Other Field Sites

Visit to a Sewage Plant

Level

7-8+

Key question

What happens to domestic liquid wastes from the bathroom, kitchen and laundry?

Key outcome

To observe primary and secondary sewage treatments.

Adapted from field notes for Year 10 Geography, St. Aidan's School, Corinda, Brisbane, and the Brisbane City Council.

Hazard warning!

Do not touch the treatment machinery or ponds or the treated water or sludge. Emergency showers are available. Everyone should wash their hands afterwards. Avoid inspecting the initial entry pipe and screen as these appear and smell most offensive.

Most Year 10 and above secondary students find the visit interesting and informative once they get used to the smell.

What you need

Pencil, field sheet of diagram of sewage treatment, clipboard

Solid shoes

Small towel, soap to wash afterwards.

What you do

You will notice some smell when you first arrive, but your nose quickly becomes used to it. Follow the instructions of the guide carefully, especially in relation to safety precautions. Do not touch any of the treatment ponds.

1. As you move around the outdoor plant, make notes at each part of the diagram which shows the flow of liquid and solids.
2. At the end, find answers to the following:

- describe the location of the sewage plant
- what is the total volume of wastes entering this plant
- from what area
- why is screening (removal of large solids held on a metal gate) necessary first
- why is oxygen bubbled through the settlement tanks
- how safe is the liquid at the end of treatment
- where is the liquid discharged
- what happens to the treatment plant during heavy rain
- what happens to the treated sludge
- is the methane gas (a by-product) utilised within the plant itself or is it sold to other consumers or allowed to vent to waste
- what attempts have been made by the Council to shield the sewage plant from nearby houses
- is this successful
- who pays for sewage treatment
- why is sewage treatment considered a controversial issue in some communities (where is the liquid discharged)
- what other methods exist of treating or getting rid of household sewage wastes (septics, dry pits, 'bio-loos', 'deep sinkers', bin collection).

3. List some public awareness campaigns to reduce the amount of sewage, or to reduce the materials requiring more treatment (e.g. phosphates in washing powders are difficult and expensive to remove in conventional secondary treatment plants).

Visit to a Sewage Plant

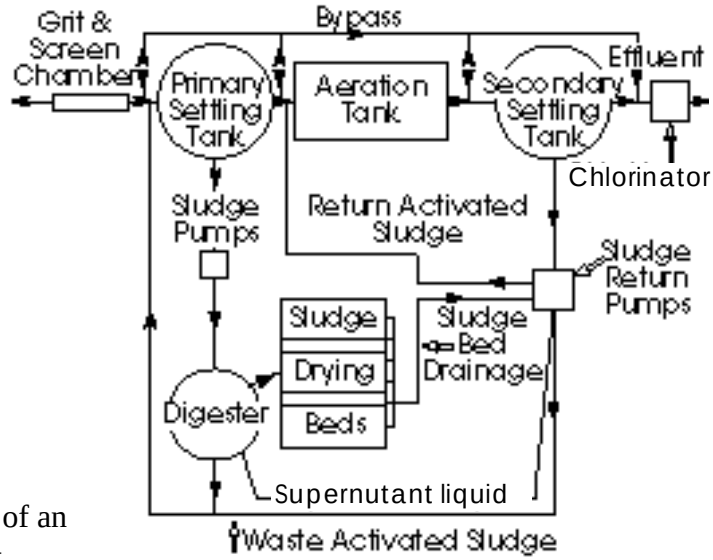

Figure 1. Illustration of an activated sludge plant

Information sheet

Sewage treatment requires both physical and bio-chemical treatment of solid and liquid wastes from household, some industrial and commercial premises before being suitable for discharge into inland or tidal watercourses. Sewage treatment has assumed an added importance in the last two decades due to higher density living and a greatly increased community awareness of environmental matters.

The objective of sewage treatment is to convert domestic sewage and other wastes into a clear and inoffensive effluent by the removal of solids and the purification of the liquid. Treatment involves the following:

- screening out of large items such as drums, paper and rags
- removal of grit
- the settling out of inorganic and organic solids
- the removal of oils and grease
- the promotion of the growth of micro-organisms which feed on the sewage and break down dissolved organic matter into readily settled ‘floc’ particles
- the changing of the character of sedimental sludge by digestion under anaerobic conditions
- the drying and disposal of the digested sludge
- The final effluent is further improved and disinfected by chlorination.

Visit to a Sewage Plant

The processes employed in the primary treatment stage are physical in character and are usually common to all plants, but treatment in the secondary stage is either by biological filtration or by the activated sludge process. This latter process is carried out either by the diffused air method or by mechanical surface aeration. Local Councils may adopt all these alternative processes in various plants. The diffused air activated sludge process is favoured for large treatment plants, because of its intensive nature and economy of space. This process involves the continual feeding of the organic matter to a mass of activated sludge, containing millions of micro-organisms known as aerobes. This aerobic process requires the discharge of large volumes of compressed air into the liquid to keep the mass in suspension and to supply oxygen to the micro-organisms so that they may assimilate and destroy the organic matter. The purified effluent is separated by sedimentation from the activated sludge, most of the sludge being returned for continuation of the process. After treatment with chlorine gas, the treated liquid is discharged to a local creek, or into wetlands/swamps for further filtration, or piped direct to the sea.

In Australia, local councils are charged with the treatment of sewage and disposal of the solids and treated liquid. Most state governments now require all Councils to use secondary treatment to treat the liquids to a non-hazardous fluid which can be safely discharged into fresh or salt water. However, some older sewage systems only do primary treatment, whereby some liquids may be discharged into the sea still containing large amounts of untreated solids, contaminated water, and wastes with a high biological demand.

Toxic waste disposal and industrial wastes are usually treated by a state government facility. These are rarely open for inspection to school students, though tertiary health/engineering students may be able to arrange visits.

Most local treatment plants will have guided tours by chemists to groups of up to 30 students and may also supply some printed diagrams of treatment. A sample diagram is shown above.

People Working with Oceans

Level

1-8

Key Questions

How do people earning their living from the ocean?

What are their attitudes to the marine environment?

Key Outcome

Understand some of the work of and attitudes held by people who earn their living from the ocean.

Adapted from Bob Foster-Smith, *Ocean Challenge*, & St. Margaret's School, Brisbane.

What you need

People to interview and talk to about their work

Suitable sites such as fish market, trawler base, dive shop, ship chandlers, ferry terminal, seafood restaurant, yacht club, and Marine Park Centres

What you do

Many people in Australia have skills associated with the sea, and work in it. You should be able to arrange to visit at least one of the sites listed above, and talk to the workers. Some of these may be able to talk to the whole class group at once; then students can interview workers. Prior arrangements are essential if work is to be interrupted. One of the best sequences is to go early to the fish market, attend an auction, then visit a seafood restaurant, or buy some fish and return to school and learn how to gut, scale and cook them.

1. List all the jobs associated with the ocean and coastal areas.

2. Do you know of anyone doing these jobs?

3. Visit to the Fish Market. Find out:
   - where is it located
   - what are the buildings made of
   - what does it smell like
   - is it noisy
   - is it messy
   - what is the daily life of the people
   - do they have to get up early in the morning?
   - what sort of work are they doing
   - what types of fish do you see
   - what other sea creatures, for example, squid, shell fish, prawns, etc.?

4. What happens when the fish are purchased.
   - Where do they go?
   - How are they packed?

5. Back in the classroom, turn your notes into a Place Profile Poster.
   - Work in small groups and use a large piece of paper.
   - Draw some of your impressions.
   - Draw, or find an illustration of a fish, some of the jobs being done, and what finally happens to the fish.

6. It may be possible to interview a person on site, say down on the seashore, or at a trawling wharf, or someone may come to the class for a class interview. If you are interviewing someone, draw up your own questions. You could ask:
   - What does the person like best about working in the sea?
   - What do they like least?
   - What is the most exciting thing they do?
   - Is special training required for this work?
   - What do they consider are the beautiful things about the sea?
   - Are they worried about the future for their work?
   - Is their work threatened by demands of others about the sea (e.g. to restrict catches of fish)?

After the interview, you could sum up your findings in a Person Profile as though you were going to publish a short article about the work in a magazine or local newspaper. Give your story a title which sums up what you have found.