

## DCM Exhibitions – Staff Training Materials

### Water World (PART B)

#### Exhibition Particulars:

- Water has broad appeal and *Water World* has been designed for the **broadest age range**: ages 2 – 12 + adults. This is important to keep in mind as a staff person in this exhibition. There is a lower tank designed for Little Learners, but they will undoubtedly explore the whole exhibition. When necessary, help older kids be aware of smaller ones around them.
- As there will regularly be water on the floor, staff should encourage **walking** only. Shoes are required at all times for the safety of visitors.
- To support parents and to provide launch points for discussion for older children, a set of twelve 8 ½ x 11” **laminated cards featuring additional background information** on water topics has been developed.
- Additional information about the **Hoover Dam, water power** and **water facts** may be found on larger graphics on the walls. Staff should familiarize themselves with the content found there.
- There are **loose props and manipulatives** throughout the exhibition, including plastic balls, oversize Legos, funnels, etc. Staff needs to be mindful of this and pick things up off the floor as needed and return items to the tanks where they’re needed/used.
- Water resistant **smocks and a dryer** are available for visitors.

#### Component Descriptions:

##### Orientation Labels:

At the front entrance of *Water World* are three circular labels highlighting the experiential and discovery goals for the exhibition. Visitors explore these concepts throughout *Water World* by conducting their own open-ended experiments.

- Use the power of water to make things happen.
- Explore water science.
- Experiment with water’s current, pressure and energy.

##### Laminated Card Topics:

- Play is a child’s way of learning.
- What is water?
- Water as solid, liquid and gas.
- Water currents.
- Laminar flow effect.
- Water tanks, pumps and pressure.
- Water vortex.
- Locks.
- Water flow.
- Bernoulli Principle.
- Electricity generated at the Hoover Dam.
- Turbines and generators at the Hoover Dam.

### **Central Tank Cluster**

At the *Central Tank Cluster*, visitors learn how a water tank works and how water can be used to generate electricity (hydroelectric power).

- A. Ball Launch Tower and Track** – Visitors use a powerful stream of water (Laminar Flow Effect) to carry a plastic ball 12 feet in the air. When hit, balls shoot in the air and land in a suspended, overhead track before traveling to a bin to be used again.

#### Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Encourage visitors to use a pulsing stream of water (Laminar Flow) to launch balls onto an overhead track. Launch one ball at a time to prevent the track from jamming.
- Discourage visitors from placing any other loose materials on the ball track.
- Ask visitors to make predictions about the ball launcher, i.e., Where will the balls go after they are launched? How high will the balls travel before landing on the track? What is the probability of the balls landing on the right track, the left track?
- Ask visitors to predict how many gallons of water are in the water tables.

- B. Moveable Water Wheel** – Visitors use the power of water to turn a water wheel. The water wheel can be moved to different locations in the tank.

#### Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Encourage visitors to use rushing water to turn turbines and water wheels.

- C. Build a Canyon** – Visitors work with Lego blocks to build variously shaped pathways for water to travel through. Visitors investigate how water responds to barriers of different shapes, and use the blocks to build gullies, dams, streams, or canyons.

#### Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Use floating toys to model navigation of the waterways.
- Use motorized water toys to demonstrate navigation of the canyon or waterways.
- Encourage visitors to build canyons and gullies.
- Ask visitors to design and test different structures/models using the Lego blocks.
- Challenge visitors to build a dam-like structure to prevent water flow.
- Encourage visitors to build a dock for their boat.

- D. Locks** – Visitors control downstream and upstream water movement as they move boats and other floating objects from low water to high water, operating a series of manual locks.

#### Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Use a motorized water toys to navigate through the locks.
- Ask visitors to experiment guiding balls and boats through the system of locks, while identifying the purpose of the manual locks.
- Challenge visitors to move boats through the lock system, without capsizing.
- Ask visitors to manipulate the locks to create a “waterfall” effect in the canyon exhibit.
- Challenge the visitors to a boat race in this area.

**E. Percussion Squirters** – By aiming steady streams of water at percussive metal chimes, visitors create musical effects with water.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Work collaboratively with visitors to use water squirters (forced flow) to play musical chimes.
- Discuss the relationship between the length of the chimes, and the resulting pitch.
- Challenge visitors to identify the chimes that result in the loudest sound.

**F. Pipeworks** – Visitors assemble plastic pipes and connectors to create a vertical or horizontal “plumbing system” through which water can travel.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Challenge visitors to direct water up into the pipes.
- Encourage visitors to create pipework “fountains.”
- Encourage visitors to block, release and re-route water to trigger cause-and-effect activities.
- Provide tips to increase the water pressure in the pipes (cover some of the pipelines in the water table using a closed PVC pipe.)
- Work collaboratively with visitors to construct a working plumbing system.
- Challenge visitors to work together to build their plumbing system higher/longer.

**G. Water Tank** – Pumping water into a tank and then releasing it provides a demonstration of “head pressure.” As the water level decreases, so does the force with which it exits the tank. (Torricelli’s Law)

Water head pressure is static pressure caused by the weight of water solely due to its height above the measuring point. The pressure at the bottom of a 40-foot lake or a 40-foot high thin tube would be identical, since only height is involved. The value may be expressed as pounds-per-square-inch or inches-of-water column pressure. This calculation is used to solve many different practical problems involving water and other liquids of known density.

Source: [http://www.ehow.com/how\\_7231875\\_calculate-water-head-pressure.html#ixzz2KkqMe81k](http://www.ehow.com/how_7231875_calculate-water-head-pressure.html#ixzz2KkqMe81k)

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Encourage visitors to pump water up to a water tank and observe what happens when it's released.

- H. **Geyser** – Balls appear to “float” above spouts of water as they are “balanced” by all the forces acting on it. (Bernoulli Principle)

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Use a geyser to trap balls in the air by balancing the balls on the stream of water emitted from the geyser. (Bernoulli's Principle)

- I. **Downstream Diversions** – Visitors position plastic panels to dam, channel or divert the “downstream” flow created by the “used water” flowing through the turbines.

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Encourage visitors to race boats downstream.
- Work collaboratively with visitors to build channels and dams.

- J. **Turbines and Power Transmission Tower** – Visitors work together to operate a large-scale model of the Hoover Dam's hydroelectric plant, controlling the flow of the water from the intake towers to the penstocks and from the penstocks to the turbines. [See diagram of hydroelectric generator.]

Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Work collaboratively with visitors to use the model of the hydroelectric plant to generate power and light up the cityscape image of Las Vegas.
- Use floating toys to demonstrate how objects float, and how currents affect floating objects.
- Use motorized water toys to demonstrate how boats and watercrafts navigate through water.
- Use a fishing game to enhance fine motor skills, and to encourage a discussion about wildlife in Lake Mead.
- Use a sink or float game to demonstrate buoyancy. Compare and contrast the properties of items that sink and float.

- Share interesting facts about Lake Mead, the Hoover Dam, and the impact that hydropower has in Las Vegas.



**Top left:** Hoover Dam releasing water from the jet-flow gates in 1998.

**Top right:** The Hoover Dam Bypass as seen from the Dam.

**Bottom:** Hoover Dam 2011 panoramic view from the Arizona side showing the penstock towers, the Nevada-side spillway entrance and the Mike O'Callaghan – Pat Tillman Memorial Bridge, also known as the Hoover Dam Bypass.

Source: [http://en.wikipedia.org/wiki/Hoover\\_Dam](http://en.wikipedia.org/wiki/Hoover_Dam)

### **Turbulence Tank**

At the *Turbulence Tank*, visitors experiment with various forces that act on water, directing air blowers over the water's surface, or creating currents by maneuvering underwater air jets. A "mushroom" water bell demonstrates surface tension.

### Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Direct air blowers over the water's surface to move objects and create surface currents.
- Create underwater currents by positioning underwater jets to move objects or create directional or turbulent flow conditions. Encourage visitors to use the underwater jets to lead boats to the dock area.
- Create a "mushroom" water bell (surface tension).
- Use floating toys to show how objects float, and how currents affect floating objects.
- Use motorized water toys to show how boats and watercrafts navigate through water.
- Use a fishing game to enhance fine motor skills, and to encourage a discussion about wildlife in Lake Mead.
- Use a sink or float game to demonstrate buoyancy. Compare and contrast the properties of items that sink and float.
- Encourage visitors to use the red wands to apply varying degrees of pressure to the water spouts, while observing the different outcomes.

### ***Little Learner Tank***

The *Little Learner Tank* provides pre-school-aged children (ages 2-4) with their own dedicated set of activities especially geared to their size and developmental level.

### Engagement Tools and Tips

- Use laminated Conversation Cards to facilitate an inquiry-based approach to learning.
- Use products from the retail store that correlate with the Water World experience.
- Encourage visitors to drop plastic balls into a water vortex and observe them as they travel around and around and out through a drain.
- Work collaboratively with visitors to fill and pour water from the tippable tubes.
- Encourage visitors to interrupt the flow of a "mushroom" water bell and then observe it reshaping when they remove their hand.
- Encourage visitors to cover holes in a pipe with their hands to observe the effects as water is redirected through open holes. Children can also observe different levels of water pressure as more or fewer holes are covered.
- Encourage visitors to fill containers and pour water using funnels, scoops and other manipulatives.