MASLAB 2014 – Game Description and Rules

THE STORY

The government has commissioned MIT engineers to construct an autonomously run Nuclear Energy Facility. To do this, autonomous robots are charged with the task of running the plant.

A properly running plant requires the placement of fresh active energy cells into the facility's reactors. Some energy cells are located at various stations around the facility, and others are located in a centralized Energy Cell Silo. This Silo needs to be checked on a daily basis, so the facility drones are encouraged to extract cells of any kind from it. Placing active cells into as many unique reactors as possible will lead to optimal plant efficiency. Placing dead cells into reactors is wasteful and will not benefit the energy production of the plant. Finally, any dead cells on the facility's floor are considered as hazardous and should be cleaned up.

Since many teams have owned up to the challenge and only one team can obtain the government contract, a competitive approach was proposed. Two competing teams are operating in adjacent facilities. The team with the most efficient plant and fewest scattered dead cells will be declared the winner, thus advancing them towards acquiring the contract.

THE FACILITY LAYOUT

This year's competition will have two teams competing on the field every match. Matches last the duration of 3 minutes. Each team is given the opportunity to run on both sides of the game field (one side per match). The game field has a fixed starting position for each robot on a particular side. Each side will have 2-4 empty cells (red balls) and 6-9 active cells (green balls) on the field at the beginning of a match. The main components of the nuclear power facility have the four elements:
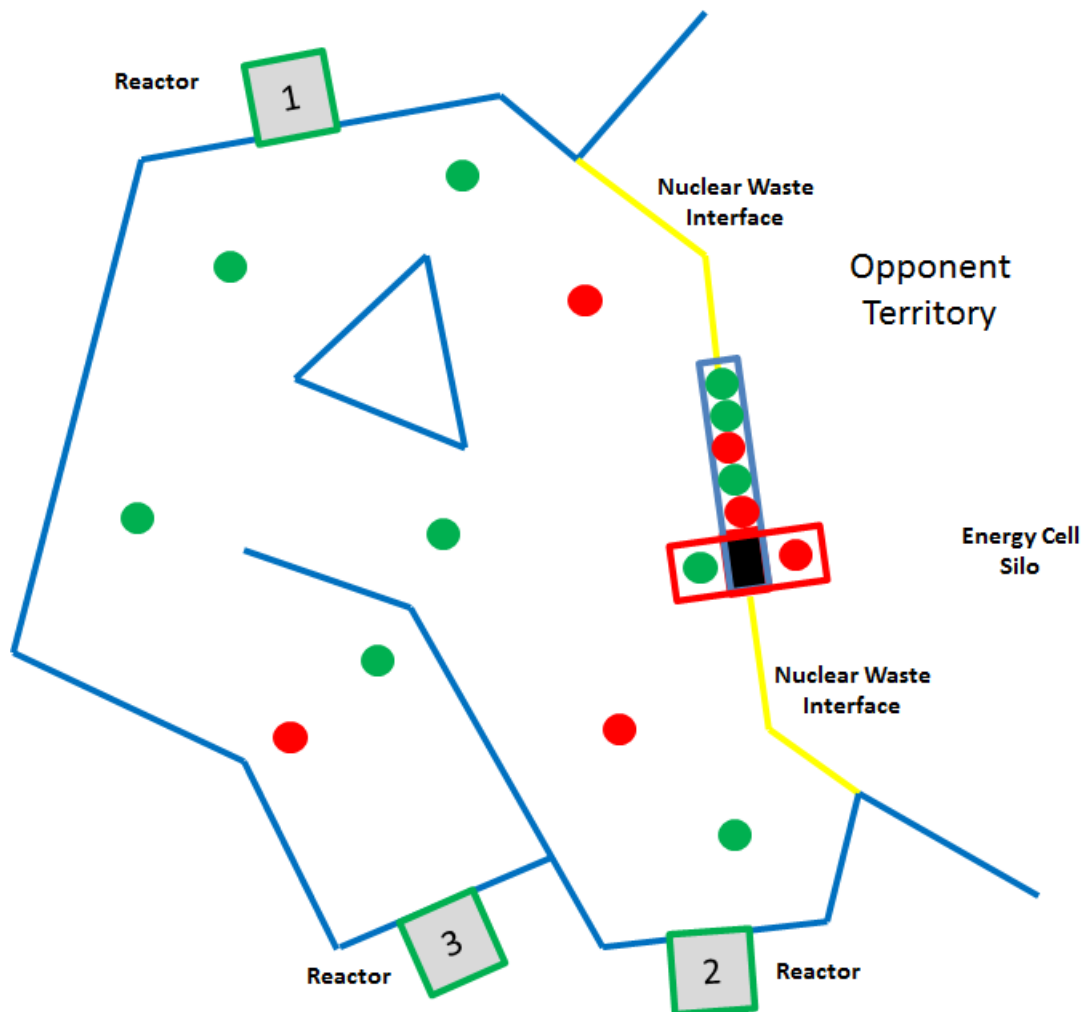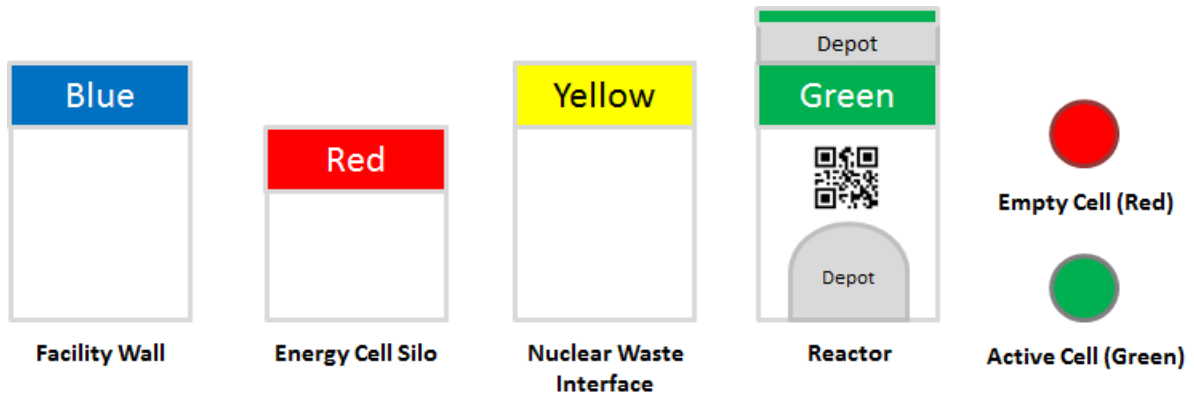
1. Facility Walls
2. The Energy Cell Silo
3. Nuclear Waste Interfaces
4. Three Reactors (per side)

The default **Facility Walls** are white-faced, 6 inches tall, and are lined with 2 inches of blue paint at the top. Knocking these over could lead to the facility collapsing and causing a nuclear meltdown.

The **Energy Cell Silo** is a dispenser containing green and red balls located in a common vessel to both teams. The walls for this container are 4 inches tall and lined with red paint at the top. Both teams can extract balls from this container. The dispensing system will only release one ball at a time into a collection zone. If the ball present is removed, a new ball will be dispensed within 1 second.

The **Nuclear Waste Interfaces** are any walls lined with yellow paint at the top. Teams may dispense their nuclear waste (red balls) onto the opponent's territory at these interfaces.

A **Reactor** tower functions as a location to collect active energy cells (green balls). Reactors are denoted by walls that are lined with green paint at the top. Reactor towers are 6 inches tall and have energy cell repositories on the top (as flat area) and on the bottom (as a mouse hole). Each of the three reactors per side of the map has a unique QR code to identify it.

Blue — **Facility Wall**

Red — **Energy Cell Silo**

Yellow — **Nuclear Waste Interface**

Depot / Green / Depot — **Reactor**

Empty Cell (Red)

Active Cell (Green)

Reactor 1

Nuclear Waste Interface

Opponent Territory

Energy Cell Silo

Nuclear Waste Interface

Reactor 3

Reactor 2

GOVERNMENT RANKING CRITERIA

Possession of any Energy Cell (**Active** or **Empty**)	**1 pt** each
Placement of **Active Cell** in low port of **Reactor**	**3 pt** each
Empty Cell in _opponent's_ facility at the end of the match	**5 pt** each
Empty Cell in _opponent's_ reactor in low port	**5 pt** each
Placement of **Active Cell** in high port of **Reactor**	**7 pt** each
Empty Cell in _opponent's_ reactor in high port	**10 pt** each
Unique **Reactor** used with at least one **Active Cell**	**10 pt** per unique reactor
Unique **Reactor** used with **Active Cells** in both ports	**5 pt** per unique reactor
Collection of any Cell (**Active** of **Empty**) from **Energy Silo**	**15 pt** obtainable once

Tie breaking techniques are TBD

For now assume that the lighter robot will win.