

## DCM Exhibitions – Staff Training Materials

### Water World (PART A)

#### Exhibition Overview:

*Water World* celebrates water – its movement and power, the courses it finds, and the ways it interacts with objects it encounters as it flows and falls. Visitors will play and work with water in a variety of hands-on ways: launching balls into winding tracks, guiding boats through a lock system, fitting together plastic pipe to redirect flow, feeding a vortex or using air blowers to create currents. Visitors will also interact with a model of the Hoover Dam, Lake Mead, and the Bypass Bridge. The Hoover Dam model and related activities demonstrate where the region’s water comes from, how the dam works, how electricity is generated, and the real-life forces of water. To support hands-on learning about water, hand dryers and water resistant smocks are available for visitors to use in *Water World*.

#### Target Audiences:

Children ages 2-12 + adults (families), school groups (Pre-K – 7<sup>th</sup> grade)

#### Education & Experience Goals:

- Visitors discover and experiment with the properties, flow, power and speed of water through open-ended, exploratory play.
- Visitors engage with sensory qualities of water.
- Visitors are active learners. They use critical thinking and problem solving skills as they manipulate the flow and power of water at exhibit components. (Visitors utilize the scientific method: asking a question, researching, hypothesizing, testing the hypothesis by experimenting, analyzing data, creating a new/ revised hypothesis and conducting another experiment [if needed], drawing a conclusion and communicating results.)
- Visitors create water “events” in which cause and effect are visible and use the flow of water to power activities.
- Visitors learn more about water phenomena, such as pressure, flow, surface tension and Bernoulli’s or Torricelli’s Law.
- Visitors connect what they’re doing in the exhibit to the real world, such as the generation of hydroelectric power and the Hoover Dam.
- Visitors work individually, collaborate with friends or family members, or interact with water “events” set up by other visitors. Activities support all approaches.
- Staff supports and extends the visitor experience by facilitating educational interactions at individual components.

#### Key Takeaway Messages:

- **Water has power.** Flowing water can cause objects to move, rise up or come down, spin or shoot up into the air.
- **You can make things happen.** You can use water to cause certain things to happen. If you change what you’re doing (input), the results will be different (output).

## **Appendix A**

### **Background Information:**

#### ***The Power of Water***

Historians believe that as early as 2500 BCE, the ancient Egyptians used the energy from river currents to rotate a waterwheel, which then ran machinery (for example, a tool used to grind grain). Today, electricity from water-powered generators is known as *hydroelectric power* (or “hydropower”). When water flows through a pipe, or penstock, it pushes against and turns blades in a turbine, which spin a generator to produce electricity.

Unlike fossil fuels such as petroleum, natural gas and coal, hydroelectric power is a renewable source of energy. When a dam is built to harness the power of water, it also typically creates a source of water for irrigation and drinking. Other sources of water power include waterfalls; swiftly flowing water in rivers; and the tides, waves and currents of the ocean.

Sources:

**Compton’s by Britannica, Britannica Online for Kids**

<http://kids.britannica.com/comptons/article-231139/dam>

<http://kids.britannica.com/comptons/article-9277668/waterpower>

#### ***Hoover Dam***

The Hoover Dam, constructed between 1930-1936, backs up the Colorado River along the Arizona/Nevada border to create a large reservoir, Lake Mead. The Hoover Dam’s generators provide power in California, Nevada and Arizona. Originally named the Boulder Dam, the Hoover Dam was the first of several large-scale reclamation projects completed along the Colorado River and its tributaries. The dams allow the river water to be captured and used for irrigation, domestic water, recreation and hydroelectric power production in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming, and parts of Mexico. Due to drought and increased water consumption in the Southwest U.S., Lake Mead’s water level has declined significantly over the past several years. Authorities have attempted to deal with the issue by developing new turbines at the dam and by looking to alternative water sources, such as groundwater.

Sources:

**U.S. Department of the Interior, Bureau of Reclamation**

<http://www.usbr.gov/lc/hooverdam/educate/hoovered.pdf>

**Compton’s by Britannica, Britannica Online for Kids**

<http://kids.britannica.com/comptons/article-198588/dam>

**Las Vegas Sun**

<http://www.lasvegassun.com/news/2012/sep/12/water-authority-gets-state-agencys-backing-pipelin/>

**Washington Post**

[http://www.washingtonpost.com/business/economy/dealing-with-drought-at-the-hoover-dam/2012/09/07/220dc628-f91e-11e1-8b93-c4f4ab1c8d13\\_gallery.html#photo=4](http://www.washingtonpost.com/business/economy/dealing-with-drought-at-the-hoover-dam/2012/09/07/220dc628-f91e-11e1-8b93-c4f4ab1c8d13_gallery.html#photo=4)

**Water's Properties/Science of Water**

A water molecule is made up of two hydrogen atoms bonded to an oxygen atom (or H<sub>2</sub>O). Pure water has no color, odor or taste; however, it is vital for life. Where there is water on Earth, there is life. Where water is scarce, such as in the desert, life can be a struggle.

Water has a number of unique scientific properties: polarity, capillary action, surface tension, and density. Water is *polar*, which makes its molecules “sticky” or cohesive. This stickiness is responsible for *capillary action*, an important facet of water that allows it to move upward through the roots of plants and the small blood vessels of human bodies. Cohesion also causes *surface tension*, water’s “invisible skin.” Water is considered the “universal solvent” because its bipolar molecule allows it to dissolve a wide range of substances. Finally, water’s *density* allows sound to move through it for long distances. And, solid water (ice) is less dense than liquid water, which means that ice floats. Floating ice in a body of water – as opposed to a lake freezing from the bottom up – actually ensures the survival of many aquatic ecosystems.

Sources:

**Utah.gov, Division of Water Resources**

<http://watereducation.utah.gov/WaterScience/default.asp>

**U.S. Department of the Interior, U.S. Geological Survey**

<https://www.usgs.gov/products/data-and-tools/data-and-tools-topics/water>

**Resources:*****The Power of Water***

[http://www.eia.gov/kids/energy.cfm?page=hydropower\\_home-basics](http://www.eia.gov/kids/energy.cfm?page=hydropower_home-basics)

Energy Kids, U.S. Energy Information Administration

<http://education.nationalgeographic.com/education/encyclopedia/hydroelectric-energy/?ar a=1>

National Geographic Education, Hydroelectric Power

***Hoover Dam***

<http://www.usbr.gov/lc/hooverdam/educate/kidfacts.html>

U.S. Department of the Interior, Bureau of Reclamation, Hoover Dam Factoids for Kids

<http://www.usbr.gov/lc/hooverdam/educate/hoovered.pdf>

U.S. Department of the Interior, Bureau of Reclamation, *Hoover Dam Learning Packet*. 1999

<https://www.youtube.com/watch?v=JaSIVSnfkv4>

U.S. Department of the Interior - Documentary Film

***Water's Properties/Science of Water***

<https://water.usgs.gov/edu/>

U.S. Department of the Interior, U.S. Geological Survey, "The USGS Water Science School"

<http://watereducation.utah.gov/WaterScience/default.asp>

Utah.gov, Division of Water Resources, "Water Science"