



Tour of Regional Water Reclamation Facility

Middle School Life Science | Fall Module 3 | Regional Water Reclamation Facility

NGSSS Big Idea: Big Idea 1—The Practice of Science

Benchmark Code & Description:

SC.6.N.1.1, SC.7.N.1.1, SC.8.N.1.1—Define a problem from your curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

NGSSS Big Idea: Big Idea 6—Earth Structures

Benchmark Code & Description:

SC.7.E.6.6—Identify the impact that humans have had on the Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.



LEARNING GOAL/OBJECTIVE

Students will learn how scientist designed a system to reduce impacts on the environment from a basic human function and turn a waste product into a resource.



PREREQUISITES

Review:

- Process Diagram
- RWRF Safety Rules



VOCABULARY

See vocabulary sheet.



HANDS-ON ACTIVITY

Tour of the Regional Water Reclamation Facility.

Provided Materials:

- Clipboard/Pencil
- Process Diagram

Career Options: Engineer (BS Degree) , Mechanic (Certification), Electrician (Certification), Instrumentation Specialist (Certification), Operator (High School Diploma and Certification)

Lesson Steps:

1. Each student will be given a clipboard and process diagram.
2. Staff will guide students on a tour of the water reclamation facility.
3. Students are shown the SCADA system.
4. Discuss responsibilities, job descriptions and educational requirements of operators.



Altamonte Springs
**SCIENCE
INCUBATOR**

Regional Water Reclamation Facility Life Science Vocabulary List

Activated Sludge—small clumps of organisms that grow in wastewater. It's called "activated" because the particles are alive with microorganisms.

Aeration—combining air with a liquid

Aerobic—to need oxygen.

Aerobic Digestion—the process of stabilizing sludge.

Algae—single or multi-celled autotrophic organisms that range in size from microscopic to 213 feet long.

Anaerobic—not needing oxygen.

Autotrophic—organisms that can use the sun's energy or chemical energy to create organic compounds from inorganic compounds.

Biosolids—solids that have been treated enough to become fertilizer.

Cellular Respiration—the opposite reaction of photosynthesis. Cells convert sugar and oxygen to carbon dioxide, water and energy.

Clarifier—a tank that lets the solids settle to the bottom.

Disinfection—the process of killing or disabling pathogenic organisms.

Ecosystem—a community of living and non-living things that interact with their environment.

Effluent—treated wastewater ("reclaimed water") leaving the plant.

Eutrophication—a water body that has too many nutrients leading to excessive algae and plant growth. This can lead to a lack of oxygen and the death of other living organisms such as fish.

Heterocyst—cells that carry out nitrogen fixation.

Influent—wastewater flowing into the wastewater treatment facility.

Microbe/Microorganism—microscopic organisms that can be either single-cell or multi-cell.

MLSS (Mixed Liquor Suspended Solids)—the mixture of solids and water in the aeration tank.

Nitrogen Fixation—converting atmospheric nitrogen (N₂) into ammonia nitrogen (NH₃) which the algae can use for other processes.

Nitrogen—another essential element used by all life forms. Nitrogen makes up approximately 78% of the air on Earth.

Nutrients—elements necessary for organisms to live and grow (including carbon, nitrogen, phosphorus).

Phosphorus—an essential nutrient for all life forms. This is the backbone and is present in every cell of the human body.

Photosynthesis—the opposite of cellular respiration. Cells use sunlight to create chemical energy in the form of sugars.

Preliminary Treatment—the first treatment process that removes larger particles and heavier grit particles (sand, gravel, metal or glass).

Reclaimed Water—treated wastewater that can be used for a beneficial purpose.

Sand Filters—filtration through sand.

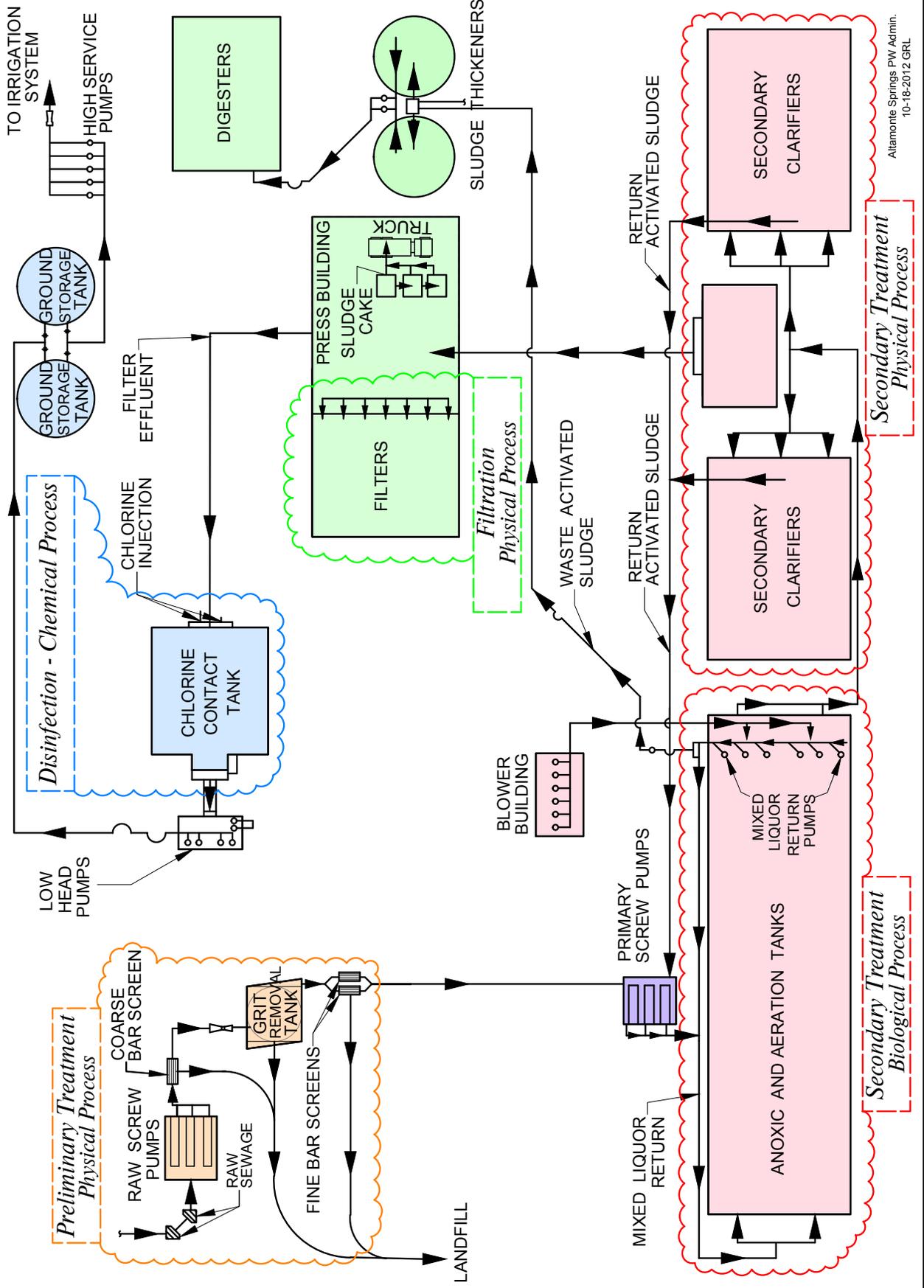
SCADA (Supervisory Control and Data Acquisition)—computer system that monitors pumps, motors and plant processes.

Secondary Treatment—the third process in the treatment plant that includes the aeration tanks and secondary clarifiers. The wastewater is treated by microorganisms in the aeration tank then are removed (settle to the bottom) in the clarifier.

Wastewater—water that has been used for purposes such as bathing, cooking, washing clothes, toilets, etc.

Water Reclamation—the physical, chemical and biological process of removing contaminants from wastewater to produce a reusable water source.

ALTAMONTE SPRINGS WATER RECLAMATION FACILITY



Altamonte Springs PW Admin.
10-18-2012 GRL



Regional Water Reclamation Facility Life Science Quiz

Read each question carefully and circle the correct answer.

1. What is the purpose of a clarifier?
 - a. To disinfect water
 - b. To heat water
 - c. To allow solids to settle out
2. What makes the rotten egg smell?
 - a. Chlorine
 - b. Hydrogen sulfide
 - c. Dirty rags
3. Why do we use reclaimed water?
 - a. To ruin the environment
 - b. To conserve water resources
 - c. To drink
4. Why are plant operators necessary?
 - a. To operate and maintain equipment and processes
 - b. To hand crank pumps
 - c. For your tour
5. Why are bar screens important?
 - a. To remove grit
 - b. To remove rags, stick, leaves, braches and protect other equipment
 - c. For disinfection
6. What is grit?
 - a. Large branches
 - b. Bugs
 - c. Heavy particles such as metal, rocks and sand
7. What does a lift station do?
 - a. Treats the wastewater
 - b. Pumps wastewater uphill
 - c. Produces grit

8. The wastewater plant uses gravity to accomplish many tasks.
 - a. True
 - b. False

9. How much water is in "wastewater"
 - a. 30%
 - b. 68%
 - c. 99.9%

10. What is wastewater?
 - a. Water that gets wasted during every day activities
 - b. Water to drink
 - c. Water from a pool

11. What does DO stand for?
 - a. Dead organism
 - b. Dissolved oxygen
 - c. Door open

12. What is the difference between reclaimed water and the water you drink?
 - a. \$100
 - b. Not much, a few more processes and they are the same!
 - c. Reclaimed could never be used for drinking water

13. Drinking water is also called what?
 - a. Delicious
 - b. Coke
 - c. Potable

14. How does the wastewater get to the plant?
 - a. Large propellers
 - b. Lift stations
 - c. Gravity

15. What does "anoxic" mean?
 - a. Filled with oxygen
 - b. Filled with helium
 - c. Lacking free dissolved oxygen

16. What are "biosolids"?
 - a. Lifelike paintings
 - b. Solids that are processed for beneficial reuse
 - c. Bio-engineered bugs

17. What is the primary purpose of wastewater treatment?
 - a. To provide water that can be used for a beneficial reason
 - b. To provide water for swimming pools
 - c. To provide water for the Little Wekiva River

18. Which stage of treatment kills or disables the microorganisms?
- Primary
 - Disinfection
 - Secondary
19. Inorganic substances contain carbon.
- True
 - False
20. Each stage of treatment consists of physical, chemical or biological treatment.
- True
 - False
21. What test lets the operator know that the disinfection process was successful?
- Breathalyzer
 - Stress test
 - Fecal coliform
22. The goal of the Water Reclamation Facility is to recycle what % of wastewater?
- 53%
 - 66%
 - 100%
23. What stage of treatment consists of screening and grit removal?
- Disinfection
 - Preliminary
 - Secondary
24. Why are blowers important?
- To provide dissolved oxygen and mixing
 - To provide oxygen to the operators
 - To keep operators awake
25. During secondary treatment the bugs use _____ and _____ to grow.
- oxygen, food
 - water, bleach
 - acid, rain
26. What is "pathogenic"?
- Causing hunger
 - Being angry
 - Causing disease
27. The belt presses use what to separate water from the solids?
- WD40
 - Polymer
 - Oil