Succession Planning with High School Graduates

OEPA-B13338-X

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OTCO N.E. Coordinator

Compliance Workshop

October 17, 2019

Succession Planning

About Me

OTCO and NEORSD

Teaching Water & Wastewater Treatment to “Newbie's”

Success Stories

Aging Workforce

73% of operators with **wastewater** certificates received their certificates in the last 30 years

81% of operators with **water** certificates received their certificates in the last 30 years

47% of **wastewater** operators received their certificates in the last 20 years

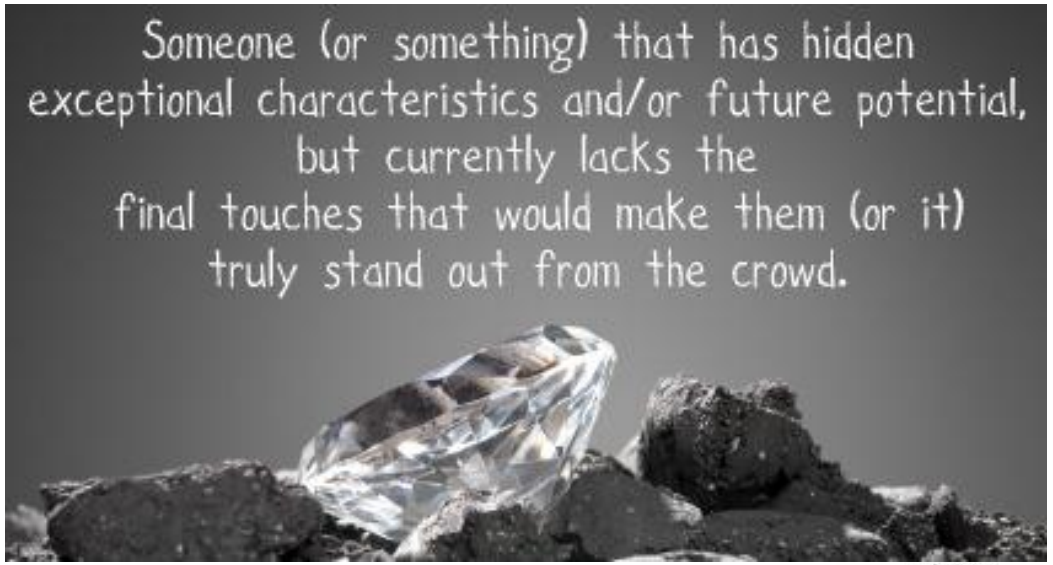
55% of **water** operators received their certificates in the last 20 years

Nationwide need to Replace the Baby Boomers

Education is the Key

Unleashing The Power Of The Hidden Workforce

Find the Diamonds In The Rough



US Department of Labor

SOC 51-8031

"Water and Liquid Waste Treatment Plant and Systems Operators"

20% National

10% Ohio

$18.46 Medium

New Industry-Recognized Credentials for 2019-2020

Ohio Department of Education, with the Governor's Office of Workforce Transformation

Prompted by passage of Ohio House Bill 49

Graduation Requirements: Students need 18 points

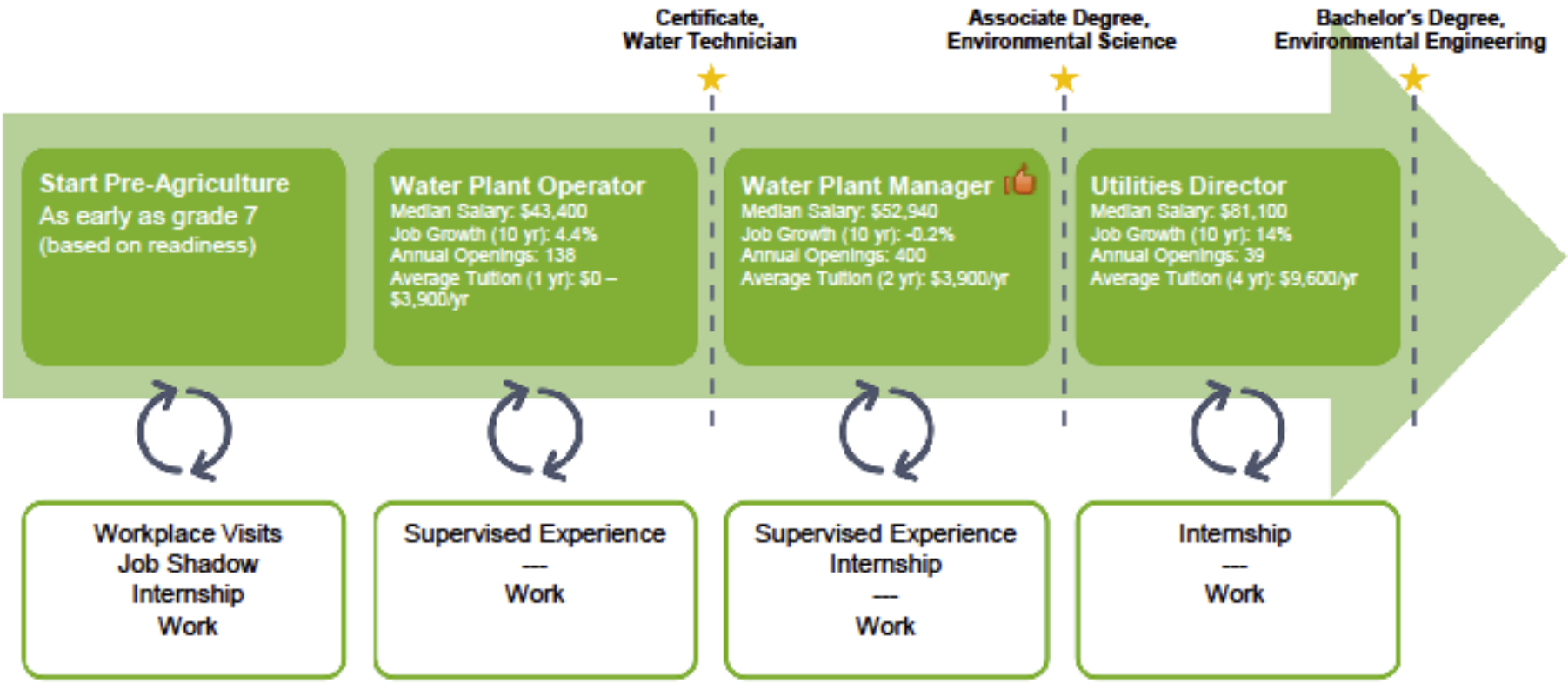
- Earn a total score of Proficient or better based on all career-technical exams or test modules;
- Earn an industry-recognized credential or credentials that equal 12 points;
- Complete a workplace experience totaling 250 hours with evidence of positive evaluations.

Lieutenant Governor (Task Force) in Marietta

LG Jon Husted with Jarrod of Building Bridges

Career Field	Credential Name	Credential Vendor	Point Value
Agriculture	Ohio EPA Professional Class A Wastewater Operator OIT (Operator In Training)	Operator Training Committee of Ohio (OTCO)	12
Agriculture	Ohio EPA Professional Class A Water Operator OIT (Operator In Training)	Operator Training Committee of Ohio (OTCO)	12
Agriculture	Ohio EPA Professional Class I Wastewater Operator OIT (Operator In Training)	Operator Training Committee of Ohio (OTCO)	12
Agriculture	Ohio EPA Professional Class I Water Operator OIT (Operator In Training)	Operator Training Committee of Ohio (OTCO)	12

Agriculture and Environmental Systems Career Pathway



Provided by middle schools, high schools, employers, Ohio Tech Centers, and colleges.

Preparing students for multiple options after high school:
gainful employment and/or postsecondary study.

Ohio In-demand Occupations

OTCO

STUDENTS

Coach Ginn
Ms Belle

NEORSD

Ms. Hazel Parker and Mr. Ted Ginn of Ginn Academy

Ms. Jacqueline Bell, Principal Glenville HS

Kindle Fire vs. Textbooks

OTCO Class A Water/Wastewater Training

Objectives:

1) To educate and train students on the basics of water/wastewater treatment.

2) To educate and train students on Ohio EPA regulations regarding Class A to Class IV Water/Wastewater Treatment Systems.

3) To educate and prepare students for interviews with potential employers

OTCO Class A Wastewater Training

Class #	Date	Class and Book	Assignment	Points	Due by 4:00 PM
1	3/14/18	OEPA Class A WW Training	Introduction & Basic Treatment Units: page 1-10 & On-Line Quiz TAG 1	25	19-Mar
		OEPA Class A WW Training			
2	3/21/18	OEPA Class A WW Training	Basic Treatment Units page 11-20 On-line Quiz TAG 2	25	26-Mar
3	Spring Break	OEPA Class A WW Training	Basic Treatment Units page 21- 29 On-Line Quiz TAG 3	25	2-Apr
4	4/5/18	OEPA Class A WW Training	Controlling the Units page 30-57 On-Line Quiz TAG 4	25	9-Apr
5	4/11/18	OEPA Class A WW Training	Maintenance page 110-136 On-Line Quiz TAG 5	25	16-Apr
6	4/18/18	Powerpoint	GIS GPS Asset Management	25	23-Apr
7	4/25/18	Catch up, summary, lab	FINAL CLASSROOM	25	30-Apr
			Homework Maximum Points (80% minimum= 140 points)	**175**	
			Attendance Maximum Points (80% minimum = 7.2 points)	**9**	

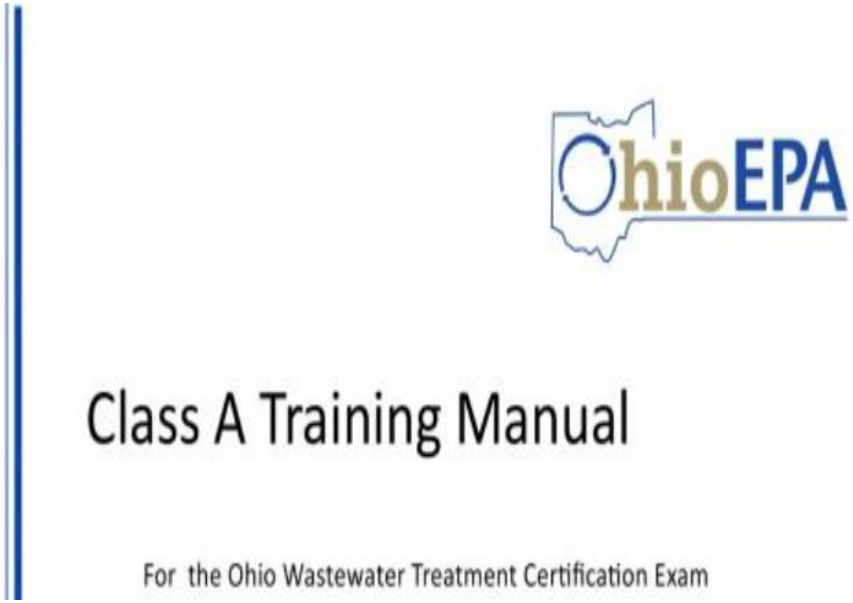
Online Exam for Students

You have 120 minutes to take this exam with two attempts. If you are familiar with the reading assignments, you should be able to complete the exam within 60 minutes with time to review your selections.

Ann\'s Wastewater Ohio EPA: Intro & Basic Units Quiz (Y.O.U.)

79 Questions

120 Minutes



OTCO Class A Water/Wastewater Training

How much time should I spent as a minimum

1.5 classroom hours = 4.5 homework hours

9.0 hours classroom = 27.0 hours homework

Equals 4.5 hours per week

9.0 classroom + 27.0 homework = 36 Total Hours

OTCO Class A Water/Wastewater Training

OTCO Class A Water/Wastewater Training

OTCO Class A Water/Wastewater Training

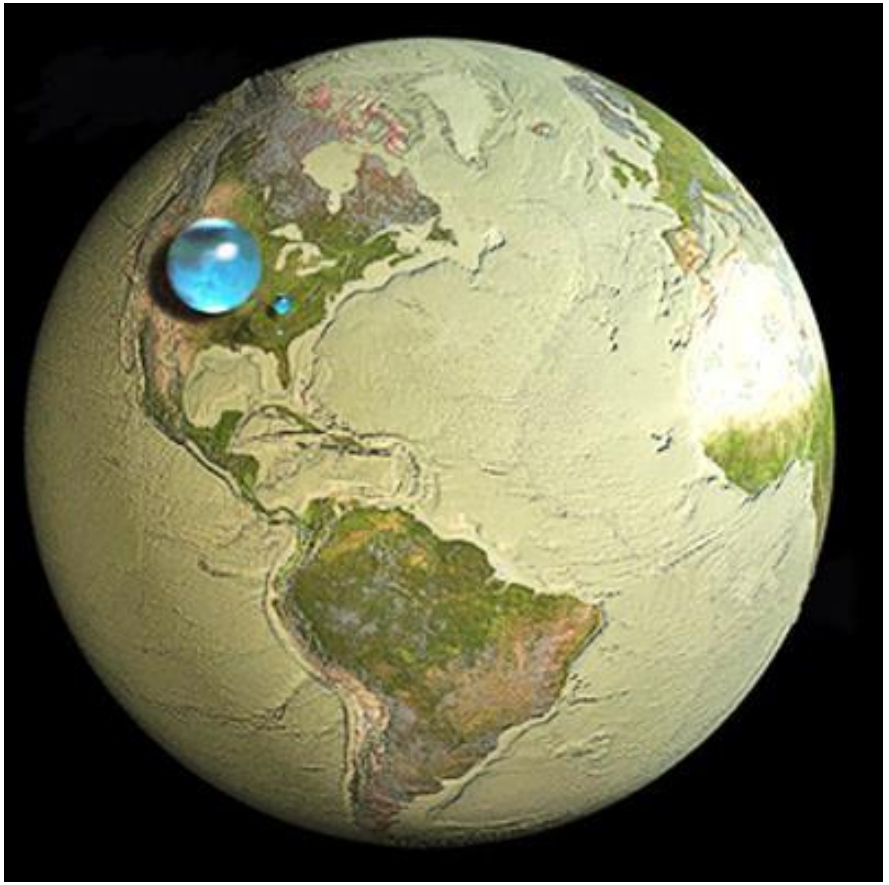
Introduction

- Water Water Everywhere: Water is Life
- Regulations
- Water from homes to the Wastewater Plant
- The Treatment Process
  - What goes in and what goes out
- The Mechanics of a Plant
  - Line Tracing
  - Electrical
  - Pumps and Equipment

Water on Earth

Largest Sphere: Earth's Water

- Diameter 860 miles, Cleveland to Savannah GA.
- Includes all water: 96.5% is oceans, 68.7% ice caps & glaciers, rivers, lakes, ground water, plants, water vapor, and you!



Middle Sphere: Fresh Water- 2.5%

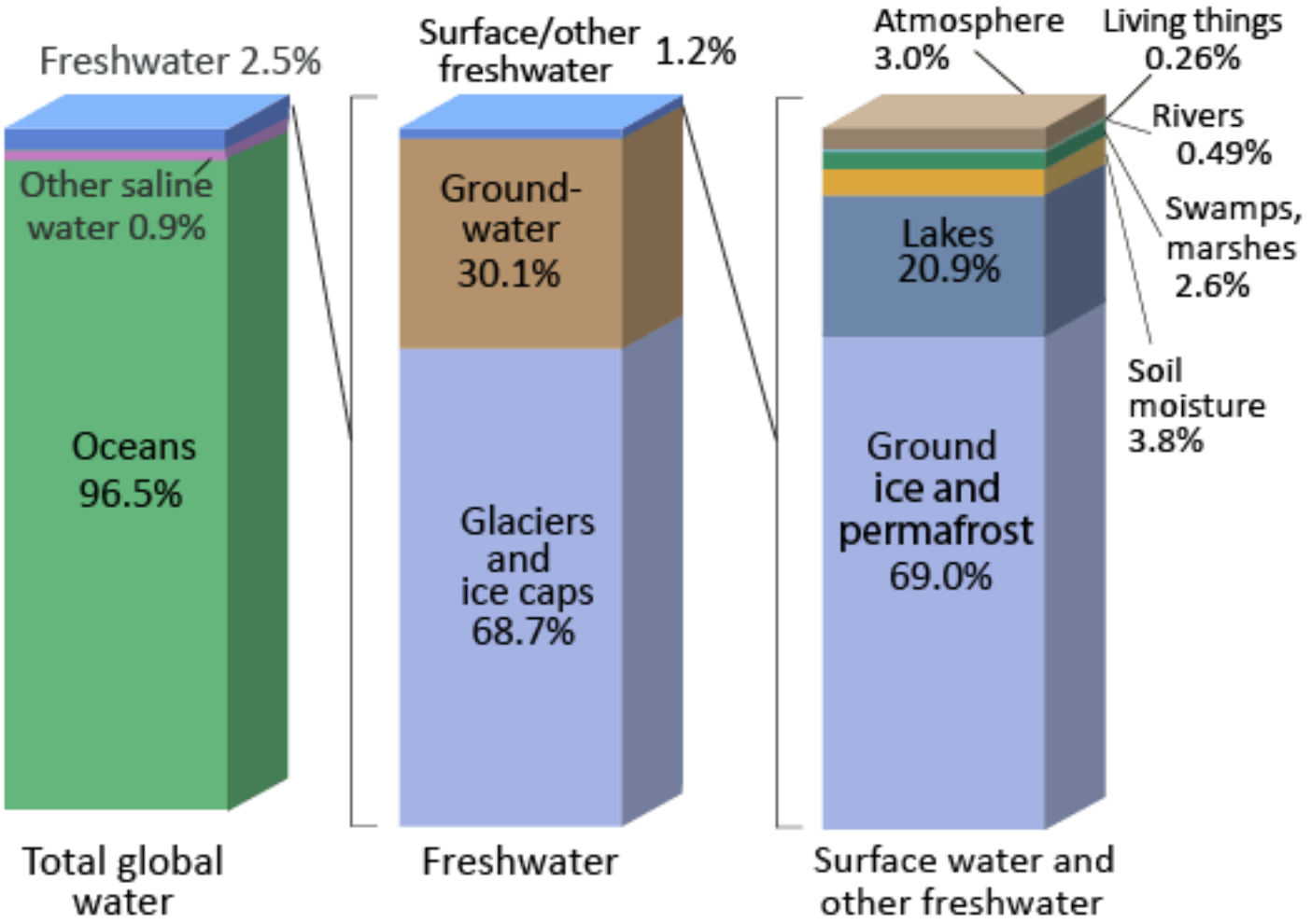
- Diameter 186 miles, Cleveland to Columbus
- Includes 30.1% ground water, 20.9% lakes, swamp waters, streams and 0.49% rivers 99% Groundwater not accessible to us

Smallest Sphere: Usable Fresh Water 1.2% of fresh water is surface water!

- Diameter 34.9 miles lakes, rivers for human consumption

Source: http://water.usgs.gov/edu/earthwherewater.html

Where is Earth's Water?



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, Water in Crisis: A Guide to the World's Fresh Water Resources.
NOTE: Numbers are rounded, so percent summations may not add to 100.

Great Lakes holds 21% of Fresh Water

Lake Erie

Source: Toledo Blade Sept. 2018 NOAA

Regulations were Instated

- “Federal Water Pollution Control Act” originated in 1948 (grandparents age)
- Amended in 1972 to establish the National Pollution Discharge Elimination System (NPDES) permit program
- “FWPC Act” renamed in 1977 “The Clean Water Act”, regulated by the United States Environmental Protection Agency (USEPA)

Regulations for NPDES Permits

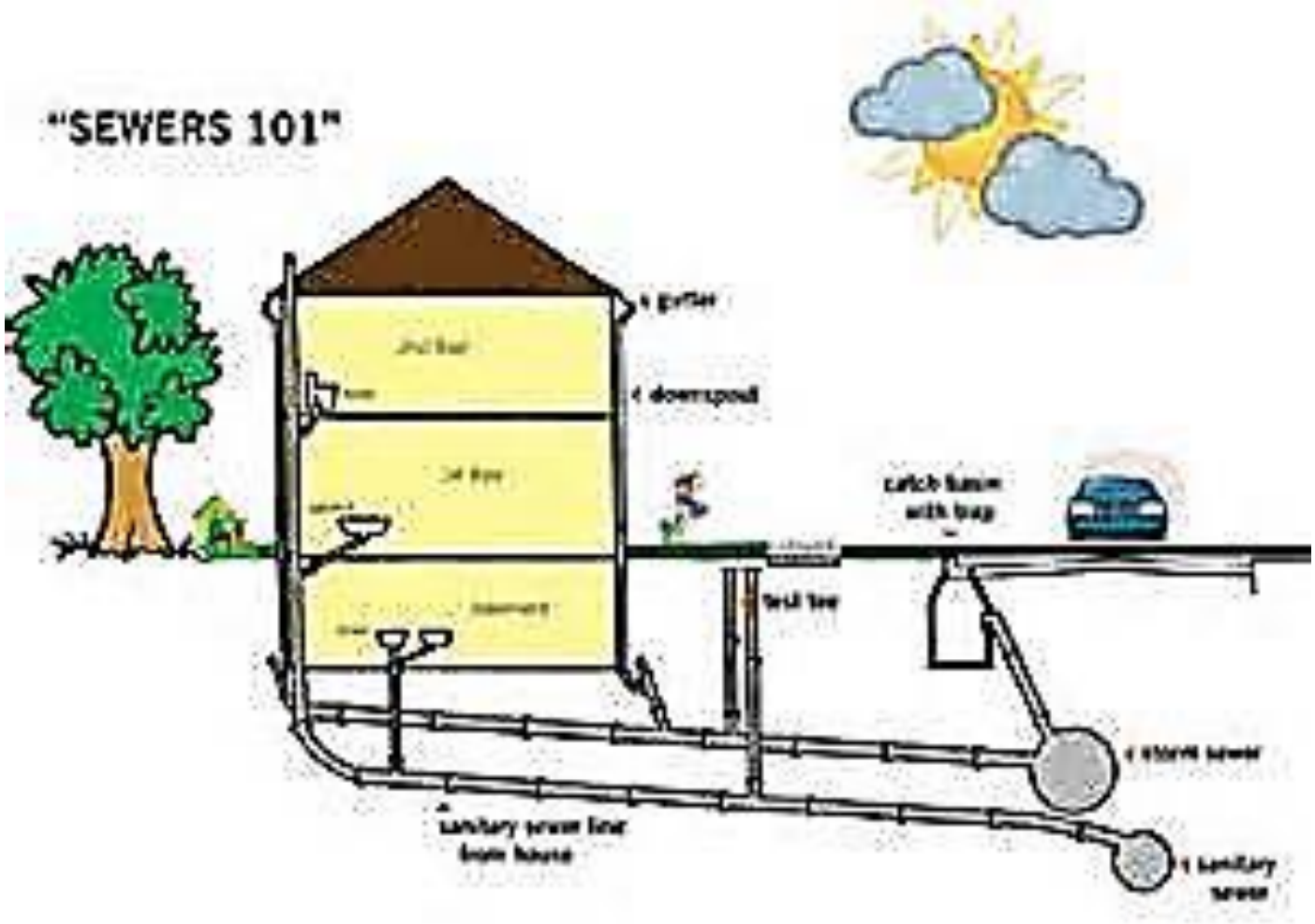
- 1992 stormwater permits implemented
- 1998, updated in 2000 to include businesses, cities, construction water “runs off site”
- Cleveland has combined sewers with carry sanitary and storm water. The flow goes to the treatment plants. If there is excessive flow it overflows through a regulated chamber to Lake Erie.
- The US EPA has mandated that the regulated chambers be eliminated and the quantity of overflows be reduced.

NO MORE SSO’s in Lake Erie!

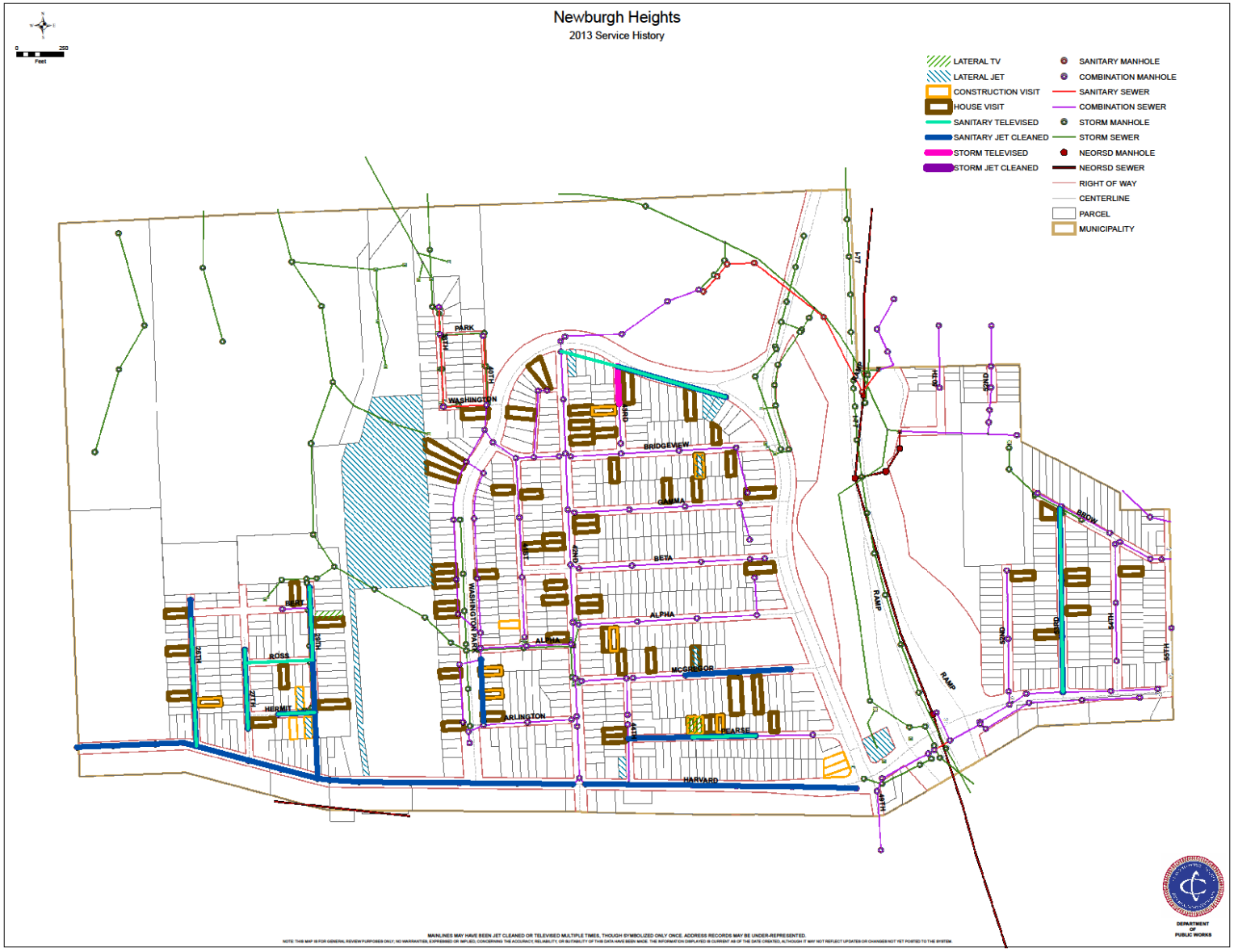
BASIC WASTEWATER

- How does wastewater get to the treatment plant?
  1. Collection or sewer system.
     A. Underground pipes or lines.
     B. Factors to consider.
        a. Time waste spends in the sewer lines.
        b. Rate of flow in sewer lines.
        c. Blockages in sewer lines.

Water Flows Downhill….



Sewer Lines



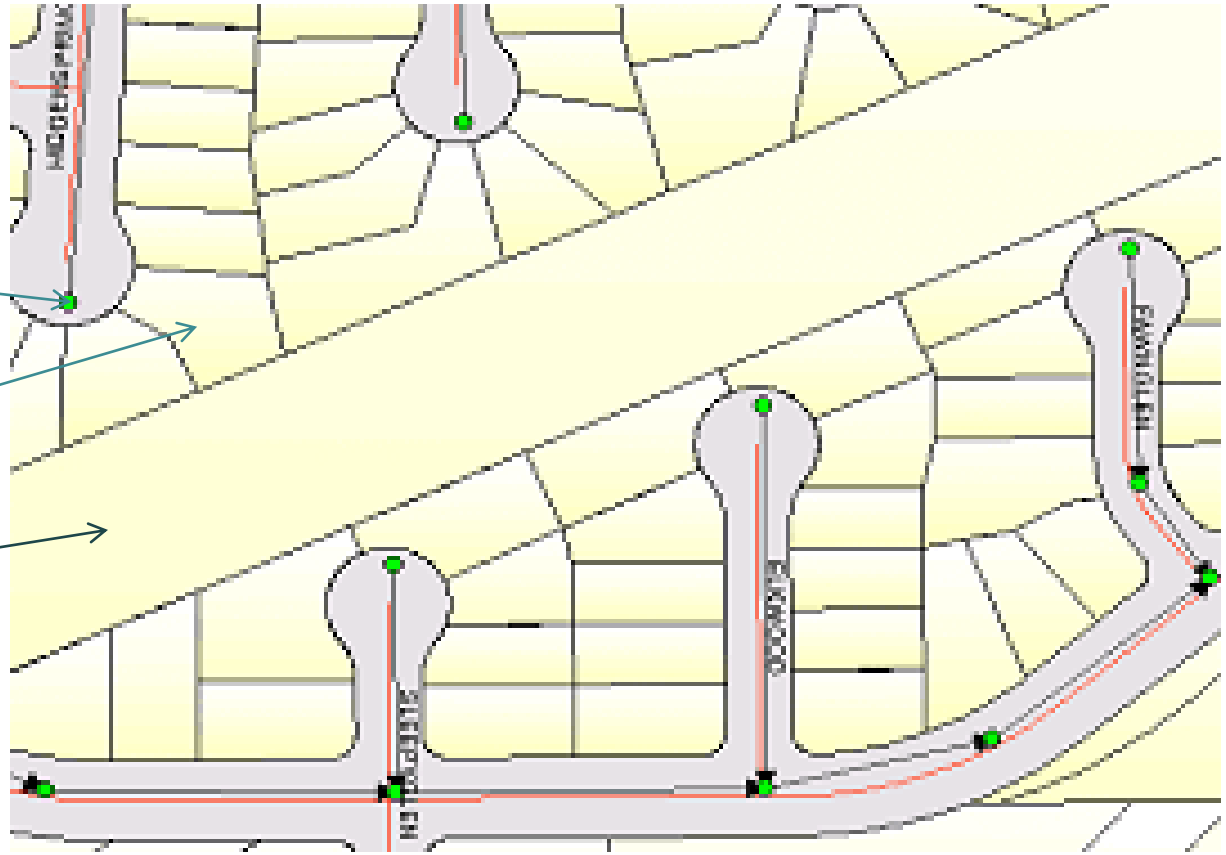
Source: Cuyahoga County Public Works

Sewer Lines

Manhole

Properties also called “parcels”

Easement



Sewer lines in Red are Sanitary
Green lines are Storm

Basic Wastewater

What is wastewater and where does it come from?

1. A number of places.
    A. Domestic
    B. Commercial
    C. Industrial
2. Domestic wastewater
    A. 99.9% water

Domestic Example

Domestic Example

BASIC WASTEWATER

- What is wastewater and where does it come from (cont.)?

  3. Commercial wastewater.

     A. Restaurants, schools, hospitals, etc.

Commercial Examples

Restaurants

Hotels

Hospitals

Schools

BASIC WASTEWATER

- What is wastewater and where does it come from (cont.)?
    4. Industrial wastewater
        A. Manufacturing and processing plants.
        B. Small percentage of flow, but largest impact.
        C. Difficult to understand and treat.
        D. This is the challenge for the operator.

Industrial Examples

Manufacturing

Food Processing

What manufacturing process would you put in this slot.

BASIC WASTEWATER

- How does wastewater get to the treatment plant (cont.)?
    2. Pump stations.
        A. Types of pump stations.
            a. Above or below ground.
            b. Backup systems.

Pump Station with Control Panel

Pump Station

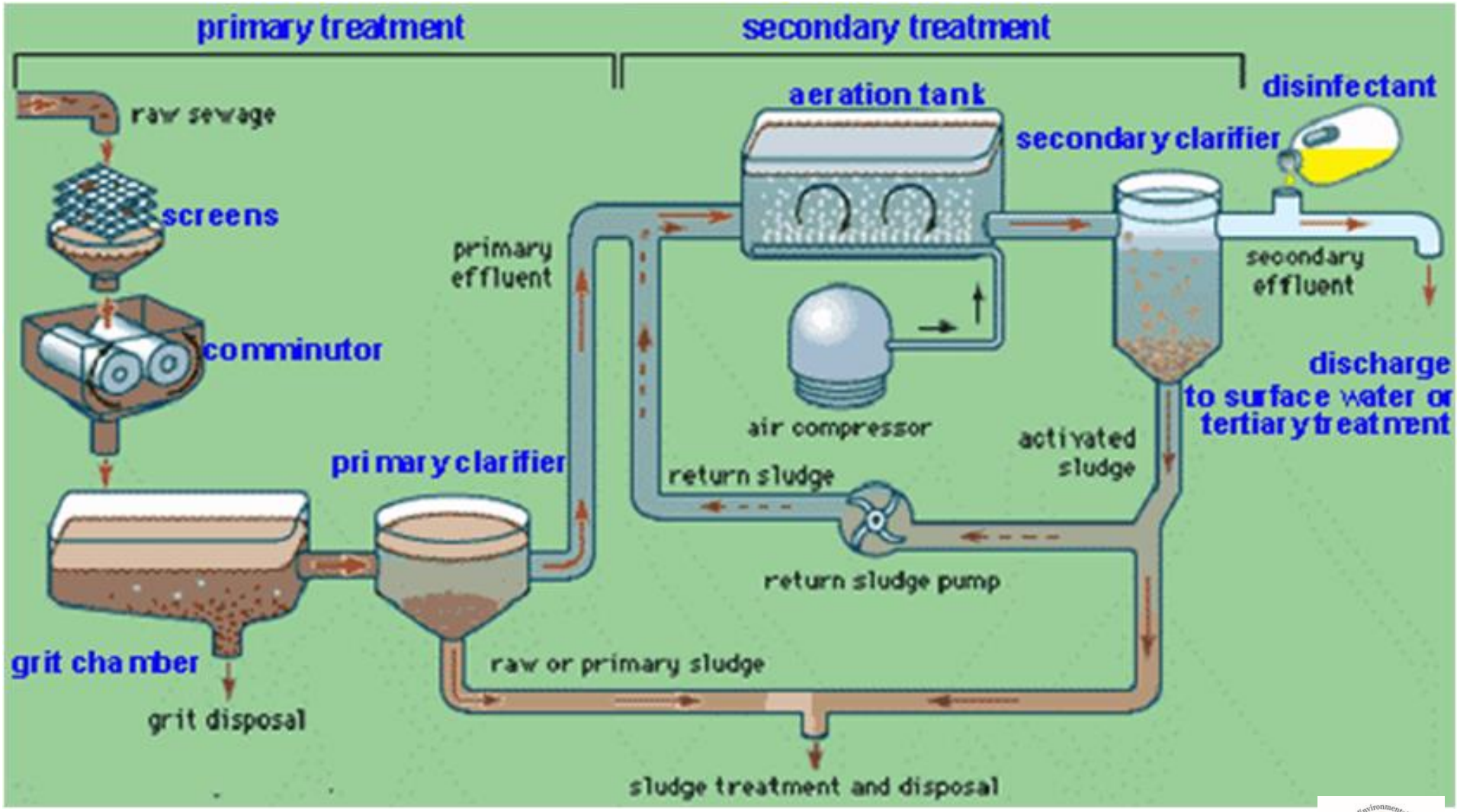
Source: Xylem

Pumps in Pump Station

Source: terra_engineering_oak_park_central_pump_station

Back-Up Systems

The Process of Wastewater Treatment



Source: mytutorial.srtcube.com

Package Plant in Egypt

Source: Egypt by Environtech

The Treatment Plant

Malibu Restaurant-Onsite installer

The Treatment Plant

The Treatment Plant

Extended Aeration Plant

The Treatment Plant

Waste Stabilization Pond

The Treatment Plant

Residential Lagoon Univ. Nebraska, Lincoln

BASIC WASTEWATER

- Why is Wastewater Treated Anyway?

  Protect the environment.

  Remove oxygen demanding material.

  Nutrient removal is important.

  Remove disease causing organisms.

BASIC WASTEWATER - LESSON 1

Classification of Wastewater

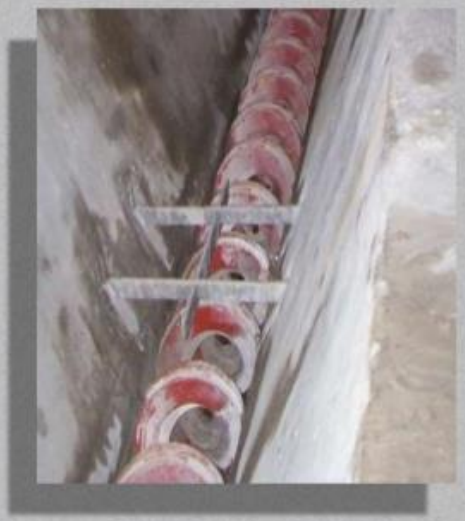
Classification	Type of Treatment	Purpose
• Preliminary	Physical	Remove large objects and protect equipment.
• Primary	Physical	Remove settleable and floatable solids.
• Secondary	Biological	Remove finely divided and soluble solids and organics.
• Tertiary	Physical	Polish or further clean effluent.
• Disinfection	Chemical	Remove pathogens.
• Solids Handling	Physical/Chemical	Disposal and reuse of by-products

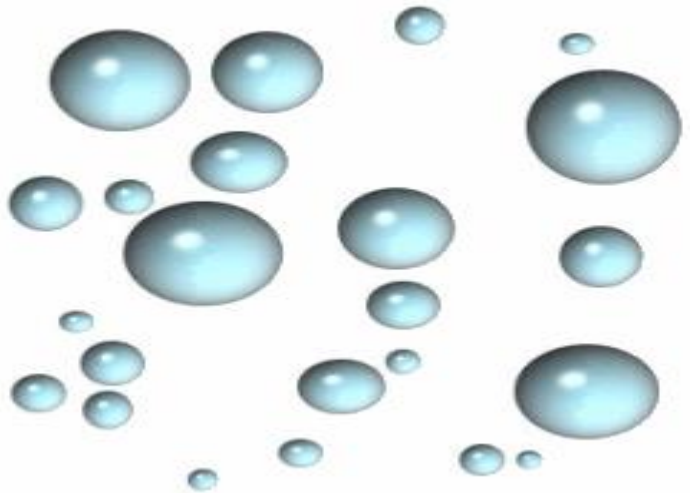
Activated Sludge Process

PROTECT ME !!!

Environmental
Since OTCO 1964
Training Center

Aerated Grit Chambers





Grit settles out for removal

The Treatment Plant

The Treatment Plant

Source: angdawa.wordpress.com

The Treatment Plant

Rotating Biological Contactor

Source: napier- reid.com & rotatingbiologicalcontactor.com

Empty Aeration Tanks Showing Diffusers that air is Pumped through.

Activated Sludge

Process involves mixing and aeration

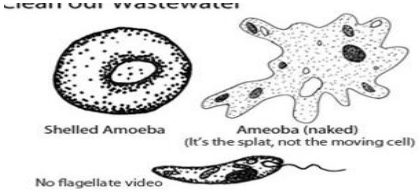
Aeration Tank & Returned Sludge

It is important to the system to return the sludge from the Clarifiers to keep a healthy balance of bacteria and solids.

Start to Finish…..

Microorganisms That Clean Our Wastewater

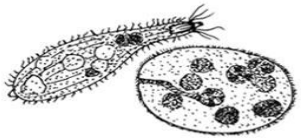
Bacteria



Amoebas

Flagellates

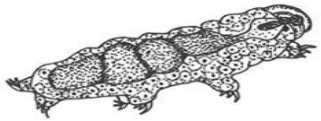
Bacteria is in all the video in the background FLOC. It doesn't move. You can click here to see a photo.



Swimming Ciliates

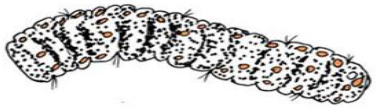
Rotifers

Crawling Ciliates

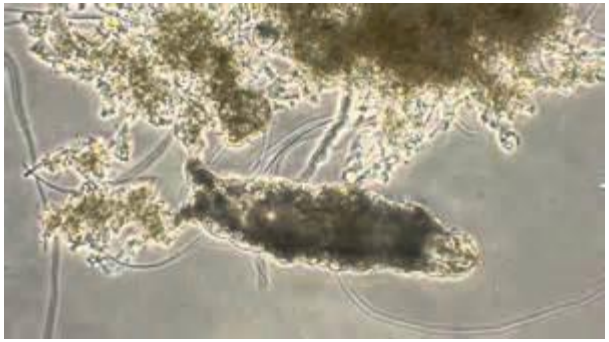


Water Bears

Stacked Ciliates



Bristle Worms

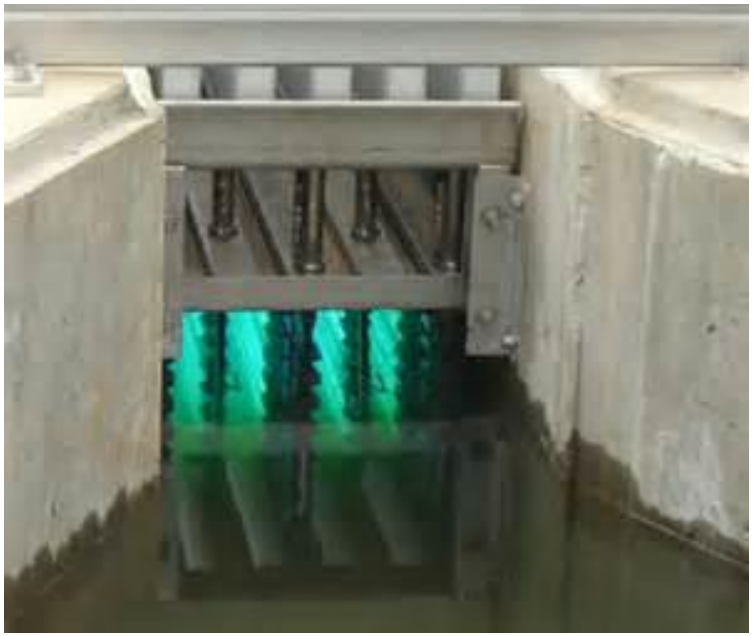


The Treatment Plant

Importance of Settling

Disinfection

Addition of Chlorine to system or use of Ultra-violet Light to kill the bacteria in the water before going to the stream

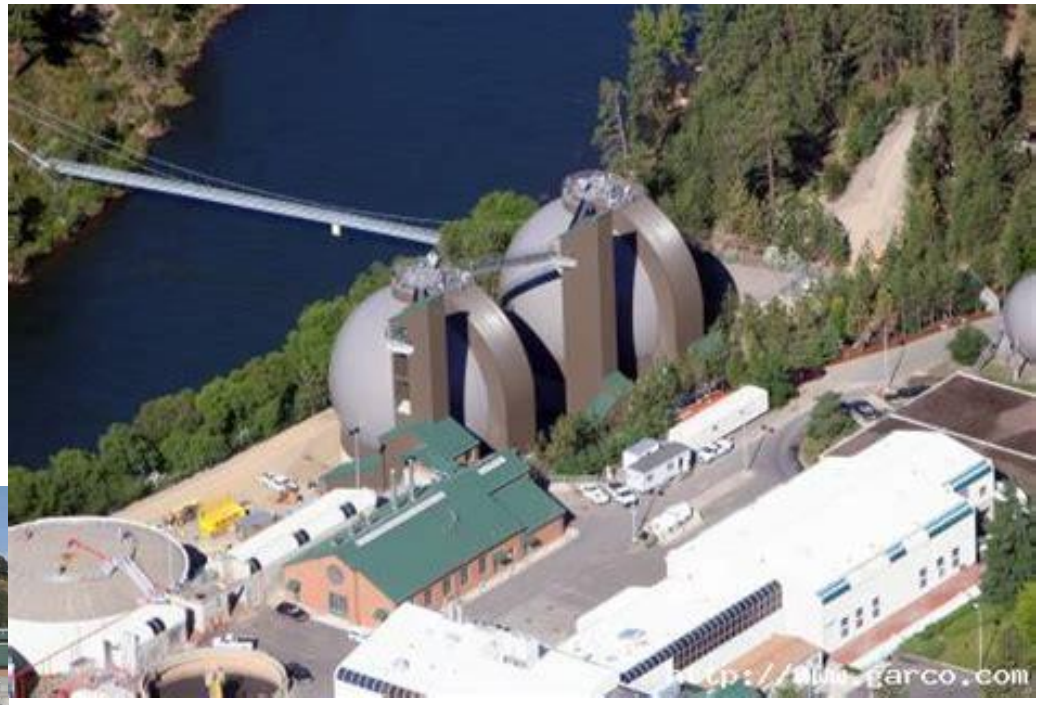


Solids Handling

- Some of the Solids that have settled out during the process are removed by either aerobic digestion (with air), which can be used for land application to help farmers grow crops above ground. These solids may also be used for compost.

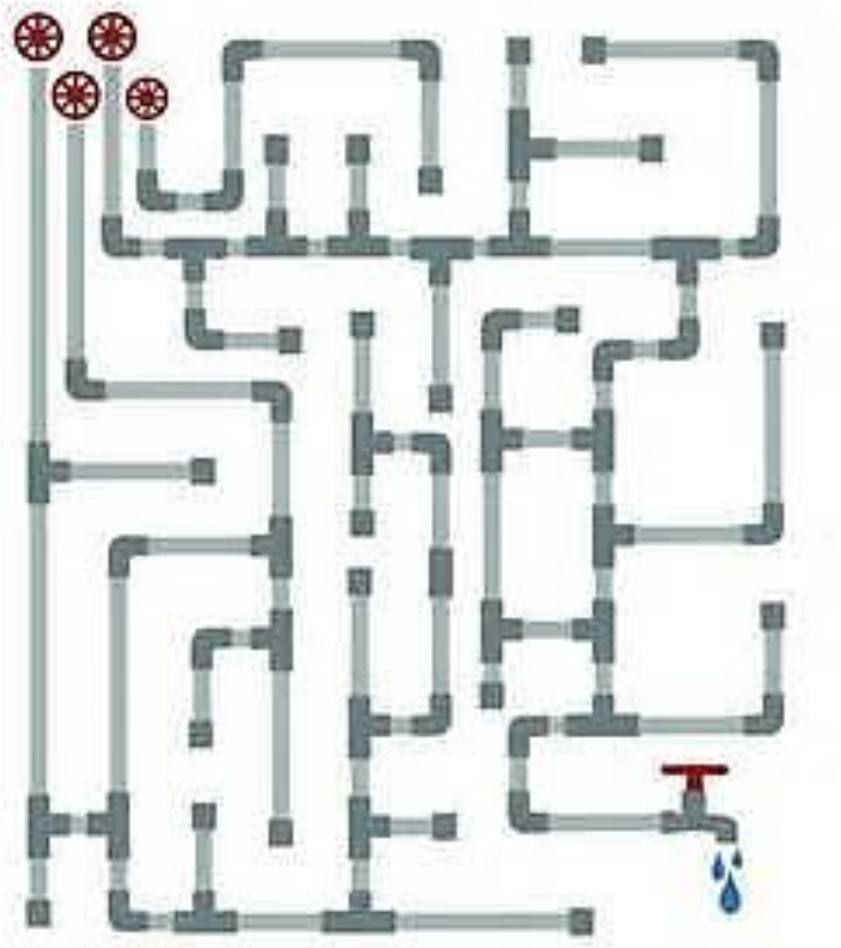
Solids Handling

- The other process is anaerobic digestion (without air), where methane gas is produced as a by-product and can be used as fuel throughout the plant. These solids are generally sent to a belt press to remove the excess water and the “sludge cake” can be taken to a land fill.



Lesson
The Mechanics of Plant

Line tracing: Pipes



In a plant follow the pipes to determine where everything goes. Look and follow the lines in your home and school

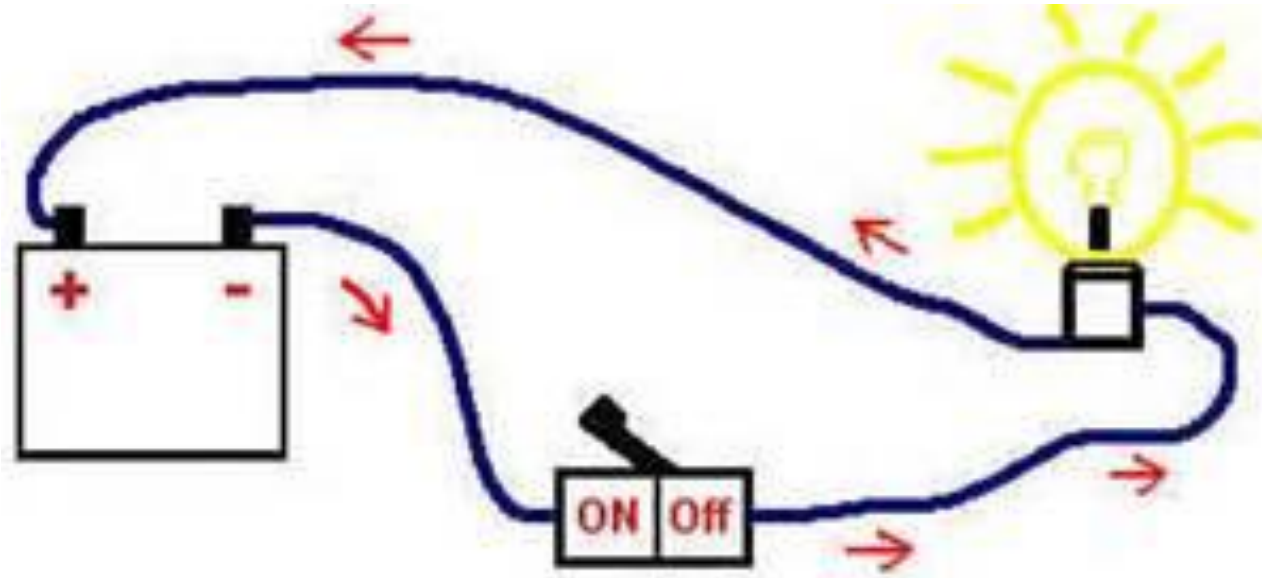
Line Tracing: Electrical

Electrical lines at a treatment plant also need to be followed.

Electrical Circuits also Follow Lines

There are 4 parts to a Circuit

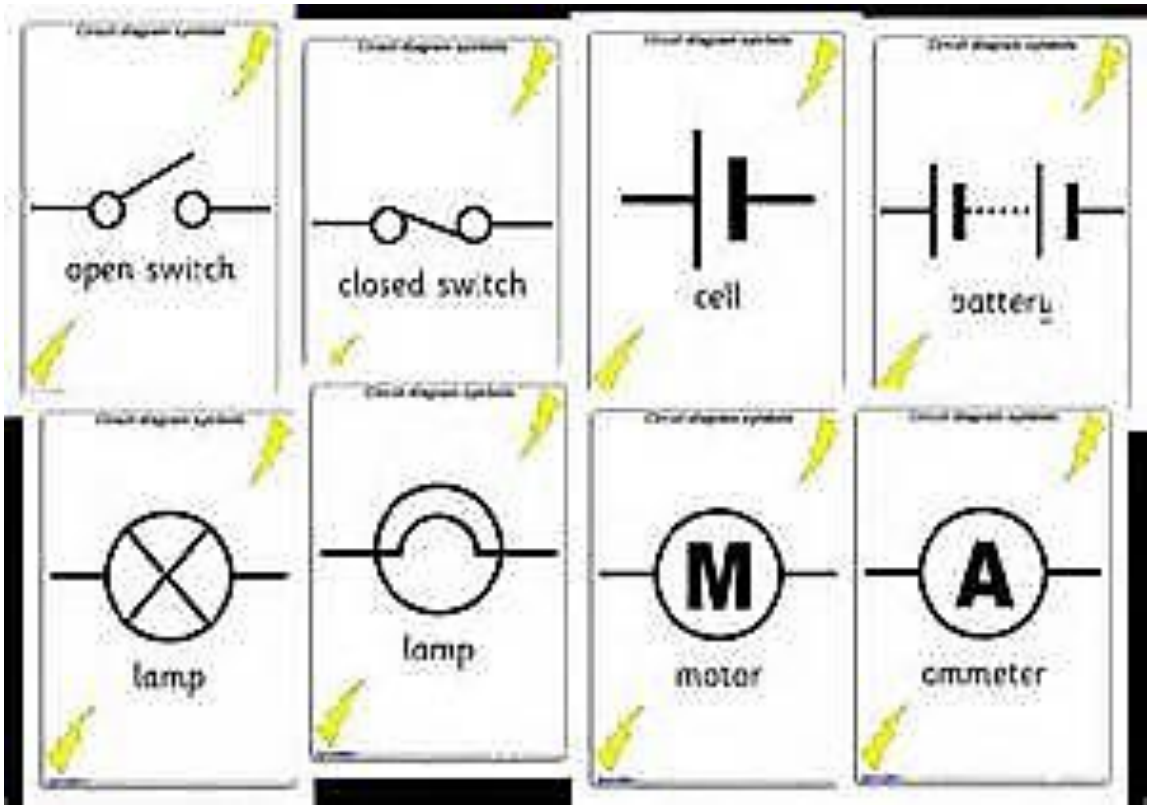
- Power Source
- Load
- Path
- Switch



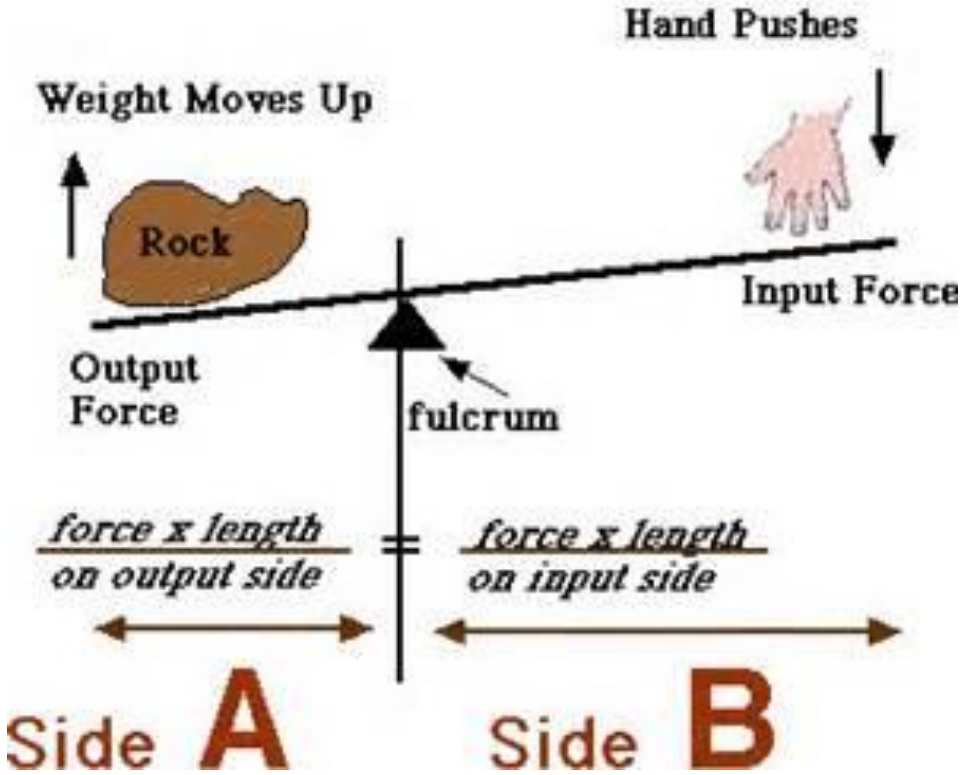
Electrical Symbols

Symbols

- Power Source
  - Cell
  - Battery
- Load
  - Lamp
- Switch
  - Open
  - Closed
- Motor
- Ohmmeter



Mechanical Aptitude



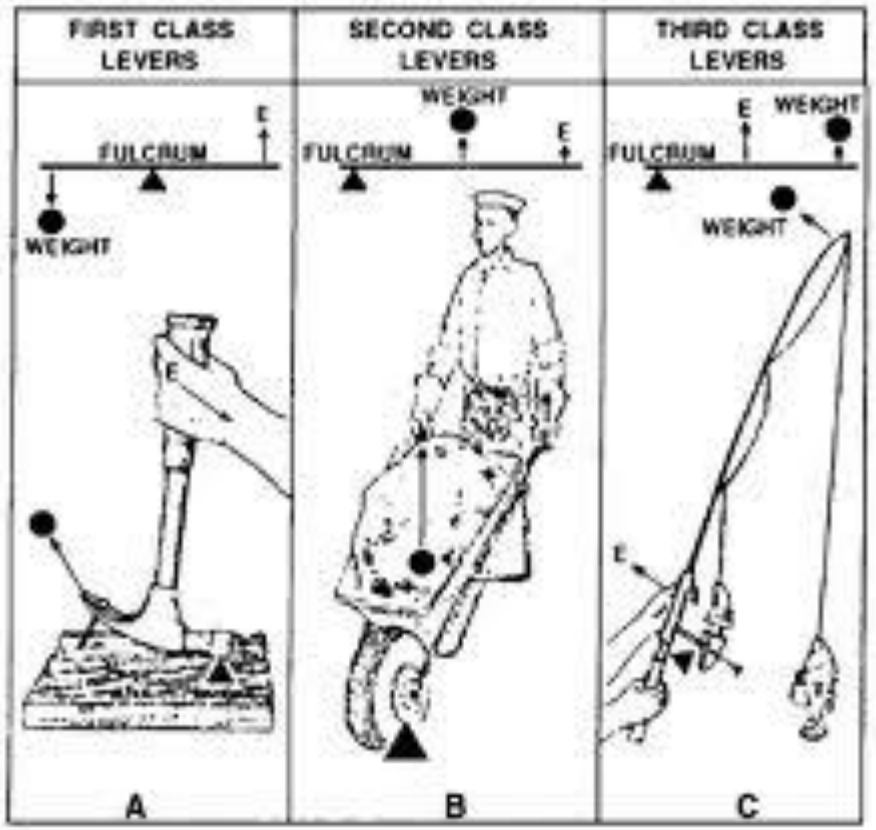
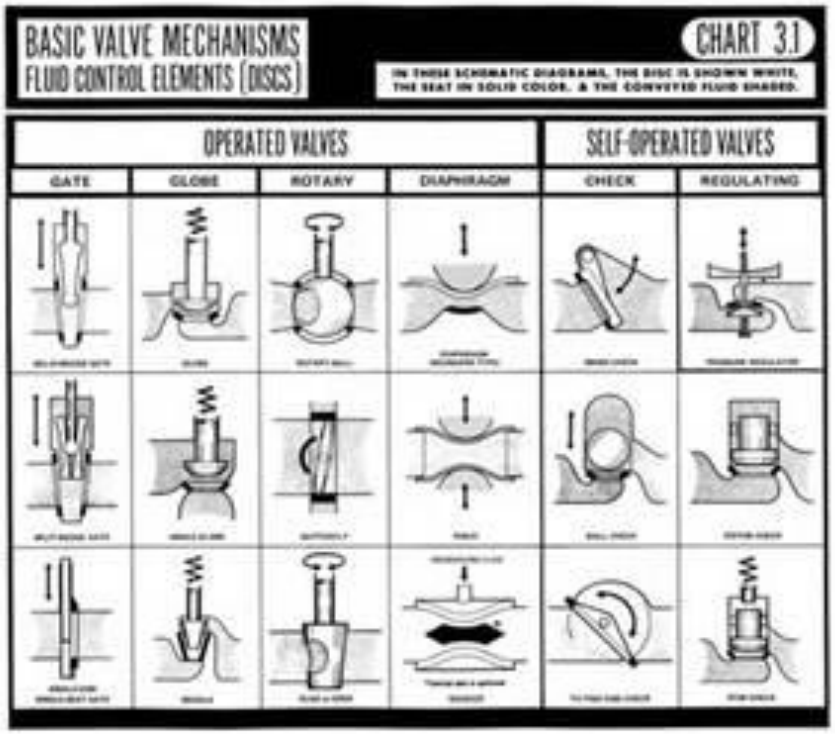


Figure 1-2.-Three classes of levers.

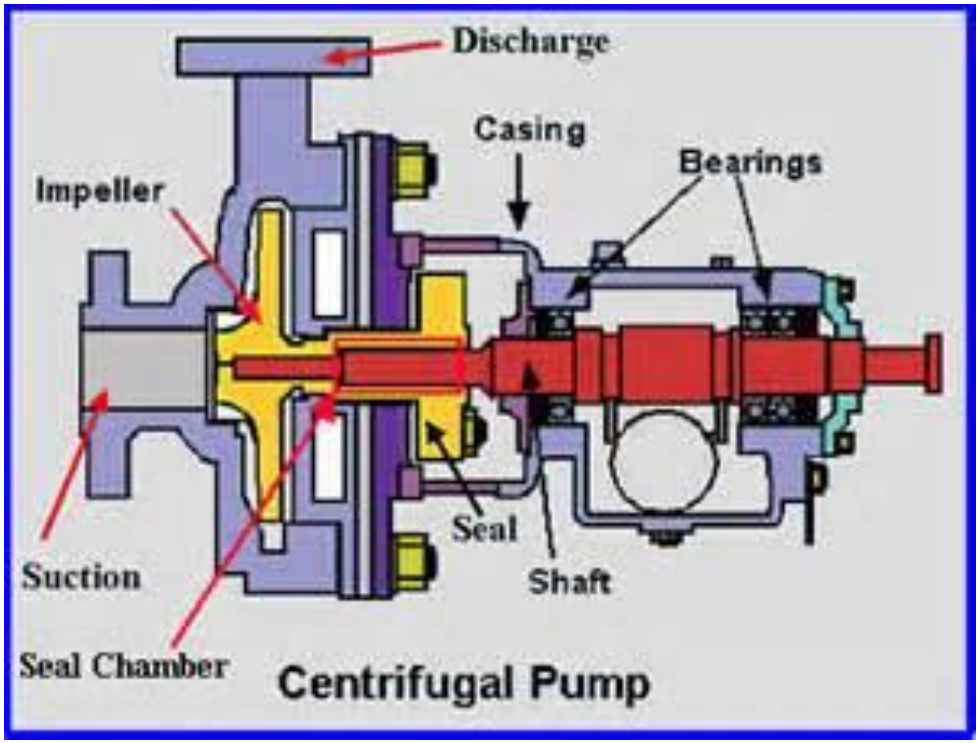
Mechanical Aptitude



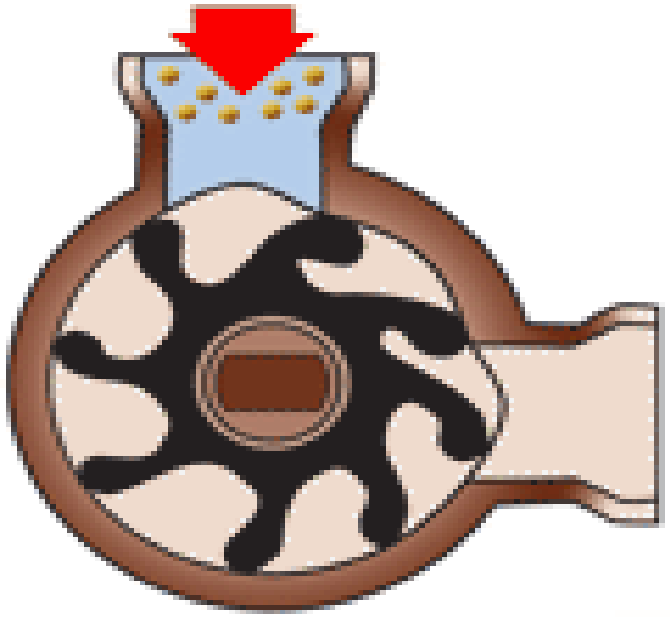
Pumps and Motors

The most commonly used pump is a Centrifugal Pump used to transfer water and light solids

Pumps

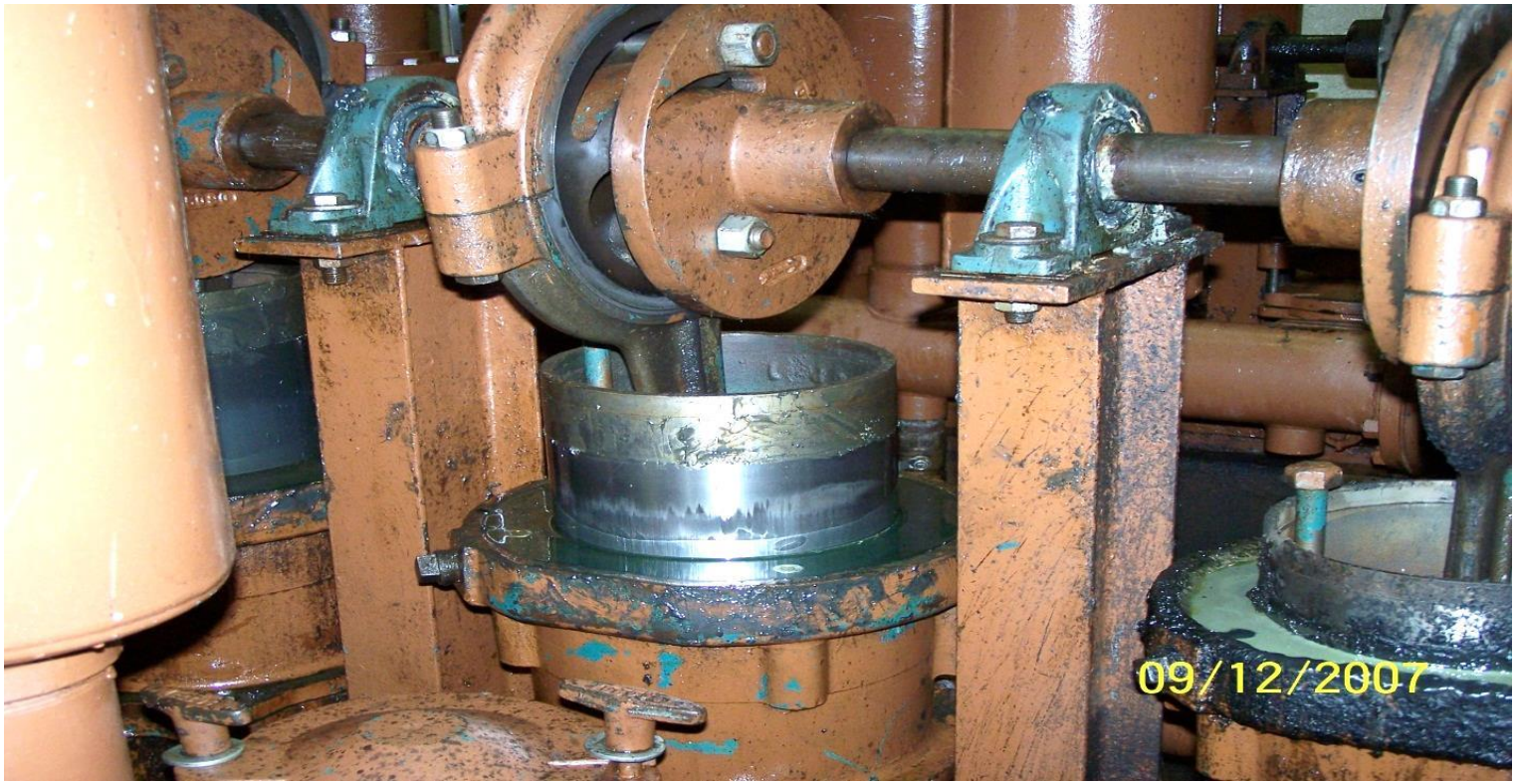

Discharge
Casing
Bearings
Impeller
Seal
Shaft
Suction
Seal Chamber
Centrifugal Pump


10/26/2011



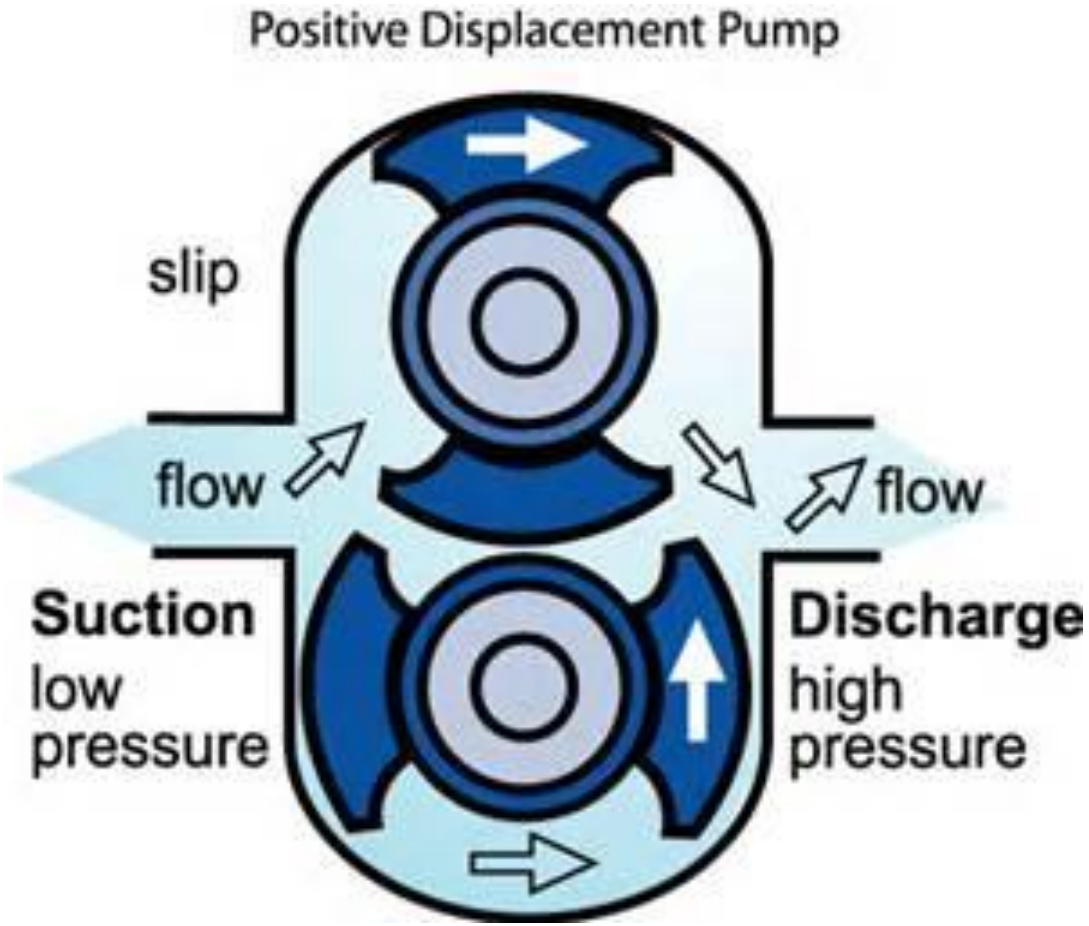
Pumps

Plunger or diaphragm pump is used for heavier solids or abrasive material.



Pumps

Plunger or Diaphragm Pump



Pumps

Clogged pump in Blacksburg Virginia, reasons why you want screens to work!

Gears and Levers in Plant Maintenance

Gears are found in motors as well as simple machines line a crescent wrench. Also found on Closed Circuit Television trucks with levers for raising and lowering the cameras in the sewers. A hammer is also a simple lever used in maintenance.

Success in Rittman Ohio

NEORSD, Ms. Bell, Past Students

Graduates to Apprenticeships: Cleveland Public Power


CONGRATULATIONS TO CWD'S GRADUATING APPRENTICE
"CLASS OF 2019"

Cleveland Water Distribution Apprentice Graduates

Apprentice Graduates

Graduates to Apprenticeship & Good Neighbor Ambassador


#RiverReborn

Chinonoso Oguekemma

Overview of the Wastewater Treatment Process

A Special Thanks to

Curtis Truss Jr.

Pat Antonelli

Sam Jacobs

Mike Maringer

Jack Doheny Group

Muffin Monster Pumps

For pictures and references

Bacteria treatment https://www.youtube.com/watch?v=epAh6hHOq3c

Plant Tour: https://www.youtube.com/watch?v=ALkiZTz7yGg

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