SPACECHEM: A GUIDE FOR EDUCATORS

WHAT IS SPACECHEM?

SpaceChem is an **intriguing, "problem-solving centric" puzzle game** by Zachtronics Industries that combines the **logic of computer programming** with the **scientific domain of chemistry**, set in an original science fiction universe. Players build machines using mechanics similar to visual programming that assemble and transform chemical compounds. Players later connect those machines together to form complex pipelines, and ultimately construct special pipelines to fight back against space-monsters that threaten humanity. In addition to being challenging and mentally stimulating, it's been described as "**one of the year's best indie games**" by *Rock, Paper, Shotgun*, a leading PC gaming website.

WHY WOULD I WANT TO USE SPACECHEM IN MY CLASSROOM?

As a solid entertainment title that also ties into real-world science and engineering, SpaceChem is unique because it is educational without falling into the trap of other "educational games" that often forget to be fun. While not a replacement for traditional instruction in the areas of computer programming and chemistry, SpaceChem can be used as:

- a reward that keeps students thinking;
- an opportunity to practice problem solving skills;
- an application for statistics using students' scores, with in-game histograms;
- a cross-curricular reinforcement tool; or
- a way to get students excited about computer programming and chemistry.

WHAT DOES SPACECHEM TEACH?

- In SpaceChem, players must construct molecules, which are made out of atoms that are bonded together.
- Most molecules and atoms are based off of those from real life. For example, one puzzle requires players to build a machine that combines H_2 and O_2 molecules to create H_2O_2 molecules.
- Many molecules have short blurbs of chemistry trivia associated with them.
- The core programming model consists of two "threads" that operate simultaneously, requiring players to explore and master concepts like **in-order execution**, **loops**, **branching**, **synchronization primitives**, and **subroutines** in an organic and comprehensible environment.

WHAT DOES SPACECHEM NOT TEACH?

- The core gameplay involves programming machines that are able to directly manipulate atoms and molecules, a concept that is not entirely grounded in reality.
- The bonding model in SpaceChem is much simpler than in real life. Instead of being based on electronegativity and orbital levels, bonds are created and removed directly through the use of "bonders".
- The last few puzzles involve imaginary atoms as part of the story. However, they are clearly marked and appear in a special section of the in-game periodic table.

WHAT AGES IS SPACECHEM APPROPRIATE FOR?

The story in SpaceChem is presented as a 10,000 word novelette, interspersed with the 53 puzzles in the game. While the "battle" scenes of the game depict no blood or gore (and, in fact, very little fighting), the story in an off-the-shelf version contains a few scenes that would most likely be classified as **E10** if rated by the ESRB. Specifically:

- A character's head explodes, described as "sending chunks of flesh and blood flying all over the office". A nostril is described landing on another character's shirt.
- A character discovers a dead body, described as "atop the stack of desks, eyes wide and face drained of color".
- A character, after being possessed by a space-monster, is shot by another character, with the action described as follows: "A bullet pierced through Bruce's forehead, sending blood onto the wall".

When purchased directly from Zachtronics Industries, the story can be modified to remove objectionable scenes or be removed entirely if desired.

WHAT PLATFORMS IS SPACECHEM AVAILABLE FOR?

SpaceChem is available for and supported on the following platforms:

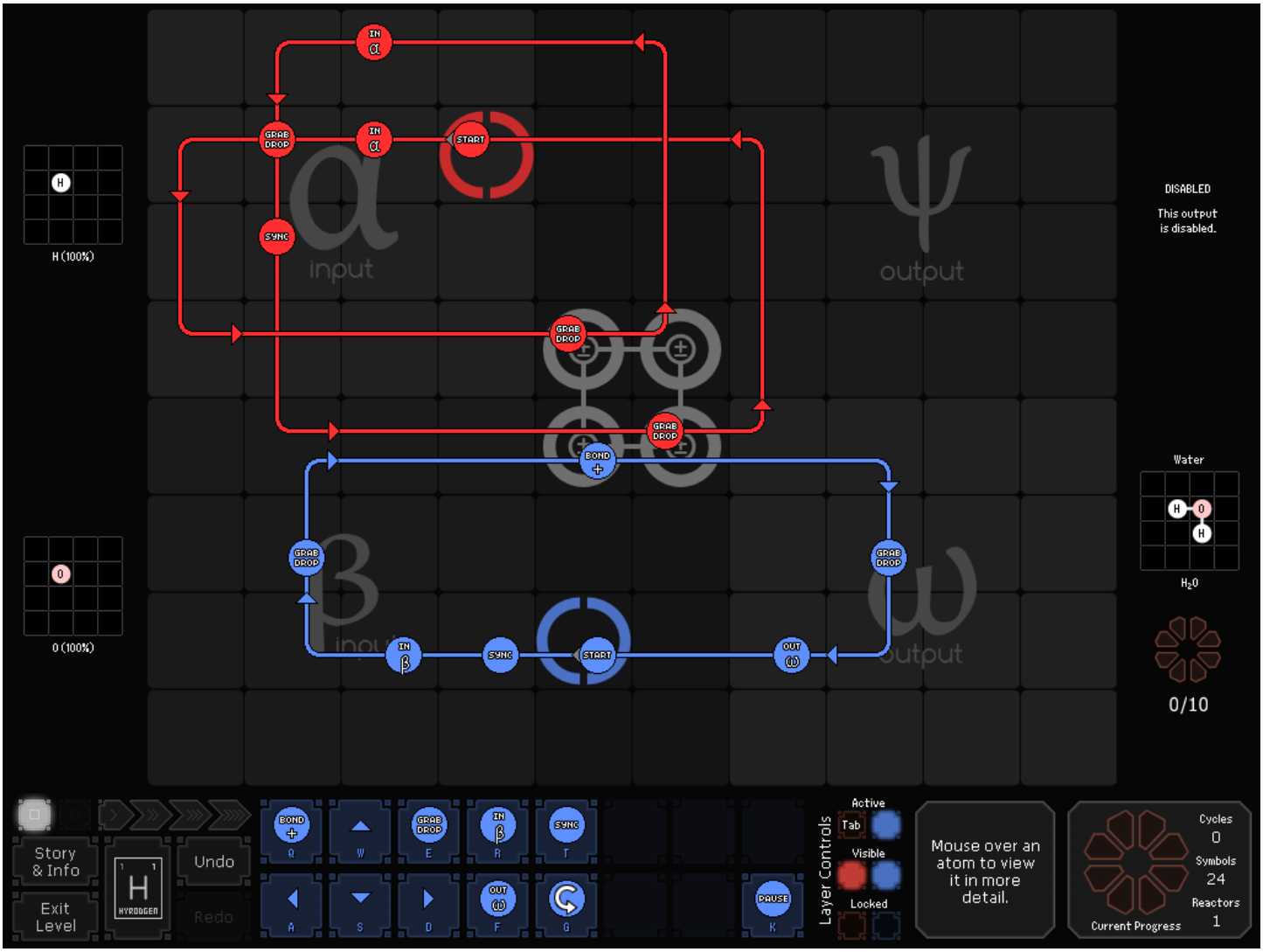
- Windows XP
- Windows Vista
- Windows 7
- Mac OSX 10.5.8 and above
- Ubuntu 10.04 and above

A free demo is available at **http://store.zachtronicsindustries.com** for testing and trial purposes.

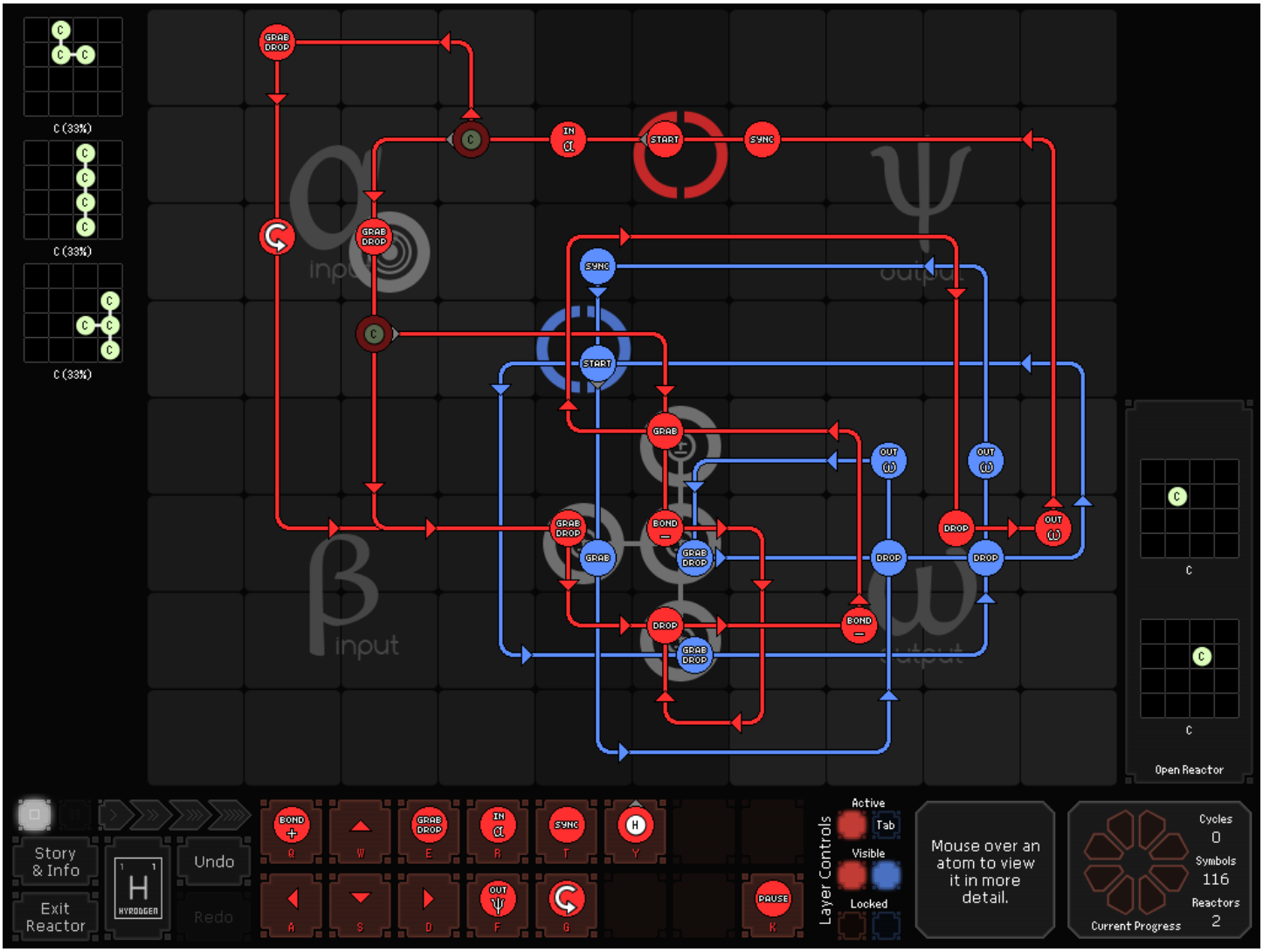
IS AN EDUCATIONAL DISCOUNT AVAILABLE?

Yes! If purchased directly from Zachtronics Industries, SpaceChem is available at an educational discount price of $10 per license when 10 or more licenses are purchased. If interested, please contact **zach@zachtronicsindustries.com** for more information.

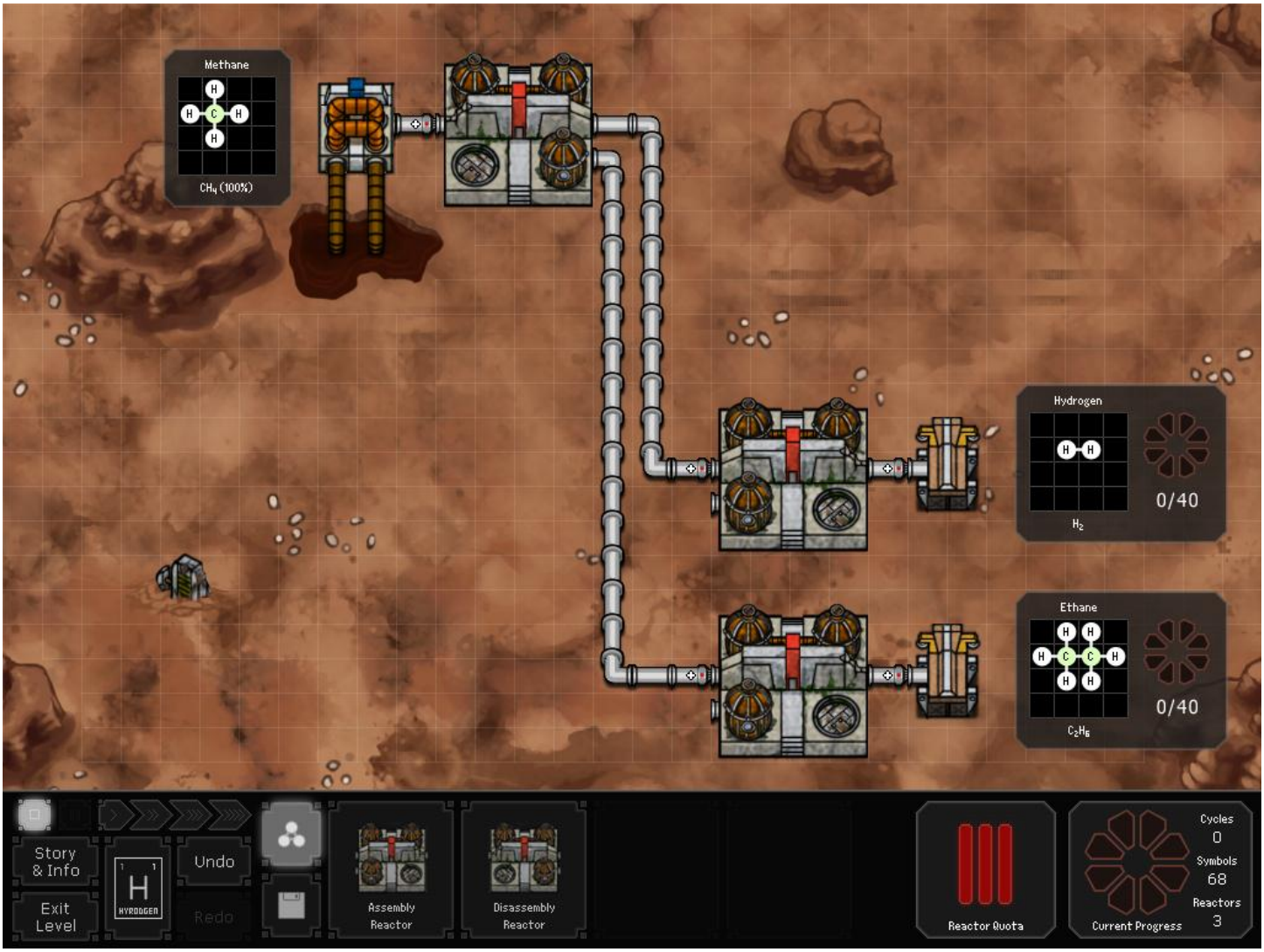
SCREENSHOT – INSIDE OF A “REACTOR”, CREATING WATER



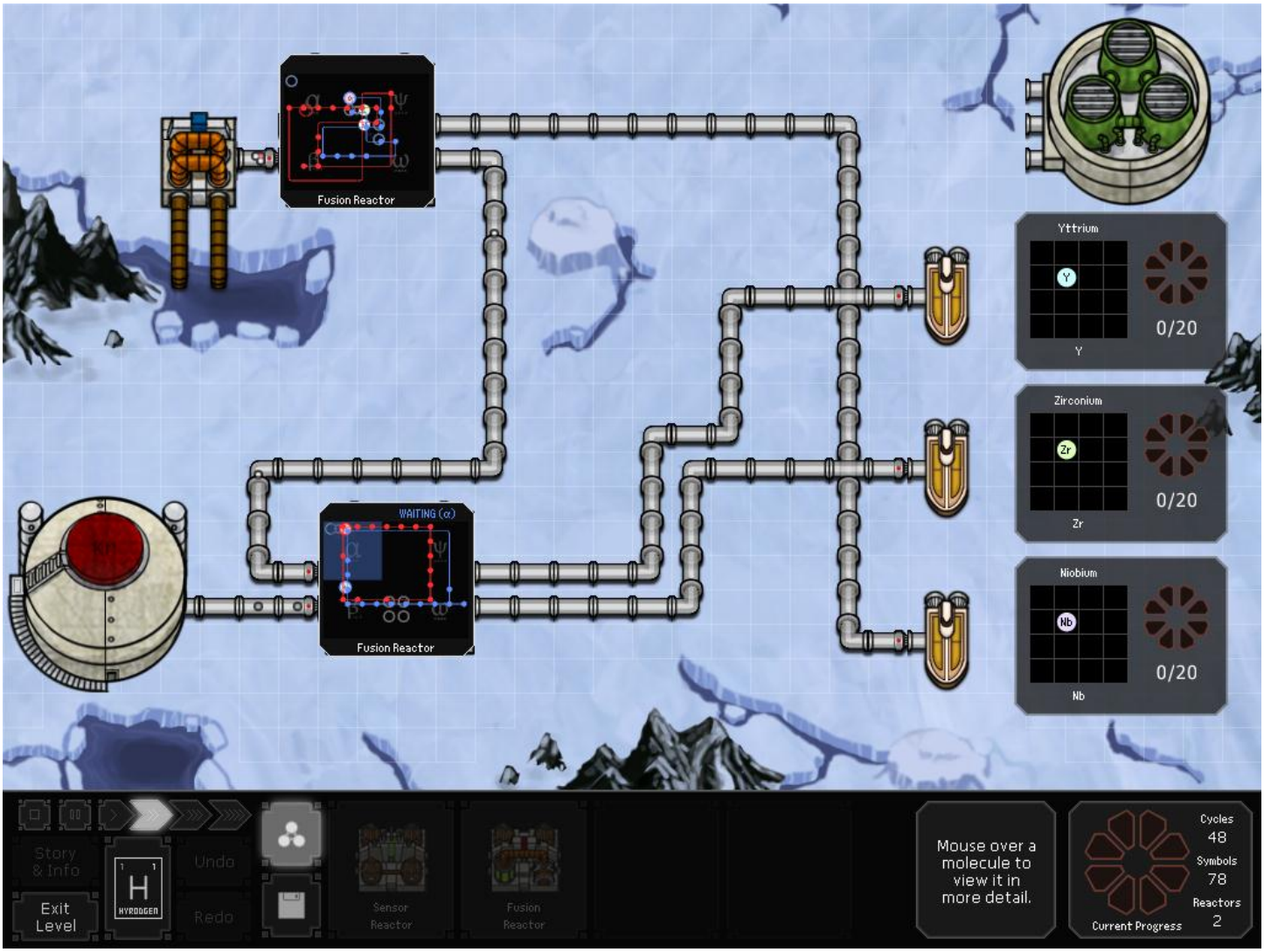
SCREENSHOT – INSIDE OF ANOTHER “REACTOR”, BREAKING UP CARBON CHAINS



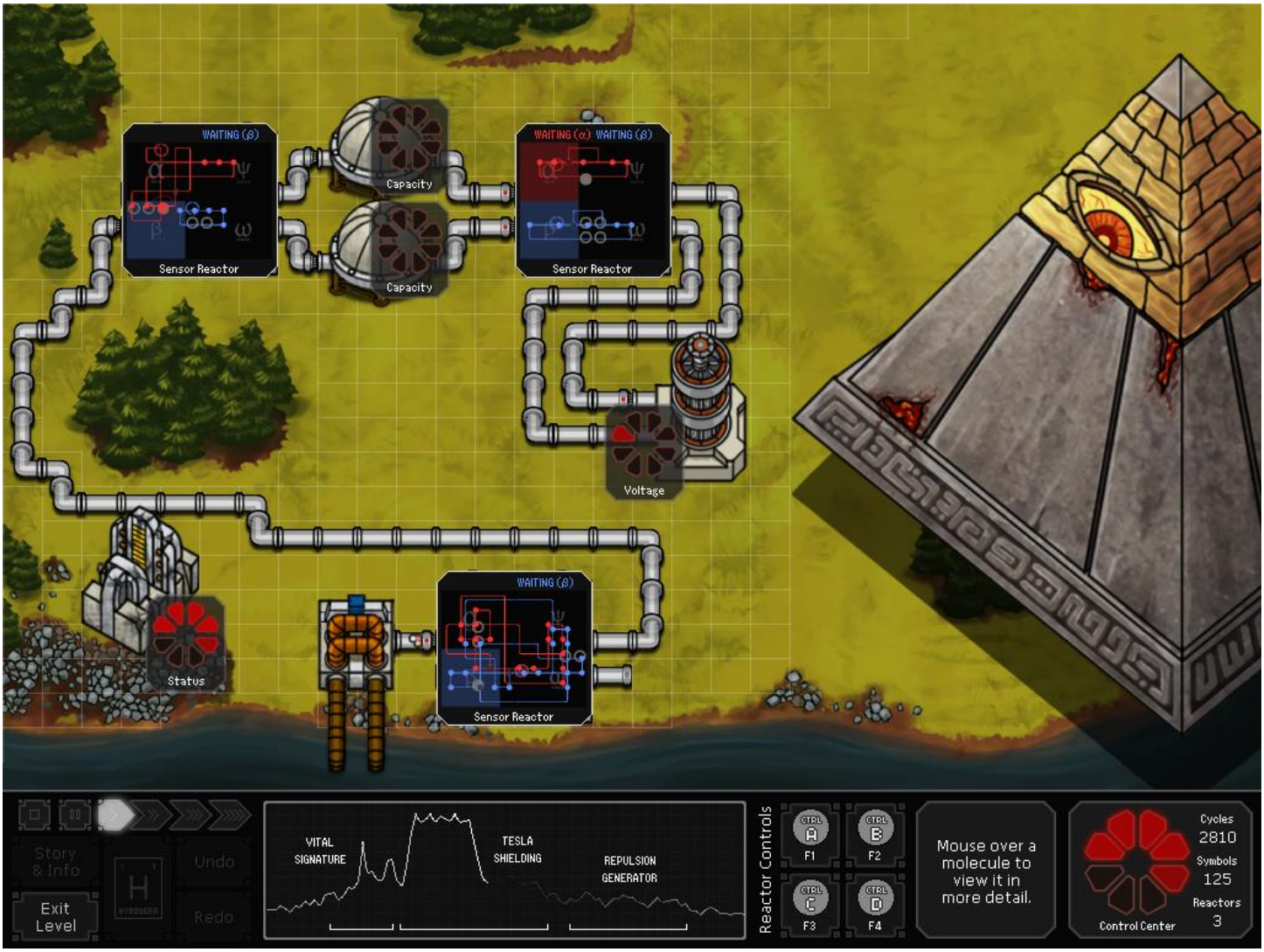
SCREENSHOT – A PIPELINE, COMPRISED OF MULTIPLE “REACTORS”



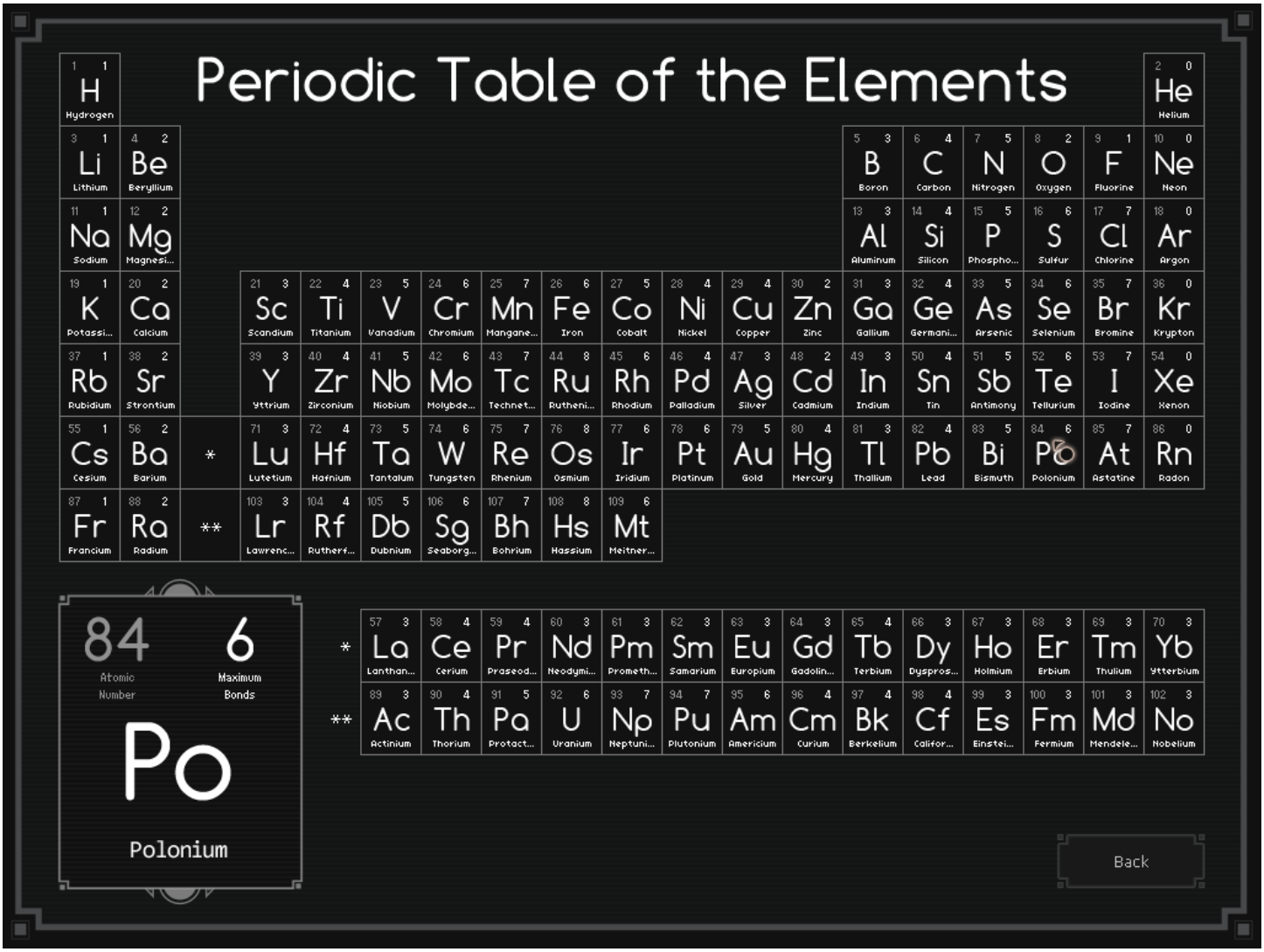
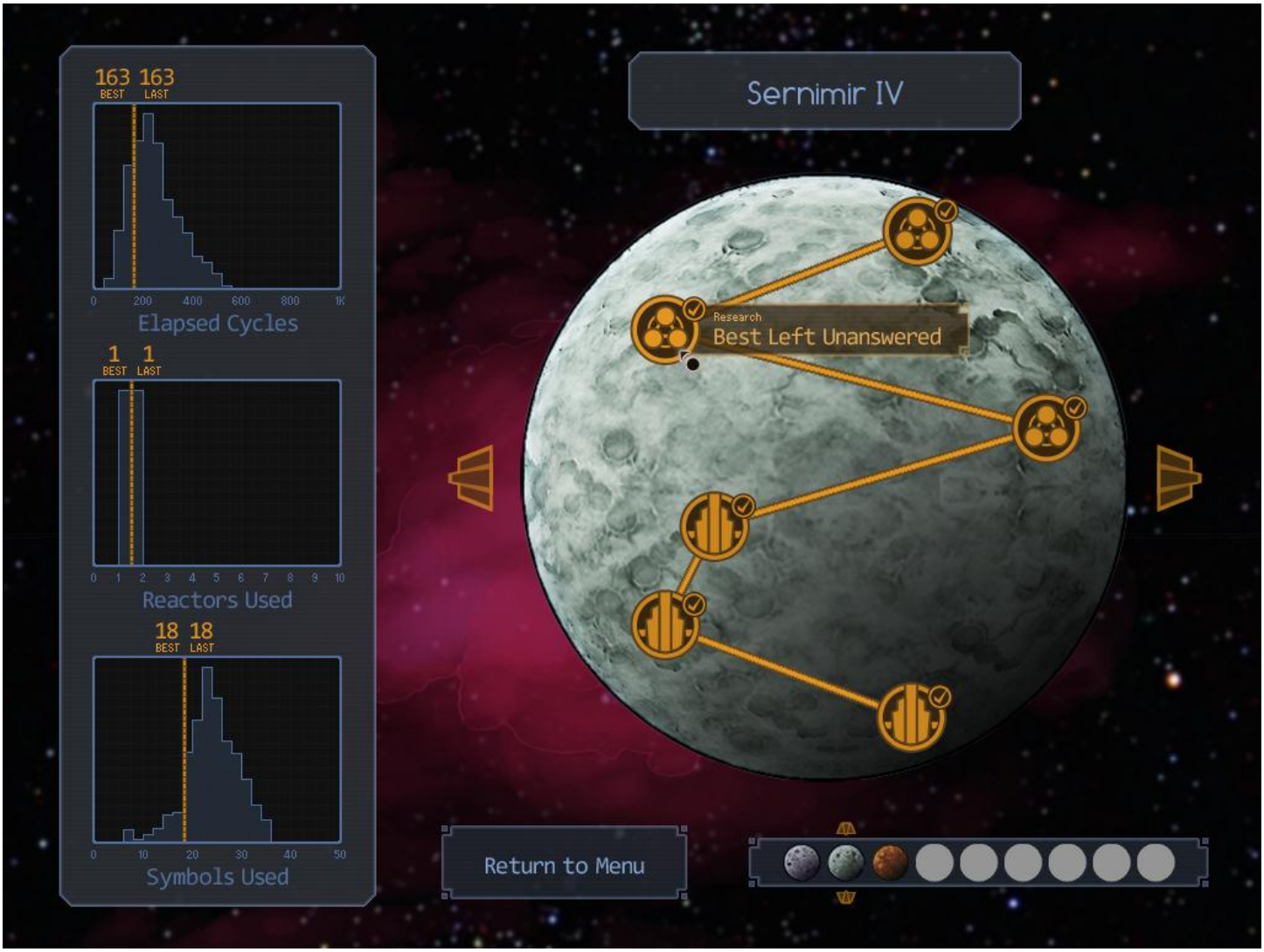
SCREENSHOT –ANOTHER PIPELINE, THIS TIME WITH FUSION



SCREENSHOT – A BOSS BATTLE



SCREENSHOT – THE IN-GAME PERIODIC TABLE



SCREENSHOT – LEVEL SELECT, WITH SCORE HISTOGRAMS