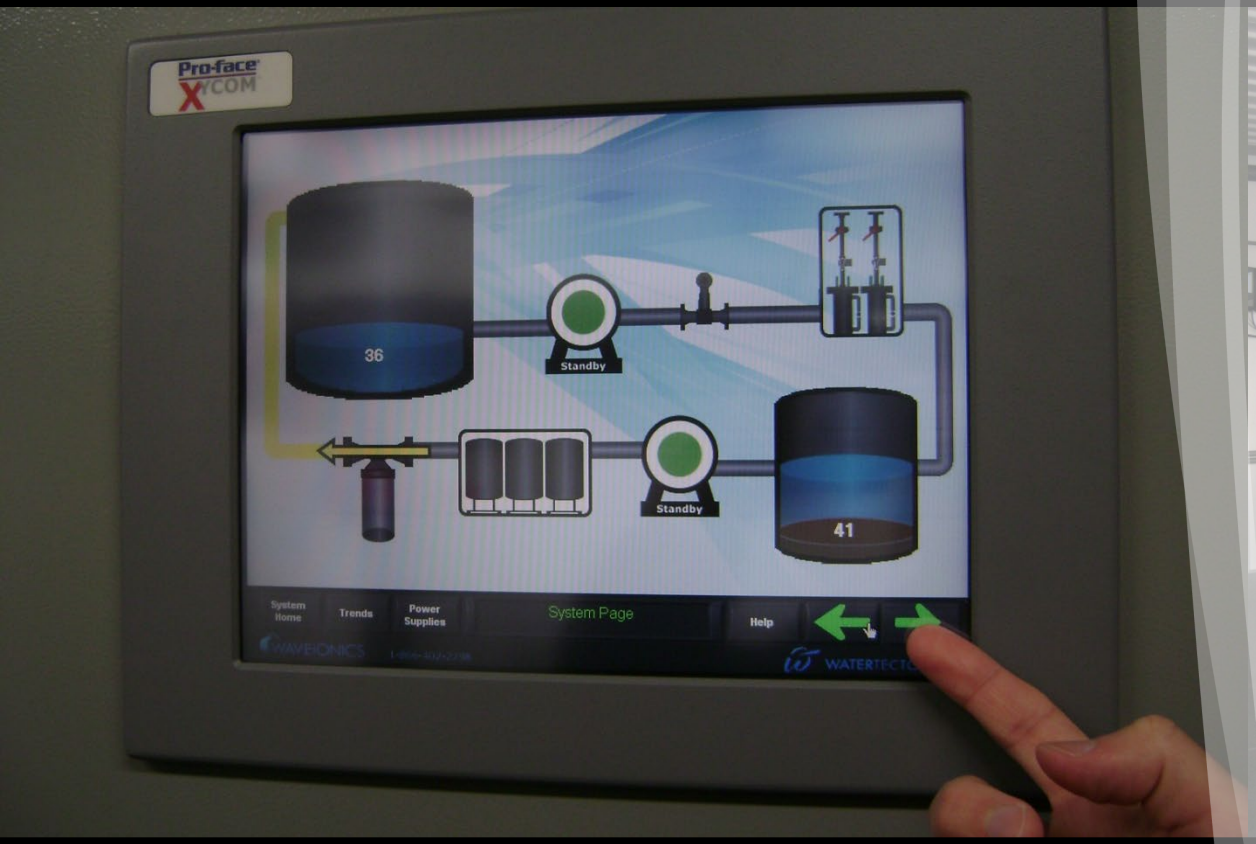
ELECTRO-COAGULATION

Destabilization of suspended contaminants by introducing an electrical current.

Contact with the current causes the suspended and/or dissolved solids in that water to form into a floc or precipitate of sufficient size that it can be rapidly removed from the liquid by filtration.

ELECTROCOAGULATION

WAVEIONICS™



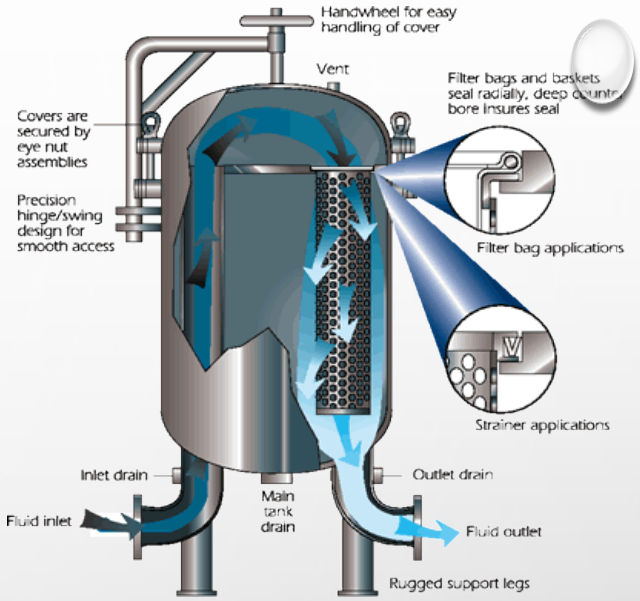
TWO APPLICATIONS OF CHEMICAL TREATMENT

PASSIVE DOSING

LIQUID INJECTION

PRETREATMENT STORAGE SUPPORTS CONSISTENT TREATMENT

CARTRIDGE FILTRATION



- CAN BE DONE WITH OR WITHOUT CHEMISTRY BUT STRUGGLES WITHOUT.

- **MEDIA CAN BE VERY TARGET SPECIFIC**
- **GOOD IN LOW FLOW SITUATIONS**
- **SMALL FOOTPRINT**
- FILTER BLINDING
- **MEDIA AND FLOCCULANT MATCHING**
- MEDIA REPLACEMENT

- Versatile and Adaptable to Different Soil Types
- Extremely Low Turbidities at High Flow Rates
- Controlled Dosing
- Sand Filters Can Crash
- Footprint
- Treatability Conflicts

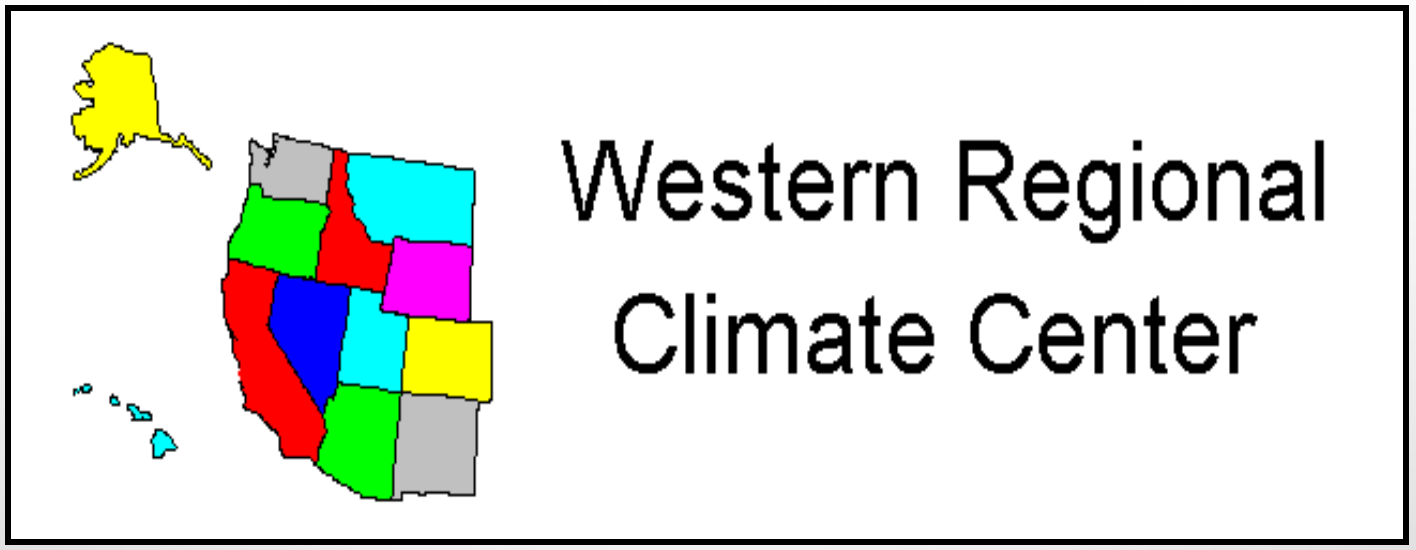
CONSIDERATIONS FOR TREATMENT SELECTION

- SIZING, STORAGE, SYSTEM FOOTPRINT/LAYOUT
- SCALED/PHASED TREATMENT OPTIONS
- SYSTEM AUTOMATION (RISK VS. REWARD BALANCE)
- MEDIA SELECTION:
  - RESIDENCE TIME VS. CONTAMINANT LOADING & DISCHARGE TARGETS
  - ANTICIPATED CHANGE OUT FREQUENCY, LEAD TIME, DOWN TIME
  - LEAD/LAG IN SERIES VS. PARALLEL FLOW
- SYSTEM REDUNDANCY & CONTINGENCY OPTIONS
- COMMINGLED OR SEGREGATED WASTE STREAMS
  - STORMWATER, GROUNDWATER, PROCESS WATER
- DEWATERING, COLLECTION & CONVEYANCE METHODS
- MULTIPLE DISCHARGE LOCATIONS & RECEIVING WATERS
  - SURFACE WATER DISCHARGE
  - SANITARY DISCHARGE

1. SITE CONSIDERATIONS

- SOIL TYPE
- POTENTIAL POLLUTANT(S)
- ALLOWABLE FOOTPRINT FOR EQUIPMENT AND WATER STORAGE
- PROJECT START DATE

2. PRECIPITATION & SYSTEM SIZING



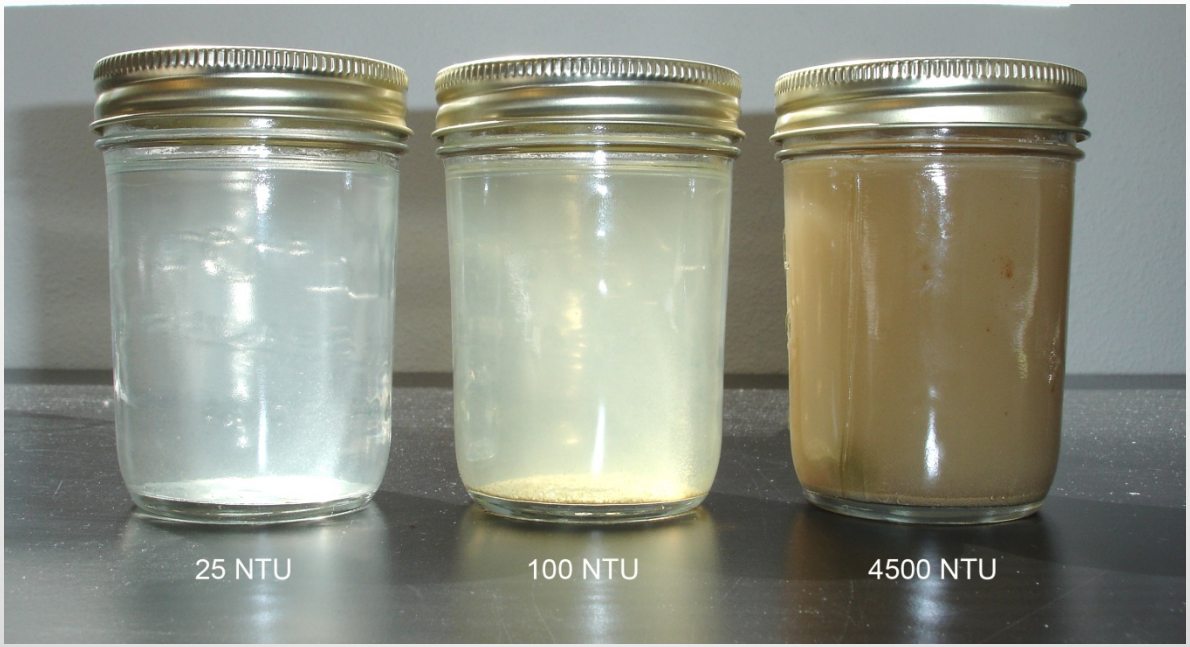
- **DRAINAGE (HISTORICAL RAIN VOLUME, FLOW RATE, ETC.)**
- **TOTAL VS. INTENSITY**
- **MINIMUM STORAGE VOLUME**
- **2 YEAR – 6 HOUR EVENT <+*PRETREATMENT*>**

3. DISCHARGE



- **RECEIVING WATER**
- **303(D) & SENSITIVE HABITAT**
- **STORM SEWER VS. SURFACE DISCHARGE**

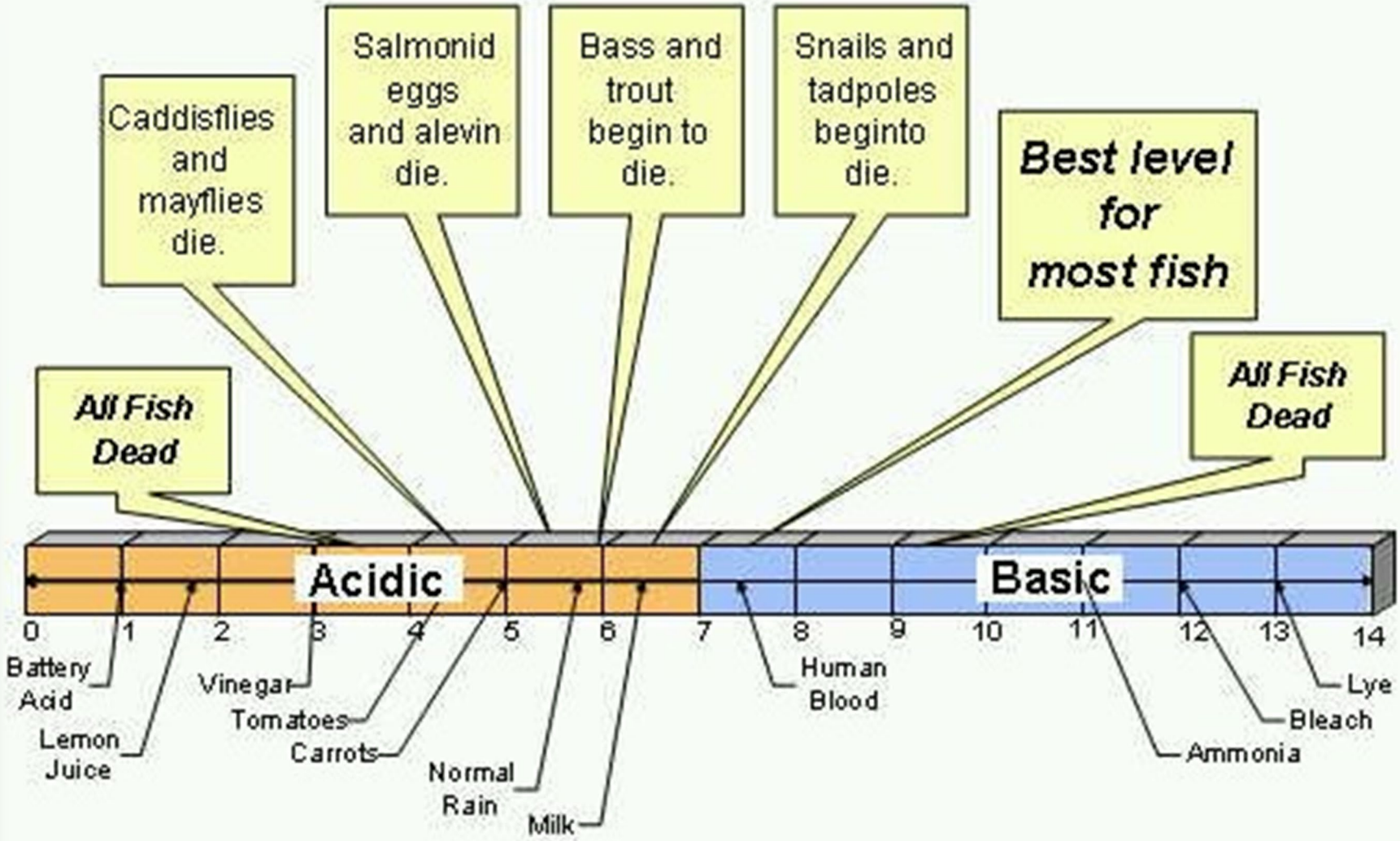
4. CHEMISTRY



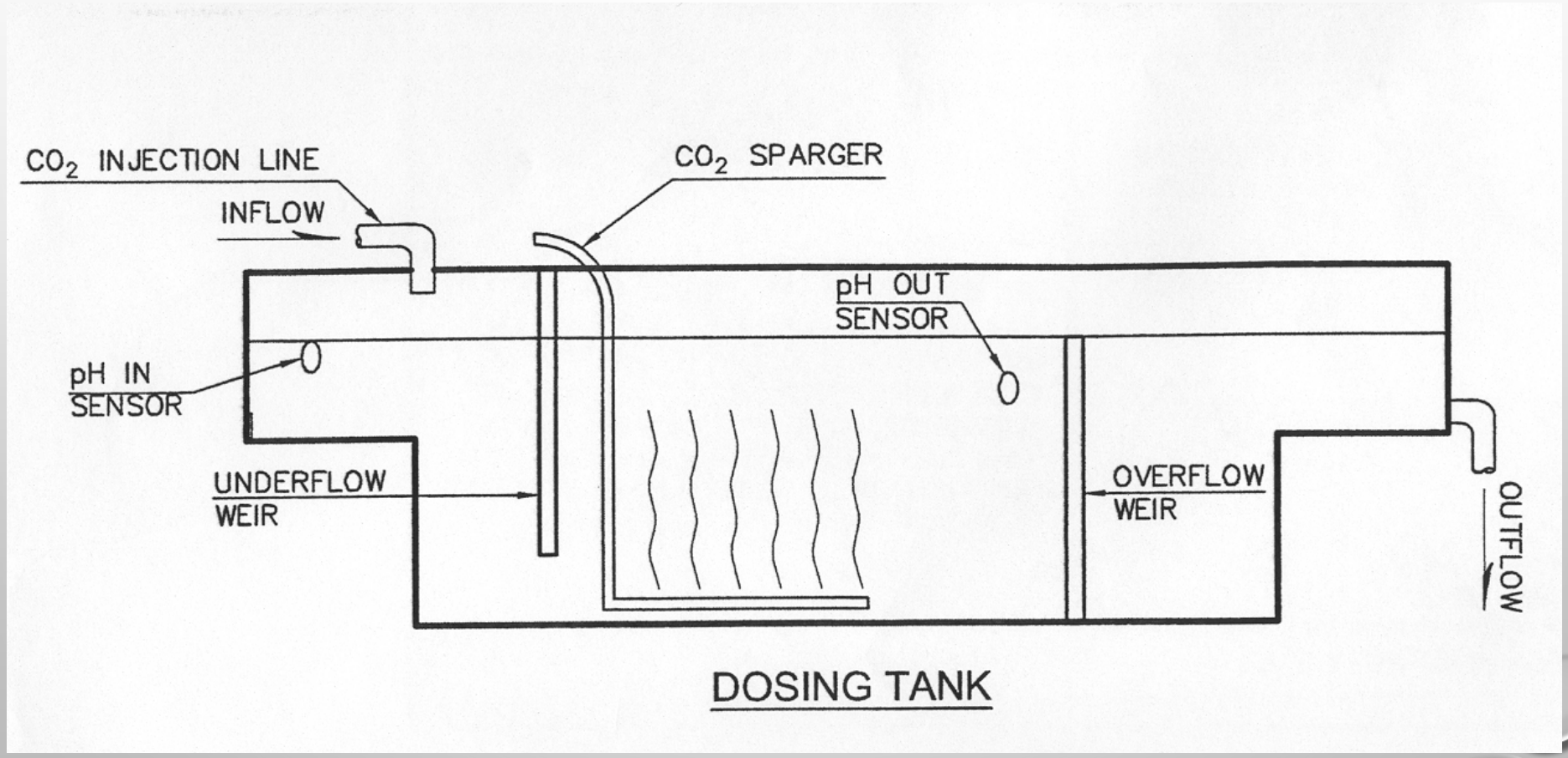
- TREATABILITY
- "APPROVED" CHEMISTRY
- USE DESIGNATION - DOSING
- RESIDUAL

PH = NONVISIBLE POLLUTANT

PH & AQUATIC LIFE

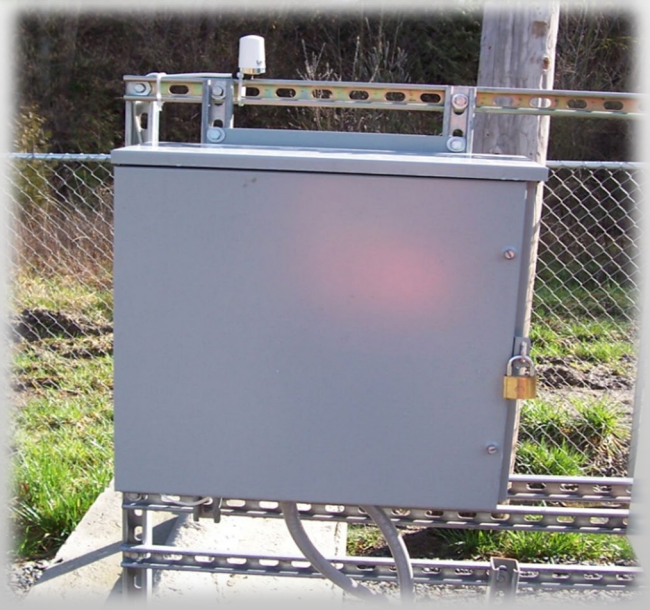


HIGH PH NEUTRALIZATION USING CO2 BMP C252



NEUTRALIZATION SYSTEMS

NEUTRALIZATION SYSTEMS



IMPLEMENTATION REQUIREMENTS FOR WATER TREATMENT

Address in SEPA documentation

Address in NOI

Prepare a SWPPP

Submit Chemical Treatment Request Form

General Use Designation (GULD)

- Monitoring
- Reporting
- Record keeping

CHEMICAL TREATMENT MONITORING

Required Monitoring

- pH, conductivity, turbidity, and temperature of untreated water
- pH, turbidity, and toxicity of treated water and receiving water
- Total volume treated and discharged, discharge time and flow rate
- Type and amount of chemical used for pH adjustment
- Amount of polymer used
- Settling time

Test results recorded in a daily log kept on site

COST INFLUENCES ON TREATMENT

Site conditions

- Project size
- Soil type

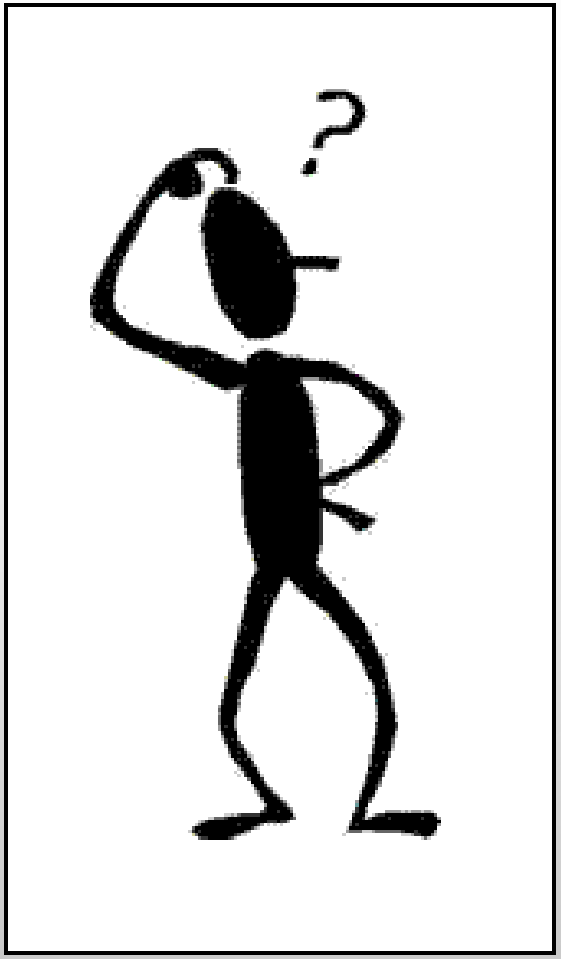
Factors influencing costs

- Phasing of project
- Receiving waters for discharge
- Other pollutants (i.e. pH, arsenic, petroleum products)
- Treatability of stormwater

OTHER CONSIDERATIONS

- In-field Service: Contractors self perform vs. service companies
- Potential chemistry conflicts – ex. Wheel Wash
- Filtration media conflicts – ex. PAM and sand

SELECTING BMPS



BMPS $AVE MONEY

Fully implementing BMPs at all levels (design, operations, physical) is the easiest way to minimize costs.

All parties (from design through construction) must understand the variables, and what actions they can take to minimize costs;

HOWEVER, All parties must also understand that actual costs will be affected by some variables outside of their control:

- Actual rainfall
- Off-site activities by others
- Unanticipated soil characteristics
- Ongoing changes in regulatory requirements.

BMP SELECTION ENVIRONMENTAL CONSIDERATIONS

#1 - Protect the environment and water quality

BMPs should outlast longest schedule and the worst storm

Consider project duration

Wastes generated must be considered

Biodegradable vs. solid waste	Media Disposal and Replacement	Sludge – Contamination and Land application

BMP SELECTION
ECONOMIC CONSIDERATIONS

Save time and money and reduce the likelihood of penalties

Minimize interruption in operations and decrease costs of repairing damage caused by erosion

Proper installation and maintenance can help control costs of replacing BMPs

Look at both long and short term cost

BMP SELECTION OTHER CONSIDERATIONS

May require multiple BMPs to achieve an outcome

Soils, climate, topography and duration of use must be examined prior to ground breaking (BMP Planning).

It may not be appropriate to use a certain BMP once all variables are factored in.

PRIORITIZING ESC FOR CONSTRUCTION SITES

Pratice	Cost
Limiting disturbed areas through **phasing**	$
Protecting disturbed areas through **mulching and revegetation**	$ $
Installing diversion around disturbed areas	$ $ $
Sediment removal through **detention** of all site drainage	$ $ $ $
Other **structural controls** to treat sediment-laden flow	$ $ $ $ $

Adapted from KY ESC Field Manual

PRODUCT PERFORMANCE IS AFFECTED BY:

- SLOPE STEEPNESS AND LENGTH
- SOIL TYPE
- SEASON
- DIRECTIONAL EXPOSURE
- CHANGING WEATHER CONDITIONS
- QUALITY OF INSTALLATION

BMP SELECTION REMINDERS

Plan ahead!

- Design project and BMPs specific to the site conditions
- Minimize erosion potential from Day 1.

Timing

- Complete projects in phases
- Don't expose soil in rainy season if possible

Take time for proper installation & maintenance of BMPs

BREAK