**Trash management**

3 kinds of trash & 3 kinds of processing plant:

1. Biodegradable: 10 Env Point each.
2. Plastic : 30 Env Point each.
3. Radioactive: 100 Env point each (very few will be there, just 1 or 2)
4. Research Facility

In-game Menu to build factories and research facilities: There will be a build-icon. Clicking on it will enlarge the build menu. The menu will display: a) How much resource is left b) options to build different kind of plants. The plant will get built just below the hydrobot position.

More and more trash will be dropped periodically.

+ Pressing Z: collect trash and put it in biodegradable category.

+ Pressing X: collect trash and put it in plastic category.

+ Pressing C: collect trash and put it in radioactive category.

+ Double clicking on a plant will drop the collected trash in it.

It takes 5 resources and 5 days to build a plant/research facility.

Player will initially have only 20 resources. Plant will generate resources to build more plants or power packs. Resources will get carried over to next level.

Right click on research facility to see options to upgrade. If Research Facility is 15 days old, and 25 trash has already been processed, level 1 upgrade will be available. If 50 trash has been processed, level 2 upgrade will be available. Upgrade option not available for radioactive trash. This screen will also display the information about how the trash is getting processed & how it will be processed when the plant gets upgraded. It will also have option to choose whether to produce resources or powerpacks. By default, it produces resources.

**BIODEGRADABLE WASTE**

5 trash = 1 powerpack = 1 unit resource

Basic Plant : Trash decompose naturally to produce methane power packs after 40 secs/ 10 days.

Upgrade 1: Waste decomposes faster using chemicals like fertilizers. Power packs after 4 secs / 1 day

Upgrade 2: Waste decomposes even faster to produce charcoal using flash carbonization process. Power packs after 1 sec / 0.25 day.

DISPLAY:

Plastic

Power packs after 1 days ( 4 sec )

Basic Plant : Only PET and HDPE plastics are recycled. 1 power pack for every 10 trash.

Upgrade 1: Monomer Recycling. 1 Power pack for every 3 trash.

Upgrade 2: Thermal depolymerization. Power pack for every 1 trash.

DISPLAY:

Basic Steps for plastic recycling:

1. Manual Sorting: All non-plastic materials are removed. Plastic is sorted into 3 types: PET, HDPE and ‘others’.
2. Chipping: The sorted plastic is cut into small pieces ready to be melted down.
3. Washing: Contaminants are removed.
4. Pelleting: The plastic is melted down and made into small pellets.

Types of plastic (with code and some examples):

1: PET – bottles

2: HDPE – milk bottles, bags

3: PVC – pipes, detergent bottles, raincoats

4: LDPE – bread bags

5: PP – straws, screw-on lids

6: PS – foam, yogurt containers

7: Others – ketchup bottles

The code numbers are printed within a recycle sign on most plastic containers.

(For basic Plant):

Usually only type 1 and 2 are recycled. Recycled PET is usually used to make threads which are used to make shoes, jackets, hats. Recycled HDPE is used to make durable products like tables, rulers, trashcans, etc. Other types are not recycled due to lack of incentive to invest in equipments required.

(For Upgrade1):

Monomer Recycling: The polymers undergoes inverse of the polymerization reaction which is used during manufacturing. This creates same mix of chemicals that formed the original polymer, which can be purified and used to synthesize new polymer chains of the same type.

(For Upgrade 2):

Thermal Depolymerization: Melts plastic into petroleum that can be remade into a variety of products.

Biodegradable plastics can also be produced which can decompose in composting plants where it is placed in a heated environment with moisture and oxygen for months.

**RADIOACTIVE WASTE**

Process: Some part is reused to produce fuel. Remaining waste is concentrated to reduce the volume and stored it in a sealed container. It might take millions of years to lose its radioactive property completely. No upgrade.

5 Power packs after 1 days ( 4 sec ) per trash.

Fish health will reduce when it swims near radioactive trash.

Powerpacks of different quality. Methane power pack is less powerful than others.

Bones, fossils in trash. The plant will give it to you along with the power packs. Take to research lab. Lab will tell you how many more is needed for playing the jigsaw game.

DISPLAY:

The trash also contains machinery, tools, clothing, air masks etc which got exposed to radiation. The spent nuclear fuel and materials heavily exposed to the fission process are called ‘high-level’ waste. These are highly corrosive and destroys most materials.

**Dry cask storage** is a method of storing high-level [radioactive waste](http://en.wikipedia.org/wiki/Radioactive_waste), such as [spent nuclear fuel](http://en.wikipedia.org/wiki/Spent_nuclear_fuel) that has already been cooled in the [spent fuel pool](http://en.wikipedia.org/wiki/Spent_fuel_pool) for at least one year.[[1]](http://en.wikipedia.org/wiki/Dry_cask_storage#cite_note-0). These [casks](http://en.wikipedia.org/wiki/Cask) are typically [steel](http://en.wikipedia.org/wiki/Steel) cylinders that are either[welded](http://en.wikipedia.org/wiki/Welding) or [bolted](http://en.wikipedia.org/wiki/Bolted_joint) closed. When inside, the fuel rods are surrounded by [inert gas](http://en.wikipedia.org/wiki/Inert_gas). Ideally, the steel cylinder provides leak-tight containment of the spent fuel. Each cylinder is surrounded by additional steel, [concrete](http://en.wikipedia.org/wiki/Concrete), or other material to provide radiation shielding to workers and members of the public. Some of the cask designs can be used for both storage and transportation.

The low-level (not extremely radioactive) waste can often be buried near the surface of the earth. It is not very dangerous and usually will have lost most of its radioactivity in a couple hundred years. The high-level waste, comprised mostly of spent fuel rods, is harder to get rid of. There are still plans for its disposal, however. Some of these include burying the waste under the ocean floor, storing it underground, and shooting it into space. The most promising option so far is burying the waste in the ground. This is called "deep geological disposal". Because a spent fuel rod contains material that takes thousands of years to become stable (and non-radioactive), it must be contained for a very long time. If it is not contained, it could come in contact with human population centers and wildlife, posing a great danger to them. Therefore, the waste must be sealed up tightly. Also, if the waste is being stored underground, it must be stored in an area where there is little groundwater flowing through. If ground water does flow through a waste storage site, it could erode the containment canisters and carry waste away into the environment. Additionally, a disposal site must be found with little geological activity. We don't want to put a waste disposal site on top of a fault line, where 1000 years in the future an earthquake will occur, releasing the buried waste into the environment.

The waste will probably be encapsulated in large casks designed to withstand corrosion, impacts, radiation, and temperature extremes.

The **Yucca Mountain Nuclear Waste Repository** was to be a [deep geological repository](http://en.wikipedia.org/wiki/Deep_geological_repository) storage facility for[spent nuclear reactor fuel](http://en.wikipedia.org/wiki/Spent_nuclear_fuel) and other [high level radioactive waste](http://en.wikipedia.org/wiki/High_level_radioactive_waste), until the project was canceled in 2009. It was to be located on federal land adjacent to the [Nevada Test Site](http://en.wikipedia.org/wiki/Nevada_Test_Site) in [Nye County, Nevada](http://en.wikipedia.org/wiki/Nye_County,_Nevada), about 80 mi (130 km) northwest of the [Las Vegas metropolitan area](http://en.wikipedia.org/wiki/Las_Vegas_metropolitan_area). The proposed repository was within [Yucca Mountain](http://en.wikipedia.org/wiki/Yucca_Mountain), a [ridge](http://en.wikipedia.org/wiki/Ridge) line in the south-central part of Nevada near its border with [California](http://en.wikipedia.org/wiki/California).

Although the location has been highly contested by both environmentalists and non-local residents in Las Vegas, which is over 100 miles (160 km) away, it was approved in 2002 by the [United States Congress](http://en.wikipedia.org/wiki/United_States_Congress). However, under the [Obama Administration](http://en.wikipedia.org/wiki/Obama_Administration)[[2]](http://en.wikipedia.org/wiki/Yucca_Mountain_nuclear_waste_repository#cite_note-GAO-1) funding for development of Yucca Mountain waste site was terminated effective with the 2011 federal budget passed by Congress on April 14, 2011. The [US GAO](http://en.wikipedia.org/wiki/General_Accounting_Office)stating that the closure was for policy not technical or safety reasons.[[2]](http://en.wikipedia.org/wiki/Yucca_Mountain_nuclear_waste_repository#cite_note-GAO-1) This leaves United States civilians without any long term storage site for high level radioactive waste, currently stored on-site at various nuclear facilities around the country, although the United States government can dispose of its waste at [WIPP](http://en.wikipedia.org/wiki/Waste_Isolation_Pilot_Plant), in rooms 2,150 feet (660 m) underground.[[3]](http://en.wikipedia.org/wiki/Yucca_Mountain_nuclear_waste_repository#cite_note-2) The [Department of Energy](http://en.wikipedia.org/wiki/United_States_Department_of_Energy) is reviewing other options for a high level waste repository.

Spent nuclear fuel is the radioactive by-product of [electric power](http://en.wikipedia.org/wiki/Electric_power) [generation](http://en.wikipedia.org/wiki/Electricity_generation) at commercial [nuclear power](http://en.wikipedia.org/wiki/Nuclear_power) plants, and high-level radioactive waste is the by-product from [reprocessing](http://en.wikipedia.org/wiki/Nuclear_reprocessing) spent fuel to produce fissile material for nuclear weapons

**Nuclear reprocessing** technology was developed to chemically separate and recover fissionable plutonium from irradiated nuclear fuel.[[1]](http://en.wikipedia.org/wiki/Nuclear_reprocessing#cite_note-0) Reprocessing serves multiple purposes, whose relative importance has changed over time. Originally reprocessing was used solely to extract plutonium for producing [nuclear weapons](http://en.wikipedia.org/wiki/Nuclear_weapons). With the commercialization of [nuclear power](http://en.wikipedia.org/wiki/Nuclear_power), the reprocessed plutonium was recycled back into [MOX nuclear fuel](http://en.wikipedia.org/wiki/MOX_nuclear_fuel) for [thermal reactors](http://en.wikipedia.org/wiki/Thermal_reactor).[[2]](http://en.wikipedia.org/wiki/Nuclear_reprocessing#cite_note-1) The[reprocessed uranium](http://en.wikipedia.org/wiki/Reprocessed_uranium), which constitutes the bulk of the spent fuel material, can in principle also be re-used as fuel, but that is only economic when uranium prices are high.

An invisible speck of radioactive material can give you cancer.

Japan’s Fukushuma powerplant explosion in December 2011 caused nuclear waste to go into the Pacific ocean, which will harm marine life. It might reach the shores of other countries. Many chemical compounds are volatile and dissolve in water to form clouds.