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DOE FINAL REPORT

PROGRAM NARRATIVE

"Burst of Energy"

In October 1991, The Discovery Center of Idaho, Inc. (DCI) was the recipient of $27,100 from the Department of Energy's (DOE) Museum Science Education Program to build six energy related exhibits. The purpose of the project was to provide the public with a hands-on opportunity through permanent exhibits to explore and become familiar with energy-related issues at a basic scientific level. By fostering this kind of appreciation and understanding, The Discovery Center of Idaho elevates individual energy awareness and provides a basis from which the Idaho population can make educated energy decisions.

As was reported in the project update March 27, 1992 some changes were made to the original exhibit plans. After evaluating the research for each exhibit and consulting with the designated advisors, DCI determined two proposed exhibits were too maintenance intensive and had a lesser teaching value than originally thought. Two new exhibits were selected to meet the expected outcomes of the original proposal. Also, the six exhibits were expanded to eleven exhibits because of DCI's unique volunteer support system. Volunteer labor was used extensively to accomplish the exhibit goals.

EXHIBIT DESCRIPTION See Attachment 1

The following exhibits were built with the money from the DOE Science Museum Education Grant and are placed in the public exhibition area of the center. The Sun Tracker is actually located on the roof of the facility. At this time the Water Freezer has not been placed on the floor because of a problem with the water delivery system.

Suntracker is a roof-mounted tracking mirror which follows the sun and reflects a 36"x24" beam of sunlight into the Center.

Solar Astmosphere uses a combination of mirrors, lenses, and diffraction grating to display the spectrum of color making up the sun's light.

Photovoltaic uses solar cells to convert sunlight into electrical energy.

Pedal Power demonstrates energy relationships by showing the conversion of chemical energy (food) into kinetic energy (pedaling) to electrical energy to light energy.

Energy Over Time develops a understanding of power as the rate at which energy is consumed.

Incandescent Vs. Flourescent compares the power consumption and light output of two different kinds of light bulbs and shows how energy producing heat, rather than light, wastes energy.

Heat Transfer demonstrates radiant energy emission and absorption, using a radiant heat source and a heat-sensitive liquid crystal to show the relationship between color and the amount of heat absorbed and emitted.
Cold Metal uses wood , metal and insulation at the same temperature, but having a very different feel, to illustrate heat conduction through different materials.
Insulators is a model house with a heat lamp serving as its home heating system and shows the amount of heat loss through different materials.
Hand Battery has two metal touch plates that display via a meter the electric current generated by the human hand touching two different metals at the same time.
Dominoes shows the energy build up in a chain reaction that allows a very small object to move a very large object.
The Sun is a pinhole image of the sun that shows an up-close portrait of our primary energy source.
Water Freezer demonstrates that evaporation is a cooling process. A vacuum allows water molecules of higher energy (warmer) to escape, leaving the lower energy (colder) water molecules behind. This process of evaporation cools the water enough to freeze it.

EDUCATIONAL PROGRAMMING See Attachment 2

The signage of each exhibit was carefully designed to provide the maximum understanding with minimum written explanation. Each visitor is asked To Do, and Notice, and is given a How It Works explanation in simple terms of what is happening. Our goal is to entice the visitor to explore on their own without inhibiting the exploration by giving answers. Our training of the floor hosts includes visitor interaction using the exhibits as a base.

An Energy Basics workshop for teachers was held May 7-9, 1992. (Attachment 2,a) The Burst of Energy exhibits were incomplete and were not included in the workshop training. Workshop participants spent time with our exhibit director learning how exhibits are built and the scientific principles behind them. Instructors gave an overview of Light, Simple Machines and Sound as examples of different forms of energy and how they are demonstrated at DCI. In small groups, teachers developed an energy presentation using their texts, a DCI exhibit and hands-on activity books. These presentations were given at the end of the workshop.

Teachers expressed an interest in receiving more information in their visit to DCI and The Burst of Energy exhibition was the catalyst to provide a demonstration program. "The Magic of Electricity" from the Lawrence Hall of Science was selected to be presented to third graders. By capitalizing on the curiosity of the third grade student, the program sets the stage for greater interaction between student, exhibit, teacher and adult supervisor.

EVALUATION See Attachment 3

Volunteer floor facilitators will interact with visitors to evaluate public participation with each exhibit. The center will evaluate the durability, accessability and visitor interest in each exhibit by observation, and review of the teacher evaluation forms. Attendance during the week has increased because of the new Magic of Electricity program and weekend attendance has increased because we are featuring a "special exhibit".

DISSEMINATION See Attachment 4

The various Press Releases sent to announce the opening of the exhibit were sent to local media. A Preview event to unveil the Burst of Energy exhibits was held the evening of September 29. Tiajuana Cochenauer, Academic Programs Specialist, DOE Idaho Field Office was keynote speaker. The Grand Opening Celebration continued throughout October and November with numerous articles being written. Articles were in Discovery News, Idaho Power Consumer Connection, Boise Weekly, The Statesman, Focus Magazine, and Idaho Current.

CONCLUSION

The DOE Museum Science Education Program provided the first opportunity DCI has had to develop a grouping of exhibits around a central theme. The unencumbered dollars allowed more flexibility in using volunteers and provided the additional money needed to build more technical and expensive exhibits. The project was so successful, we will search for financial support from other sources using the same concept.

FINANCIAL REPORT See Attachment 5

Complete financial statement for organization is in attachment. Each exhibit breakdown is as follows:

Sun Tracker	**$ 4197.99**
Solar Atmosphere	**4119.93**
Photovoltaics	**292.28**
Pedal Power	**2196.62**
Energy Over Time	**3.94**
Bulbs Vs. Tubes	**1523.36**
Heat Transfer	**1628.25**
Cold Metal	**100.68**
Hand Battery	**11.55**
Water Freezer	**2006.64**
Miscellaneous	**11650.61**
General Supplies for all exhibits plus labor, tables and graphics	
TOTAL	**$ 27741.85**

Attachment 1

DISCLAIMER

BURST OF ENERGY

Sun Tracker, a motorized, roof mounted mirror sends a stationary sunbeam into the building to power other exhibits. Because sunlight is our ultimate energy source, Solar Atmosphere explores the make-up of our sun. Using Sun Tracker and a combination of mirrors, lenses and a diffraction grating, this exhibit displays the spectrum of colors created by the sun's light. Dark lines across the spectrum, called Fraunhoffer Lines demonstrate some of the elements making up the sun's atmosphere.

A portion of the sunlight from the Sun Tracker is used to make a 8" pinhole image of The Sun.

Photovoltaics uses solar cells to convert sunlight into electrical energy. Visitors experiment with the effect of the angle of the sun on a solar panel and compare the power of an incandescent light with the power of the sunlight.

Pedal Power demonstrates energy relationships by showing the conversion of chemical energy (food), to kinetic energy (pedalling), to electrical energy, to light energy. Visitors control the amount of light produced with the amount of effort they put into pedalling. Those taking part,, develop an appreciation for the work it takes to generate electricity.

The Energy Over Time exhibit develops an understanding of the relationship between power and energy, and energy conservation.

By comparing the power consumption and light output of two kinds of lightbulbs, Bulbs vs. Tubes illustrates the energy wasted producing heat, rather than light, in the incandescent bulb.

Radiant energy emisssion and absorption is demonstrated in the Heat Transfer exhibit. A radiant heat source and a heat sensitive liquid crystal show the relationship between color and the amount of heat absorbed and emitted.

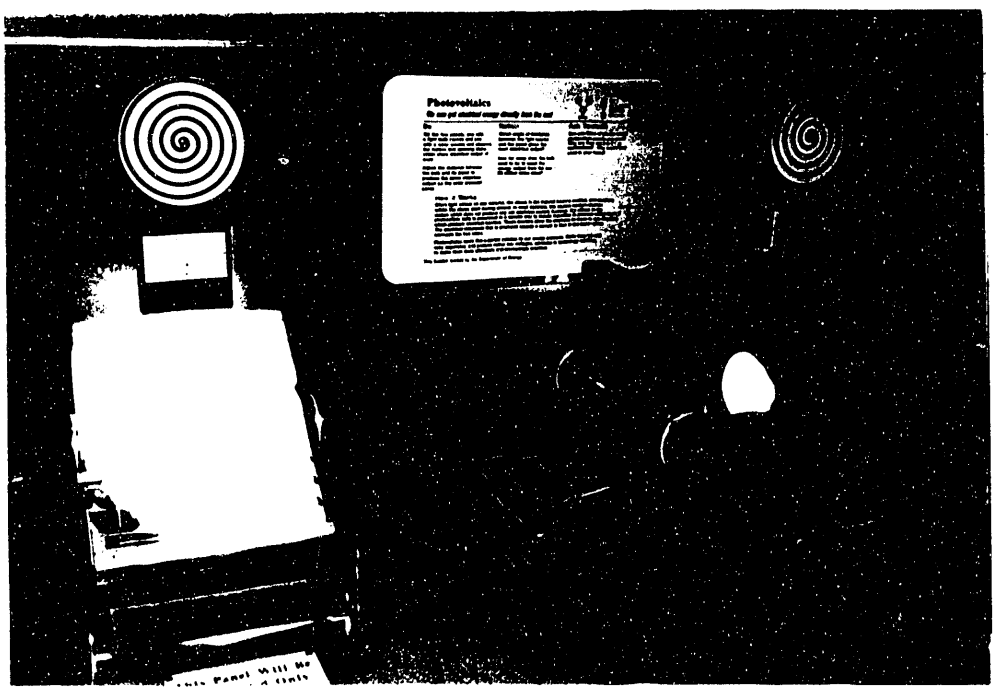
Two exhibits illustrate heat conduction through different materials. Cold Metal uses wood, metal and insulation, which are at the same temperature but feel very different. Insulators is a little hours with doors made of metal, wood, stone, and insulation. A heat lamp placed inside represents a home heating system, while the temperature of each door represents the amount of heat lost through that material.

Hand Battery has two metal touch plates to display the electric current generated by the flow of electron between dissimilar metals when they react to the salty moisture on a visitor's hand.

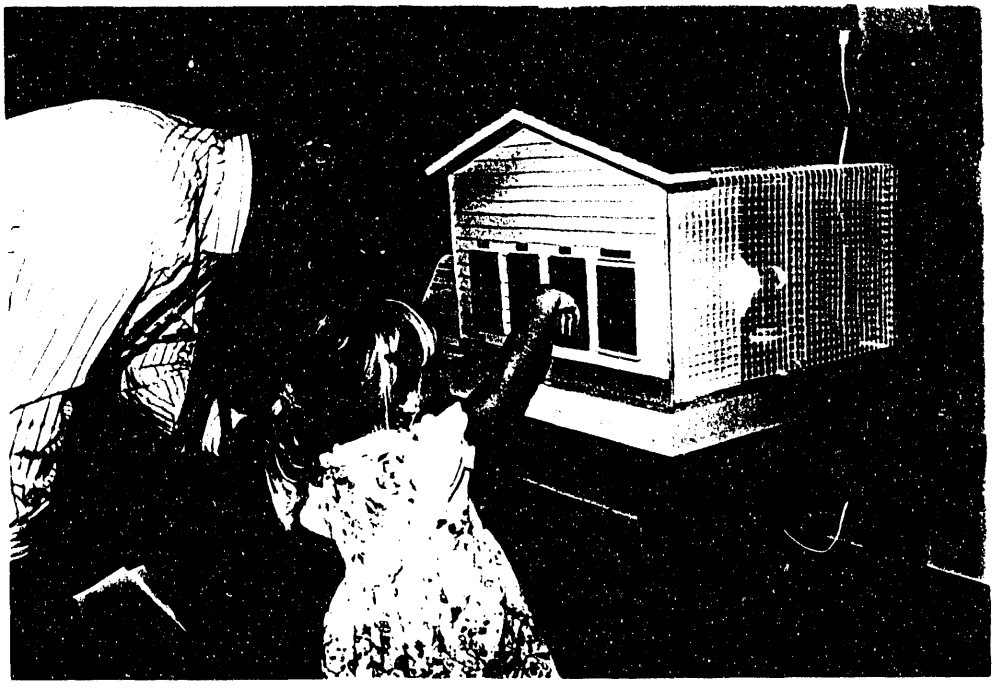
Dominoes shows the chain-reaction effect of releasing potential energy when a very small block of wood through a series of intermediate reactions, knocks over a much larger block.

Hand Battery

Photovoltaics

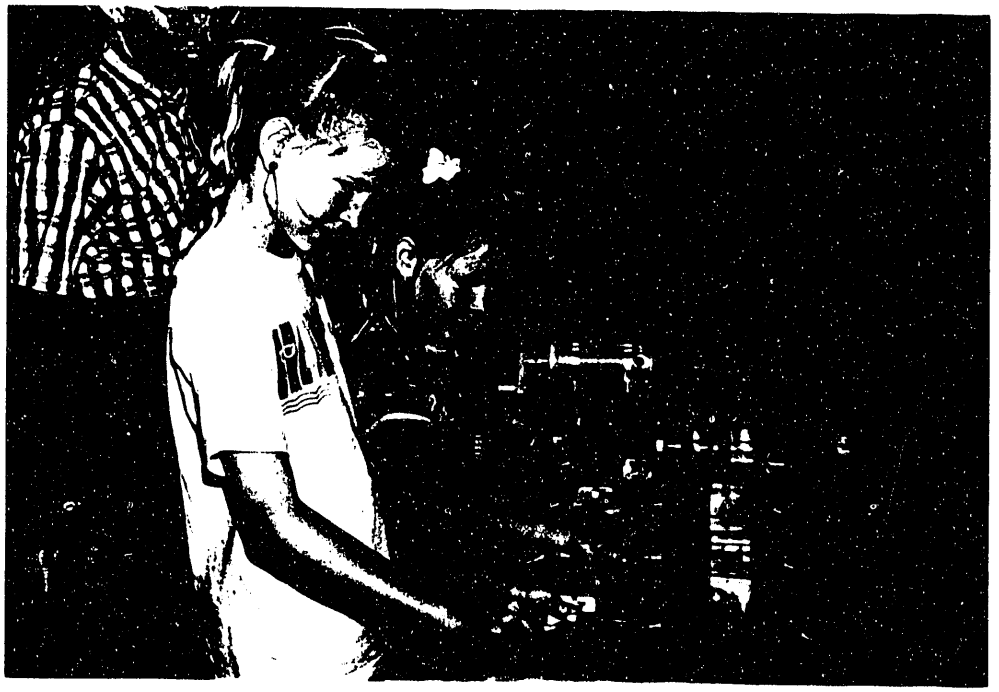


Insulators

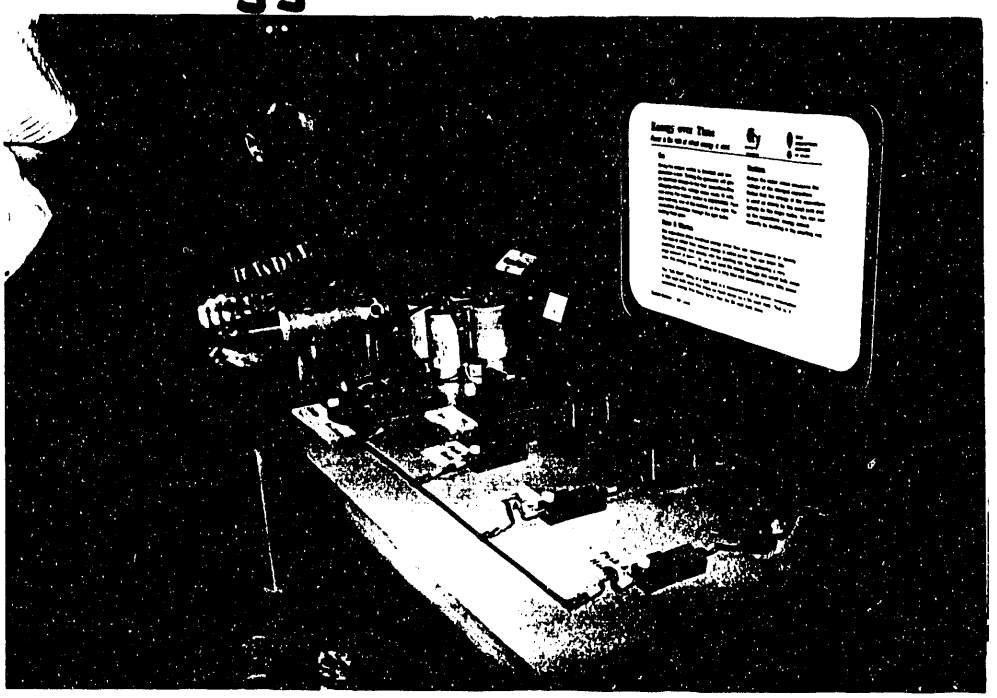


Bulbs vs. Tubes

Energy Over Time



Energy Over Time



Induction

Pedal Power

Attachment **2**

Boise State University

ATTENDEE LIST
FOR WKP013 013

TE599: Energy Basics
Catherine Matthews

- Bender, Katheryn
1409 N. 6th St.
Boise, ID 83702

- Buxton, Marilyn
3209 Tucker Rd.
Boise, ID 83703

- Cannariato, Marsha
11127 Hinsdale
Boise, ID 83704

- Duree, Galen
243 Davis Ave.
Nampa, ID 83651

- Hranac, Michael
7310 Mojave Dr
Boise, ID 83709

- Kadel, Twila
1211 N. Garden Street
Boise, ID 83706

- Klaudt, Janet
2114 Willow
Caldwell, ID 83605

- Ledbetter, JoEllen
3582 Veranda Way
Boise, ID 83706

- McCreedy, Sabra
1269 Cerramer Ct.
Eagle, ID 83616

- Renfro, Vickie
Rt. 1, Box 29
Horseshoe Bend, ID 83629

- ~~Rossow, Teresa~~ Doppel
P.O. ~~Box~~ 402
~~Eagle, ID 83616~~

- Stewart, Kaye
9175 Bienapfl
Boise, ID 83709

Ascuena, David
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Mtn. Home
ID 83647

Carol Kulack
1424 Kingswood Ave,
Meridian
ID 83642

Marsha Orsatelli-Smith
706 Crestview Drive
Nampa
ID 83686

~~Vicki Graham~~
4191 ~~N~~ Locust Grove Rd.
~~Meridian~~
~~ID 83642~~

Energy Basics

Class Project:

We will divide the class into grade-level groups to do a brief lesson on an energy concept by the end of the course. Groups will present their 10 minute mini-lessons on Saturday. Each lesson should include the following:

1. Select an energy concept from the reading in "Science Matters" or your text book -- check with the instructors to have your concept approved.

2. Prepare a mini-lesson that includes, but isn't limited to:

    a. 1 Hands-On Classroom Demonstration (samples to be handed out)

    b. 1 DCI exhibit (Bill Molina will present our energy exhibits)

    c. A written summary of the lesson for your colleagues which *may* include a bibliography of sources you found particularly useful.

d. Whatever else works well to teach your concept to students at your classes' grade level.

3. Most of all have fun, be creative, and do something that will be useful in your work.

Energy over Time

Power is the rate at which energy is used

ELECTRICITY and MAGNETISM

THE DISCOVERY CENTER OF IDAHO

Do:

Swing the copper switch to CHARGE and turn generator crank. Turning the generator will give an electrical charge to the four capacitors.Stop charging when the voltage meter reads 10 volts and swing the copper switch to DISCHARGE. Push and hold any one of the buttons on the right. The capacitors discharge through the light bulbs, making them glow.

Notice:

Notice the meter which measures the voltage of the charged capacitors. Notice that the energy of the capacitors is used up slowly by the small bulb and quickly by the larger bulbs. You can use up the capacitors' energy almost instantly by pushing in the shorting rod.

How it Works:

The capacitors store electrical energy which they can release slowly or quickly. The rate at which they release energy is called power. You can drain this electrical energy very quickly with the shorting rod, thus delivering a very large amount of power. Or, you can send the energy through the small bulb which uses this energy slowly, glowing for a long time and consuming very little power.

The "100-Watt" rating of a light bulb is a measurement of its power consumption. A 100-watt bulb uses five times as much power as a 20-watt bulb. That is, it consumes energy five times faster than the 20-watt bulb does.

Exhibit Builder: Bill Lloyd

Solar Atmosphere

Discover the makeup of the sun's atmosphere

(Note: This exhibit works only when the Sun is shining.)

THE DISCOVERY CENTER OF IDAHO

Do:

Notice the thin dark lines in the Sun's rainbow that appears on the curved white screen. Hold the white side of the orange card (stored in the front left) up to the screen. You should be able to see that the dark lines are in the rainbow, and are not on the screen.

Notice:

Holding the orange fluorescent side of the card out beyond the violet end of the rainbow makes light and more dark lines visible.

Ask Yourself:

What causes the dark bars to appear? Can we determine something about the Sun from these bars? Why does the orange card make previously invisible light and dark lines appear?

How it Works:

In our exhibit, sunlight from the solar tracker (outside on the roof) is focused on a diffraction grating, which separates the light into its constituent colors. Sunlight must pass through the Sun's atmosphere before it can reach the Earth. Elements in the Sun's atmosphere absorb some of the light before it can escape from the Sun.

The energy that each element absorbs corresponds to the narrow band of color missing from the rainbow. By matching the missing colors in the rainbow with the characteristic colors each element absorbs, we can identify the elements in the Sun's atmosphere.

The Sun also sends out energy that you cannot see. Beyond the red end of the of the rainbow is infrared radiation that is used for solar heating. Beyond the violet end of the rainbow is ultraviolet radiation that can give you a sunburn. When you hold the orange card at the ultraviolet end of the rainbow, the fluorescent chemicals convert the invisible ultraviolet light into visible light.

The Domino Theory

Discover a simple way that energy is stored!

Energy

THE DISCOVERY CENTER OF IDAHO

Do:

Set up the blocks on end so that the smallest block is on the smallest line on the left and the largest block is on the big block line on the right. Now push over the little block so that it falls into the next smallest block. Watch what happens.

Notice:

The energy released in the smallest block falling over is sufficient to knock over the next smaller block, which releases enough energy to knock over the next block, and so on, until eventually the largest block falls over.

Ask Yourself:

Can you think of other instances where a small amount of energy is used to release a larger amount of energy?

What would happen if you tried to knock over the largest block using only the smallest one?

How it Works:

Energy is the ability to do work. Energy can be stored in many ways, including the very simple way shown here. When you push the standing block over so that its center of gravity is moved beyond its base, the block falls over, pulled down by gravity. This simple operation is actually the conversion of *potential* energy into *kinetic* energy, or the energy of motion. More energy is released than originally put in by your push, since the released energy is enough to knock over an even larger block. The small amount of energy you put in is "amplified" into a large release as the largest block falls over. No new energy is created; rather, energy stored in the standing blocks is released.

This Exhibit funded by the Department of Energy

Cold Metal

Can your sense of touch be fooled?

Energy

THE DISCOVERY CENTER OF IDAHO

Do:

Briefly touch each of the three plates with your fingers. Which plate feels the warmest? The coldest? Now measure the temperature of each plate with the electronic thermometer.

Notice:

Did the thermometer readings match the temperatures you expected from your touches?

Ask Yourself:

Why do some materials feel hotter or colder than others, even though they are really the same temperature? Which of these materials should you build your house with? Why?

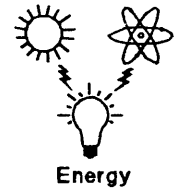
How it Works:

Some materials are good *CONDUCTORS* of heat (that is, they allow heat to pass quickly through them), while others are good *INSULATORS.* Metal, being a good conductor, quickly carries the heat away from your finger, causing the nerves in your finger to register a "cold" feeling. The wood and foam plates are good insulators, so the heat from your fingers stays in one place. Your nerves register a "warm" feeling as a result. The electronic thermometer does not generate any heat, and therefore measures the actual temperature.

Exhibit Builder: Al Johnson

Photovoltaics

We can get electrical energy directly from the sun!



THE DISCOVERY CENTER OF IDAHO

Do:

Tilt the two panels, one with a light bulb source and one with a solar source and observe the meters and spinning disks which show electrical output of each.

Adjust the distance between the bulb and its panel to produce the same electrical output as the solar powered panel.

Notice:

Which angle of incidence between the light source and the panel gives the most electrical output?

How far away does the bulb need to be to equal the energy output from the sun – 93 million miles away?

Ask Yourself:

Can you think of places where photovoltaic panels are used? Why are they used in these applications? Why aren't they used in your home?

How it Works:

When light shines on any material, the atoms in the material become excited, and electrons within the atoms start moving around. In most materials, this causes random electron motion which does not produce any net electrical current. However, the silicon in the photovoltaic cells is processed in a special way to include impurities (a process called doping) which produce electrical barriers. These barriers allow the electrons to move in one direction. The electrical imbalance that is produced causes a current to flow in the meter which connects the two sides.

Photovoltaics seem like a partial solution to our energy problems. While they are still very expensive, and produce rather low voltages, advances in technology continue to make them more affordable and increasingly practical.

This Exhibit funded by the Department of Energy

Pedal Generator

How much energy can YOU generate?

Energy

THE DISCOVERY CENTER OF IDAHO

Do:

Adjust the seat so you can easily reach the pedals. Sit down and start pedaling. Turn the rotary switch to light one or more headlights.

Notice:

The difference in pedal effort required when the headlights are on.

Ask Yourself:

Is the pedalling effort easier with the lights on or off? Why? Is this result surprising?

How it Works:

This exhibit will help you appreciate the amount of energy some of our modern conveniences require! The pedal wheel is connected to an electric generator. When the lights are off, pedalling is easy, since only the energy used by friction is required. When one or more headlights are turned on, however, the rider must supply the additional energy required to push electrons through the lights. Each light consumes 60 watts -- now you know what that much energy feels like!

Notice that the meters show the same amount of current entering and leaving the lights. The lights don't use up any electric current; this current is merely a carrier for the energy you put in with your legs. Idaho Power Company would charge less than 2c for enough electrical energy to keep all three lights brightly lit for two hours.

This Exhibit funded by the Department of Energy

Hand Battery

You can make electricity with your own two hands!

Energy

THE DISCOVERY CENTER OF IDAHO

Do:

First place the palms of your hands on the metal plates on the left side and watch the meter needle. Then put your palms on the right side and watch again.

Notice:

The needle moves, indicating the presence of an electrical current.

Ask Yourself:

What direction does the needle move in each case? Why? Where does the electric current come from? Which works best – dry palms or "sweaty" palms?

How it Works:

The plates on each side are made of two different metals – aluminum and copper. A small chemical reaction occurs at each plate between the salty moisture on your hands and the metal on the plate. Since the two plates are made of different metals the reactions occur at slightly different rates, creating an electrical imbalance between the two plates. An electric current flows through the meter (called a *galvanometer*) as the imbalance tries to equalize. Current flows in opposite directions on the two sides because the plate materials are reversed on each side.

This Exhibit funded by the Department of Energy

Exhibit Builder: Blair Christensen

Insulators

Why is a Hot Tin Roof Hot?

Energy

THE DISCOVERY CENTER OF IDAHO

Do:

Touch each of the four materials on the house.

Notice:

Which materials feel the warmest? Which feel the coolest?

Ask Yourself:

Which materials are heat insulators? Which are heat conductors? Can you determine the characteristics that make a material a good conductor? A good insulator?

How it Works:

The inside of the house is heated with a light bulb, creating a difference in the house temperature between the inside and outside of the house. Some of the materials (the aluminum, and to some extent, the concrete) are thermal conductors, and allow the heat to easily flow through them. They feel warm, even hot, since the heat conducts to the outside of the house. Other materials (the wood and foam) do not allow much heat through them, and thus feel cool to the touch.

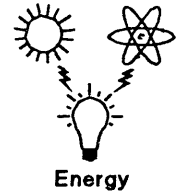
Notice that the insulators are those materials that trap air into very tiny bubbles or pockets. It is actually the little trapped air pockets that do most of the insulating, not the material itself!

This Exhibit funded by the Department of Energy

Exhibit Builder: Vern Buchta

Bulbs vs. Tubes

Are some light sources better than others?



THE DISCOVERY CENTER OF IDAHO

Do:

Match the brightness of the two bulbs by adjusting the left light to the brightness of the right. Note the amount of electricity being used by each bulb.

Place your hand above each bulb and see if you can feel a difference in temperatures.

Notice:

Which bulb produces more light for a given amount of electricity used?

Which bulb produces the most heat for a given amount of electricity used?

Ask Yourself:

Which types of bulbs are the most efficient for lighting our houses? Which type *do* we use?

Can you determine where the extra energy of the incandescent light goes?

How it Works:

The incandescent bulb produces light by passing electricity through a filament, causing it to "glow." Unfortunately, a lot of the energy is radiated as infrared rays, which we do not see, but we feel as heat. The flourescent bulb produces light by passing electricity through a gas. Much of the energy is initially given off as ultraviolet, but a flourescent coating in the bulb absorbs the energy and re-radiates it as visible light. Flourescent bulbs are much more efficient, but are more complicated and expensive.

This Exhibit funded by the Department of Energy

The Sun

The Sun Image Appears Only When the Sun is Shining

Energy

THE DISCOVERY CENTER OF IDAHO

Do:

Look at this image of the Sun. It is made by a mirror about 1/2 inch in diameter.

Notice:

The image moves every 7 seconds.

Ask Yourself:

Why is the image 5 inches in diameter when the mirror making it is only 1/2 inch in diameter?

How it Works:

On the roof, a machine we call the Suntracker reflects a beam of light into the museum. The mirror on the Suntracker doesn't move constantly. Rather it moves in small increments every 7 seconds as it follows the Sun's east to west daily motion. This is why the image moves so frequently.

So, why is the image you're looking at 10 times larger than the mirror that produces it? The reason has to do with the distance between the small mirror and the screen on which it is viewed. The greater the distance between the mirror and the screen, the larger the image. This is different than a converging lens which focuses an image at only one particular point in space.

This Exhibit funded by the Department of Energy

SUNTRACKER

How do you keep a beam of light stationary all day?

Energy

THE DISCOVERY CENTER OF IDAHO

The solar exhibits located nearby rely on a motionless sunbeam brought into the building by the suntracker on our roof. The suntracker is basically a flat mirror reflecting a shaft of sunlight along a path parallel to the Earth's axis. The mirror rotates about this axis at the same speed as the Sun's east to west travel, thereby keeping the beam aimed at one spot inside the building. Mirrors inside the building then direct the beam to different exhibits. Can you follow the light path from the roof to the "Solar Atmosphere" exhibit?

Suntrackers of various types were developed before the invention of electric light to provide illumination for early microscopes. Our type of tracker is known as a Polar Heliostat.

Photo by Janis Goodheim

THE "MAGIC" OF ELECTRICITY

THIRD GRADE CLASS VISITS to THE DISCOVERY CENTER OF IDAHO

WHAT: A 20 minute demonstration program on electricity included in 2-hour scheduled class visits to The Discovery Center of Idaho.

WHO: All third grade classes including combination classes.

WHERE: The Discovery Center of Idaho, 131 Myrtle St., Boise, Idaho (located in Julia Davis Park)

CLASS GROUP ADMISSION: $2.00 per student, adult to student ratio 1:5 with adult admission free.

WHEN: Tuesdays from October 20 through December 15, 1992 from 9:15 - 11:15 and 11:15 - 1:15. Tuesdays will be reserved solely for the use of third grade classes. Three to four classes (approximately 100 students) will be scheduled per session.

SCHEDULING: Teachers should call immediately to schedule their classes for available reserved time slots. Contact Jane Baird at The Discovery Center of Idaho by calling (208) 343-9895.

BENEFITS OF PARTICIPATION:

* Two-hour visit includes time to explore and experiment with over 80 hands-on exhibits.

* Pre- and post-visit materials distributed to teachers for use in the classroom.

* Special group demonstration presented at session beginning. Developed by The Discovery Center of Idaho Education Staff, the 20 minute presentation will target "Electricity" in the third grade science curriculum and mesh with specific hands-on exhibits at The Discovery Center of Idaho.

* Tuesdays will be reserved solely for third grade class visits.

* Museum information via "Learning Link" is available to third grade teachers, as well as access to the "Discovery Learning Lab" which provides resources for their science curriculum. The Education and Exhibit staff will answer questions and help with ideas.

EVALUATION: Every teacher will be asked to fill out an evaluation.

Attachment **3**

THE DISCOVERY CENTER OF IDAHO

GROUP LEADER ACTIVITY EVALUATION

School Name: Whittier Date: 10-19-92
District: Boise Grade Level(s): 3 No. in Group: 20 No. of Adults: 84

TYPE OF ACTIVITY: ___ workshop/class X demonstration X group visit
___ instructional materials ___ Other: _____

I AM A(N): ___ Pre-School Teacher X Elementary Teacher ___ Junior High Teacher ___ High School Teacher
___ Day Care Teacher ___ Other: _____

1. Scheduling Procedures were: Excellent 5 4 (3) 2 Poor 1

2. The Pre-Visit Information Arrived: (Early 5) 4 On Time 3 2 Late 1

3. The Pre-Visit Information was: Excellent 5 (4) Good 3 2 Poor 1

4. Floor Facilitators were: Very Helpful 5 4 Helpful (3) 2 Not Helpful 1

5. As a whole, DCI staff was: Very Courteous 5 (4) Courteous 3 2 Not Courteous 1

6. For students with disablities, the building and exhibits were: Very Accessible 5 4 Accessible 3 2 Inaccessible 1

7. Our experience at the Discovery Center was: (Excellent 5) 4 Good 3 2 Poor 1

8. What did you enjoy the most?
The electricity demonstration was outstanding

9. Did you enjoy the Discovery Center enough to schedule a visit again next year? (Yes) Maybe No

10. We are always seeking to improve educational services at the Discovery Center. On the back, please list any suggestions you may have. Thank you.

There were only 60 students here today. That was more manageable than other times when I've been here.

THE DISCOVERY CENTER OF IDAHO

GROUP LEADER ACTIVITY EVALUATION

School Name: Maple Grove Date: 10-27-92

District: Boise Grade Level(s): 3rd No. in Group: 85 No. of Adults: 20

TYPE OF ACTIVITY: ___ workshop/class ___ demonstration ✓ group visit
___ instructional materials ___ Other: _____

I AM A(N): ___ Pre-School Teacher ✓ Elementary Teacher ___ Junior High Teacher ___ High School Teacher
___ Day Care Teacher ___ Other: _____

1. Scheduling Procedures were:	Excellent (5)	4	Good 3	2	Poor 1
2. The Pre-Visit Information Arrived:	Early (5)	4	On Time 3	2	Late 1
3. The Pre-Visit Information was:	Excellent 5	4	Good 3	2	Poor 1
4. Floor Facilitators were:	Very Helpful 5	4	Helpful 3	2	Not Helpful 1
5. As a whole, DCI staff was:	Very Courteous 5	4	Courteous 3	2	Not Courteous 1
6. For students with disablities, the building and exhibits were:	Very Accessible 5	4	Accessible 3	2	Inaccessible 1
7. Our experience at the Discovery Center was:	Excellent 5	4	Good 3	2	Poor 1

8. What did you enjoy the most?

9. Did you enjoy the Discovery Center enough to schedule a visit again next year? Yes Maybe No

10. We are always seeking to improve educational services at the Discovery Center. On the back, please list any suggestions you may have. Thank you.

THE DISCOVERY CENTER OF IDAHO, INC.
YEARLY ATTENDANCE REPORTS
TOTAL PAID AND NONPAID

	1989	1990	1991	1992	1993
JAN	4127	4457	1549	2497	
FEB	4248	9614	2745	4476	
MAR	5766	6074	5338	6234	
APR	4221	6646	6263	6694	
MAY	3567	6777	9558	7343	
JUN	1920	3195	3701	3678	
JUL	1930	3508	4586	4577	
AUG	1758	2710	5503	4521	
SEP	448	2452	2148	2005	
OCT	1980	3999	2324	4899	
NOV	1970	8077	2203		
DEC	1640	2195	2202		
TOTALS	33575	59704	48120	42025	

Attachment **4**

THE
DISCOVERY
CENTER
OF IDAHO

131 Myrtle Street
P.O. Box 192
Boise, Idaho 83701
(208) 343-9895

FOR IMMEDIATE RELEASE Contact: Lorette Williams

SEPTEMBER 17, 1992 343-9895

MAJOR NEW EXHIBIT "BURST OF ENERGY" TO OPEN SEPTEMBER 30TH AT THE DISCOVERY CENTER OF IDAHO

Twelve new exhibits focusing on solar energy, energy conversion and energy conservation, comprise The Discovery Center of Idaho's (DCI) new **"Burst of Energy"** exhibition Grand Opening on September 30th for an extended showing, it was announced today by Lorette Williams, director of the hands-on science museum. "The new exhibits were developed by DCI's exhibit director, Bill Molina, and funded by a grant from the U.S. Department of Energy," Williams said, "and in the DCI tradition the exhibits give visitors a 'hands-on' experience with energy concepts enabling them to better understand the energy issues of today and at the same time have fun!"

Children and adults alike will gain a new understanding of many ways in which energy is created, converted, transferred and conserved, by operating and observing the twelve new exhibits. An advanced demonstration of the domino theory is put into action with Dominoes when a visitor places the rectangular pieces, which

are graduated in size, in a row, then pushes over the smallest piece. The chain reaction shows how a small object can move a large object through the transfer of energy. Pedal Power is a sturdy bicycling exhibit which takes hard pedaling from the participant to keep the light on, a challenge which will beckon visitors to undertake.

DCI's regular schedule, Wednesday through Sunday, will prevail for this exhibit and standard admission prices will apply. Teachers are encouraged to call in advance to schedule class visits. The **"Burst of Energy"** exhibition will become a part of the permanent collection of hands-on exhibits at DCI.

Hours of Operation

Wednesday-Friday	9:00-5:00
Saturday	10:00-5:00
Sunday	12:00-5:00

Admission:

Adults	$3.00
Students (5-18)	2.00
Seniors	2.00
Children (under 4)	FREE

THE DISCOVERY CENTER OF IDAHO

131 Myrtle Street
P.O. Box 192
Boise, Idaho 83701
(208) 343-9895

The Discovery Center of Idaho announces the following new exhibits for the Burst of Energy opening:

Suntracker, a roof-mounted tracking mirror which follows the sun and reflects a 36" x 24" beam of sunlight into DCI.

Solar Atmosphere uses a combination of mirrors, lenses and diffraction grating to display the spectrum of colors making up the sun's light. Also shown are the dark lines across the spectrum, which identify the elements making up the sun's atmosphere.

Photovoltaics uses solar cells to convert sunlight into electrical energy. Visitors experiment with the angle of the sun on a solar panel and compare the power of an incandescent light with the power of sunlight.

Pedal Power demonstrates energy relationships by showing the conversion of chemical energy (food) to kinetic energy (pedaling) to electrical energy to light energy. Visitors control the amount of light produced with the amount of effort they put into pedaling, and quickly develop an appreciation for the work it takes to generate electricity.

The Energy Over Time exhibit develops an understanding of power as the rate at which energy is consumed.

Incandescent vs. Fluorescent compares the power consumption and light output of two different kinds of lightbulbs and shows how energy producing heat, rather than light, wastes energy.

Heat Transfer is an exhibit which demonstrates radiant energy emission and absorption, using a radiant heat source and a heat-sensitive liquid crystal to show the relationship between color and the amount of heat absorbed and emitted.

Cold Metal uses wood, metal and insulation at the same temperature, but having a very different feel, to illustrate heat conduction throught different materials.

Insulators is a model house with a heat lamp serving as its home heating system. Doors make of metal, wood, stone and insulation, quickly show the amount of heat loss through each different material.

Hand Battery has two metal touch plates that display via a meter the electric current generated by the human hand touching two different metals at the same time.

Dominoes shows the energy build up in a chain reaction that allows a very small object to move a very large object.

The Sun is a pinhole image of the sun that shows an up-close portrait of our primary energy source.

The Idaho Statesman
4C Wednesday, June 12, 1991

Around the region

DOE will award $27,100 to the Discovery Center

Boise's Discovery Center of Idaho will get $27,100 from the Department of Energy to help people become more familiar with energy-related issues.

The funds were approved for the development of six energy exhibits and educational programs to provide the public with a hands-on opportunity to explore energy issues, said Sen. Steve Symms.

The award, one of 10 such grants totaling $865,000 nationwide, is from the DOE's Museum Science Education Program. The program is committed to increasing basic scientific literacy as well as increasing the number of students interested in science and technology careers.

Burst of Energy

Grand Opening
September 30, 1992

Energy Exhibits Feature Creating, Conserving and Storing Energy

- ▼ Class trips welcome for a true educational excursion!
- ▼ Please call in advance to reserve a time.

THE DISCOVERY CENTER OF IDAHO

131 Myrtle Street
P.O. Box 192
Boise, Idaho 83701

(208) 343-9895

OFFICE OF THE GOVERNOR
STATE CAPITOL
BOISE 83720-1000

CECIL D. ANDRUS
GOVERNOR

(208) 334-2100

September 14, 1992

The Discovery Center of Idaho
P O Box 192
Boise, ID 83701

RE: Grand Opening Preview/Burst of Energy

Thank you for your kind invitation to join the preview at the Discovery Center of Burst of Energy on September 29. I wish it were possible for me to attend, but commitments in Lewiston have already been scheduled on that date.

Please convey my greetings and best wishes for a successful gathering.

Sincerely,

Cecil D. Andrus
Governor

CDA:y

INEL

Idaho National Engineering Laboratory

June 27, 1991

Ms. Lorette Williams
Executive Director
The Discovery Center of Idaho
131 Myrtle Street
P.O. Box 192
Boise, Idaho 83701

DEPARTMENT OF ENERGY'S MUSEUM SCIENCE EDUCATION PROGRAM - CPW-306-91

Dear Ms. Lorette ~~Williams:~~

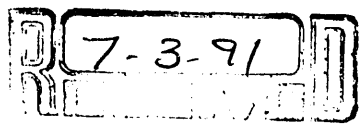
Congratulations on your award from DOE's Museum Science Education Program! We are excited to have this opportunity to work with the Discovery Center and look forward to joint learning opportunities while developing the six new exhibits. I will begin the search for appropriate consultants as we await more information on your grant.

Sincerely,

Carol

Dr. Carol P. Woodall, Manager
INEL Office of Academic Programs

jem



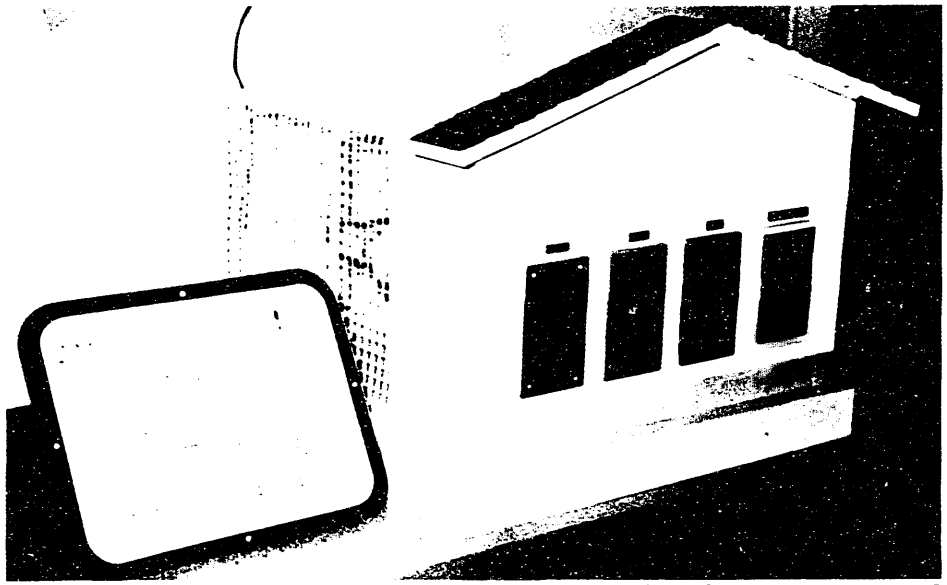
Idaho Currents

Energy and Water News October 1992

Burst of Energy display provides hands-on exhibits

By Linda Cawley, IDWR Information Specialist

Students, teachers and visitors can learn first hand how sunlight can be converted into energy when they tour The Discovery Center of Idaho's Burst of Energy display. Four of the 12 exhibits deal with various aspects of solar energy.



One of the 12 Burst of Energy exhibits is the front portion of a model house used to exemplify the amount of heat lost through different materials. A heat lamp serves as the home's "heating system," while four different types of materials mounted to the front of the house convey different temperatures. (Photo by Linda Cawley)

The display, which opened Sept. 30, is the result of a $27,100 grant from the U.S. Department of Energy's Museum Science Education fund. Originally, the grant was given to provide funds for six hands-on exhibits related to energy. Because of volunteer labor and supplies, the center was able to provide 12 exhibits for the same amount of

The purpose of the project is to provide the public with a hands-on opportunity to explore and become familiar with energy-related issues at a basic scientific level. Exhibits feature creating, conserving and/or storing energy.

Each exhibit has a four-part set of instructions. "Do" tells the reader how to work the exhibit. "Notice" tells the reader what to observe while working the exhibit. "Ask yourself" lists several short questions the reader should try to answer after working the exhibit. "How it works" explains what makes the exhibit operate in a specific situation.

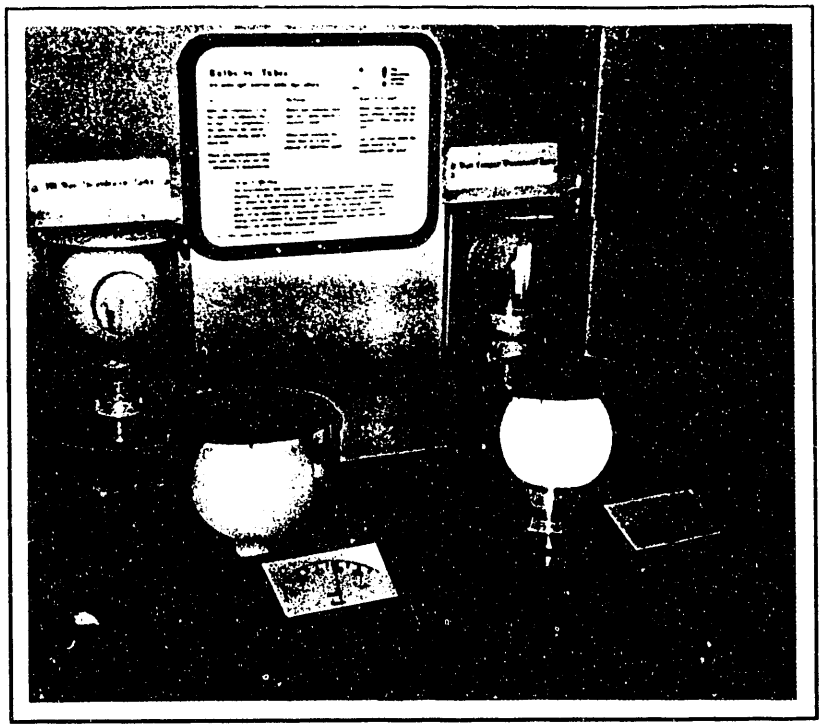
Since all the exhibits are meant for students as young as elementary school, the instructions are written without any difficult scientific terms. Visitors are encouraged to experiment with each exhibit's movable parts.

When attending the center, visitors will see the following energy exhibits:

- **Suntracker** - a tracking mirror mounted on the center's roof that follows the sun and reflects a 36-inch by 24-inch beam of sunlight into the center.
- **Solar atmosphere** - uses a combination of mirrors, lenses and diffractions grating (similiar to a series of small prisms) to display the spectrum of color making up the sun's light.
- **Photovoltaic** - uses solar cells to convert sunlight into electrical energy. This display is divided into two parts. When sunlight is reflected from the suntracker to the PV panel via a series of mirrors, a small wheel turns. Since this section only works when the sun shines, an electric light also shines on a PV panel to make the other wheel turn.
- **The sun** - a pinhole image of the sun shows an up-close portrait of our primary energy source.
- **Pedal power** - demonstrates energy relationships by showing the conversion of chemical energy (food) into kinetic energy (pedaling) to the rate at which energy is consumed. The person pedaling has the option to light between one to three lights.

(See Burst on page 2)

(Burst, continued from page 1)



Instructions for the light bulb exhibit are mounted to a display board between an incandescent and a fluorescent light bulb. The experimenter is encouraged to adjust the brightness of the lights, then compare the temperature of the heat emitted by each bulb. (Photo by Linda Cawley)

Energy over time - demonstrates an understanding of power at the rate in which energy is consumed. By standing on a movable base, the operator turns the base and holds onto a stand attached to the base. The operator is encouraged to see how he/she can make the base stop without touching the floor.

Incandescent vs. fluorescent - compares the power consumption and light output of two different kinds of light bulbs and shows how energy-producing heat, rather than light, wastes energy.

Heat transfer - demonstrates radiant energy emission and absorption, using a radiant heat source and a heat-sensitive liquid crystal to show the relationship between color and the amount of heat absorbed and emitted.

Cold metal - uses wood, metal, and insulation at the same temperature, but having a very different feel, to illustrate heat conduction through different materials.

Insulators - is a model house with a heat lamp serving as its home heating system. The display shows the amount of heat loss through different materials.

Hand battery - has two metal touch plates that display via a meter the electric current generated by the human hand touching two different metals at the same time.

Dominoes - shows the energy buildup in a chain reaction that allows a very small object to move a very large object.

Museum program

The purpose of the Museum Science Education Program is to fund the development and use of creative informal science education media which focus on energy-related science and technology. The program's objectives are to increase public science literacy and to encourage more young people to consider careers in science and technology.

In 1991, The Discovery Center of Idaho was one of 10 grant recipients in the nation. Various engineers and energy experts from Idaho companies provided a collaborative team with the center to design and build the exhibits.

The center, itself, has 90 exhibits throughout the building, each meant to stimulate

NEED Pr education

By Linda Cawley, IDWR I

Learning about energy presented in a stimulatin mind, Idaho schools are bein the National Energy Educatio

Idaho's NEED Project is Division of the Idaho Departr and the Northwest Power Pla include the Association of Id

The purpose of the pro energy education network wit provides educators with the critical thinkers, to creatively learning groups.

Idaho's project is being enable participating elementa NEED partnerships and recei Training is also provided at

Student/teacher workshops

Three Idaho Regional Workshops will be conducted school. Dates and sites are se State University, Boise; and 8 a.m., and the workshops w be provided at each site.

Workshop participants in their respective schools. S knowledge, materials, and ex various NEED activities.

During each workshop according to the role they'll include various energy game

Near the latter part of th Awards Program for Energy plaques. From those winners, outstanding elementary and s in June in Washington D.C.

Schools interested in p partnership application that v to the Idaho Department of

For additional informa workshops, principals should **800-334-SAVE.**

Program background

"NEED is a national net government leaders committe energy decisions," says Jam of interdisciplinary energy-f students to become active p fellow students."

Founded in 1980, goals are:

- To provide educator

Building Excitement for Science

Boise fourth-graders Casey Shaw, left, and Skyler Woodworth watch electric-

By Amy Stahl

At the front of the classroom, a fifth-grader holds a 3-foot fishing pole he made from a wooden dowel, string and a spool. His classmates watch intently as he demonstrates how to reel in the line and how it would handle a big fish. The pole, he explains, is a lever and the point at which the weight is distributed is the fulcrum. The other students nod knowingly.

The project is just one component of the unit on six simple machines that Sheila Robertson covers in the physics class she teaches at Boise's Lowell School. Next the students will make wheels and axles, and later they'll build wind turbines.

Hands-on experience is the best method for helping children develop an appreciation for science, says Robertson, a teacher in the Boise School District's gifted and talented program. "Students have to build something to remember it," she says. "You've got to let them do it or it won't imprint."

Yet not all teachers have the flexibility to incorporate experiential learning into their classrooms. Robertson notes that "most teachers are confined to a textbook for 30-40 minutes per day." Many others are further limited by large classes, inadequate supplies, uninterested parents and, in some cases, limited science knowledge themselves. **(For Robertson's views on gender bias in the classroom, see Page 7.)**

For whatever reason, studies show that when elementary school-aged children lose interest in science they are damaging their future earnings potential and draining "the pipeline" of future U.S. scientists and engineers.

There is no single explanation for "the great science turnoff," says geologist Robert Hazen. A scientist at Carnegie Institution of Washington and a professor at George Mason University, Hazen admitted in a 1991 *Newsweek* column that his sixth-grade daughter and eighth-grade son hate science. He wrote: "In elementary school, because of jargon and mathematical abstraction, my children got the mistaken impression that science is difficult, boring and irrelevant to their everyday interests."

Science, he said, "can provide an exhilarating outlet for every child's curiosity. Science education should teach ways to ask questions, and create a framework for seeking answers."

Scientists who are more interested in specialization than teaching future scientists should assume some of the blame, says Hazen. But he's also critical of the method by which science traditionally has been taught in the United States.

Boise State education professor Doug Yarbrough agrees. "Science is a process, it's not just the collection of facts. We've taught it that way for a long time," he says.

Memorization is not the answer, says Yarbrough. Like Robertson, he thinks children need to know more than just the terminology to understand how something works.

Yarbrough recounts the wonder he felt last summer working with children enrolled in "Ingenium," a one-week camp attended by 80 students in fourth through sixth grade. Among the camp's six class topics were computers, earth science and math adventures. Another class, "Exploring the World of Electronics," was taught by Hewlett-Packard and Micron Technology engineers who worked with the students on several projects, including a crystal radio unit. Determined to make the radios work, they strung wires up in the trees.

Their excitement was infectious, says Yarbrough. "There are a lot

CHUCK SCHEER PHOTO

ity at work with help from a Discovery Center display.

more efficient ways to learn, but if you allow [children] to get hold of something and let them work with something until it works, it gives them a real sense of mastery," he says.

While he doesn't dispute the virtues of hands-on learning, BSU physics professor Dewey Dykstra warns that there are dangers to the "make it and take it" mentality. He says teachers need to help children integrate what they've learned — not just provide "neat ways to excite the kids with little demonstrations."

A former junior high and high school teacher, Dykstra says teachers need to be flexible and willing to give children free rein to explore. But this can create the appearance of a disorderly classroom, which many teachers find disturbing, he says.

Dykstra is trying to get a better understanding of science education through a project he's conducting with a one-year $50,000 research grant from the National Science Foundation. Dykstra and Dale Sweet, an Idaho City elementary school teacher and graduate student at BSU, are studying how fourth-, sixth- and eighth-graders learn about motion. It's hoped that the results will show teachers how to be more effective in the classroom.

Improved teaching techniques certainly will help Idaho educators. But there's a bigger issue facing the state, Dykstra says. Teachers, particularly at the elementary-school level, have been poorly compensated and underappreciated.

'If you allow [children] to get hold of something and let them work with something until it works, it gives them a real sense of mastery'

"What happens in elementary school has not been considered important from a science point of view," Dykstra says.

The Discovery Center of Idaho is working to improve the situation by developing displays that are both engaging and educational. The center's latest exhibit, "Burst of Energy," includes 13 hands-on displays and a demonstration on electricity plus pre- and post-activities for teachers to use in their classrooms.

Started as a Junior League project, the Discovery Center was further inspired by concerned scientists like Dykstra and successful children's science museums in cities like San Francisco. Since the Discovery Center opened in 1988, 120,000 people have visited the renovated structure on the north edge of Julia Davis Park.

Displays are tucked into nearly every corner of the warehouse-like building. Visitors scurry from one display to the next. They plunge their hands into a replica of the Great Salt Lake, blow their own giant soap bubbles, pull on several types of levers and "play" with the numerous other displays.

"I use the term play because that's how we want the apparatus to be viewed," says executive director Lorette Williams. A former teacher, Williams believes that the center is helping to combat stereotypes by helping visitors discover that science is far from boring, she says. "Children's and adults' attitudes change when they have a chance to have fun, do hands-on things."

She is delighted to see children respond to the displays. Although each display is accompanied by a "how-to" sign, children rarely stop to read the instructions. Yet they almost intuitively know how each display works, she says.

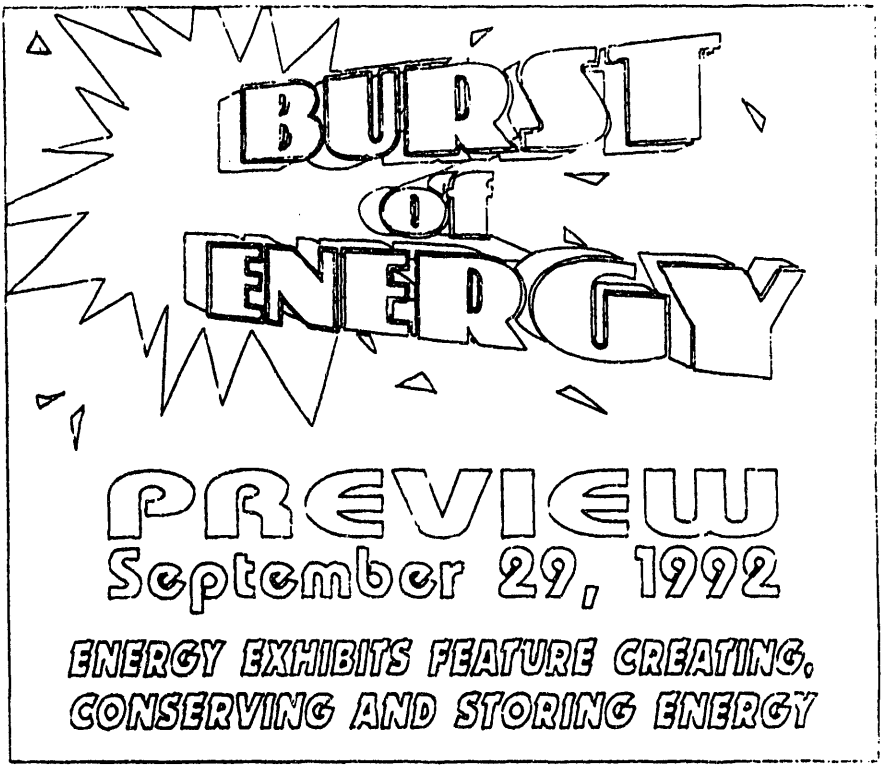
The center, which houses a growing reference library for teachers, also hosts summer day camps for 6-14 year olds and special programs for third-graders during the school year .

Williams hopes the center can be a place where children realize that learning is an exciting, everyday part of life and that "they're only limited as far as technology will take them," she says."If you share that with kids, then they can be a discoverer, they can be an Einstein — they can learn that thrill." □

Kevin Clark/The Idaho Statesman

A HAIR-RAISING EXPERIENCE: Whittier Elementary third-grader Amanda Bennett puts her hands on a Van de Graaff generator. The experiment was part of The Discovery Center of Idaho's "The Magic of Electricity" program, which will be demonstrated to area students. The program offers hands-on educational exhibits about electricity.

The Idaho Statesman


BURST
of
ENERGY
PREVIEW
September 29, 1992
ENERGY EXHIBITS FEATURE CREATING,
CONSERVING AND STORING ENERGY

BURST OF ENERGY

In October 1991, The Discovery Center of Idaho, Inc. was the recipient of $27,100 from the Department of Energy's (DOE) Museum Science Education Grant to build six energy related exhibits, "Burst of Energy" . The purpose of the project is to provide the public with a hands-on opportunity to explore and become familiar with energy-related issues at a basic scientific level. By fostering this kind of appreciation and understanding, The Discovery Center of Idaho will elevate energy awareness and provide a basis from which the Idaho population can make educated energy decisions.

MUSEUM SCIENCE EDUCATION PROGRAM

The purpose of the Museum Science Education Program is to fund the development and use of creative informal science education media which focuses on energy-related science and technology. The program has two objectives: to increase public science literacy and to encourage more young people to consider careers in science and technology. In support of these objectives, the Department of Energy anticipates funding the development of the media and informal energy-related science education. Examples of appropriate projects include (but are not limited to): interactive exhibits; demonstrations; hands-on activites; teacher/ student curriculum and film/video/software productions.

NEW ENERGY EXHIBITS

SUNTRACKER is a roof-mounted tracking mirror which follows the sun and reflects a 36" x 24" beam of sunlight into the Center.

SOLAR ATMOSPHERE uses a combination of mirrors, lenses, and diffractions grating to display the spectrum of color making up the sun's light.

PHOTOVOLTAIC uses solar cells to convert sunlight into electrical energy.

PEDAL POWER demonstrates energy relationships by showing the conversion of chemical energy (food) into kinetic energy (pedaling) to electrical energy to light energy.

ENERGY OVER TIME demonstrates an understanding of power as the rate at which energy is consumed.

INCANDESCENT VS. FLUORESCENT compares the power consumption and light output of two different kinds of light bulbs and shows how energy producing heat, rather than light, wastes energy.

HEAT TRANSFER demonstrates radiant energy emission and absorption, using a radiant heat source and a heat-sensitive liquid crystal to show the relationship between color and the amount of heat absorbed and emitted.

COLD METAL uses wood, metal and insulation at the same temperature, but having a very different feel, to illustrate heat conduction through different materials.

INSULATORS is a model house with a heat lamp serving as its home heating system and shows the amount of heat loss through different materials.

HAND BATTERY has two metal touch plates that display via a meter the electric current generated by the human hand touching two different metals at the same time.

DOMINOES shows the energy build up in a chain reaction that allows a very small object to move a very large object.

THE SUN is a pinhole image of the sun that shows an up-close portrait of our primary energy source.

PROGRAM

5:45 p.m.

September 29, 1992, The Discovery Center of Idaho presents 12 exhibits related to energy.

INTRODUCTIONS: Lorette Williams
Executive Director
The Discovery Center of Idaho

WELCOME: Robert Grover
Treasurer, Board of Directors,
The Discovery Center of Idaho

SPEAKERS: Tiajuana Cochnauer
Academic Programs Specialist
Office of External Affairs
US Department of Energy
Idaho Field Office

Bill Molina
Exhibit Director
The Discovery Center of Idaho

The exhibits were paid for by the Department of Energy grant. Engineers and energy experts from Idaho companies provided the collaborative team with The Discovery Center of Idaho to design and build the exhibits.

SPECIAL THANKS TO THE FOLLOWING

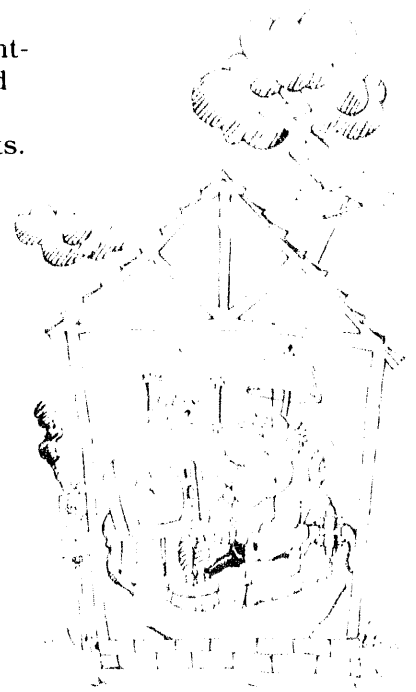
US Department of Energy
US DOE - Idaho Field Office
Hewlett-Packard Company
Idaho Power Company
Dan Mahoney
Bill Lloyd
John Brown
Vern Buchta
Bob Rinker
Karen Collins
Blair Christensen
Cliff Barber
Robert Gunter
Vern Gillogly
Gordon Pratt
Jim Richter
Bill Ross
Don Siebers
Tami Pratt
Janis Goodheim
Ray Brown

IDAHO POWER
CONSUMER CONNECTION
SEPTEMBER 1992

New Program Offered To Correct Power Disturbances

Many homes have computers, televisions, clocks and numerous other items that contain micro-electronics. Unfortunately, they can be affected by power disturbances caused by lightning, accidents, utility operations or inadequate wiring. These are *power quality* problems. Now Idaho Power is offering a new program for customers that will provide technical assistance for problem identification, power quality equipment financing and a home wiring audit.

Under the program, company Energy Services representatives will work with customers to identify the severity and probable cause of power quality problems, as well as possible solutions. If a home wiring audit is needed the customer may contact a licensed electrician to perform the audit. The audit is a written report highlighting problem areas and making recommendations for improvements. As an incentive, residential customers who have an audit performed by a participating electrician will receive a **$25 rebate** from Idaho Power.



Loans for the purchase of power quality equipment, wiring repairs and electrical system upgrades will be available to qualified residential and commercial customers. For purchases ranging from $25 to $400, interest charges will correspond with the prime rate. Loans will be paid in monthly payments of $10 on the customer's electric bill. A finance program also will be available for loans ranging from $401 to $10,000.

For an efficient and economical solution to irritating power disturbances in your home or business, call the Energy Services representative at your local Idaho Power office.

Education Programs Ready for Fall

School is open and Idaho Power's consumer education representatives are returning to the classroom, too. They present programs in schools and to community groups about electrical safety, energy efficiency, electrical generation and the environment and wildlife. Most of last year's more than 2,200 presentations were given to children in kindergarten through eighth grade.

This year new programs aimed primarily at high school students and adults have been added. They focus on planting trees for energy efficiency, electrical safety in the home and on the farm, and safety awareness for seniors.

Idaho Power developed these programs to reinforce state curriculum objectives. The programs also help students and adults learn about issues that affect the utility industry. The company believes informed customers are the best customers and is committed to providing them with educational resources.

Schools, social clubs, community groups and senior centers should contact their local Idaho Power offices for more information about the company's consumer education programs.

Energy Exhibits Dazzle

Burst of Energy, a series of thirteen new exhibits focusing on solar energy, energy conversion and energy conservation, will premiere September 30 at the Discovery Center of Idaho, thanks in part to the collaboration of Idaho Power and some of its employees. The exhibit features hands-on displays, solar panels, photovoltaics, liquid crystals, prisms and many other exciting energy ideas.

The Discovery Center of Idaho is a non-profit organization located in Boise. For more information call the Center in Boise at (208) 343-9895. Be sure to bring your children and enjoy the hands-on displays of the science behind energy.

Recipes From the Electric Kitchen

Spaghetti with Clam Sauce

8 oz. spaghetti noodles
1 cup fresh grated Parmesan cheese
3 cloves garlic, chopped
dash of thyme
2 Tbsp. fresh chopped parsley
1 Tbsp. olive oil
(3) 6 1/2 oz. cans chopped clams

Combine clams and thyme and marinate for 1/2 hour. Sauté chopped garlic in olive oil until light brown, add drained clams and parsley and heat thoroughly. Cook spaghetti until done. Spoon sauce over hot spaghetti and cover with cheese. Makes 4 servings.

Dietary information (per serving): **Calories** 318 **Total Fat** 11.2 G
Carbohydrates 22.5 G **Cholesterol** 64.5 Mg **Sodium** 599 Mg

Recipes are selected for nutritional value and low energy use in preparation. They are approved by Joanne Graff, Certified Home Economist from the Central District Health Department in Boise, Idaho.

Printed on recycled paper

You and Your Guest are invited to get a

Burst of Energy

Grand Opening Preview

Tuesday, September 29, 1992

5 to 7 p.m.

131 Myrtle • Boise, Idaho

Energy Exhibits funded by a grant from the Department of Energy

Refreshments

DISCOVERY NEWS

THE DISCOVERY CENTER OF IDAHO

A Bi-Monthly Publication of The Discovery Center of Idaho, Inc.

131 Myrtle Street • Boise, Idaho 83702 • (208) 343-9895 • September/October1992

ITEACH

Off to a Rockin' Start

by Lyn Misner

Likenesses of Elvis and James Dean served as official greeters for the first ITEACH (Idaho Teachers Excited About Cruisin' the Heavens) workshop held at the DCI July 26 to August 7. Twenty-three teachers and principals attending knew upon arrival that this conference would not be ordinary.

With a National Science Foundation grant, ITEACH moves the DCI into a state-wide role in science education. Teams from seven school districts—Buhl, Coeur d'Alene, Council/New Meadows, Nampa, Snake River, and Twin Falls—participated in the two-week session.

Participants made star charts and models in addition to constructing and launching rockets. The educators also learned to set up and operate the Starlab portable planetarium that will be delivered to participating school districts this year. NASA instructors displayed resources available to educators, and star-gazing parties were arranged with the help of the Boise Astronomical Society.

The 16-hour days of the ITEACH workshop mixed intensive astronomy instruction from Dr. Gilbert Ford (NNC), activities directed by Tom Campbell (T.C. Bird planetarium director), lesson plan ideas from Dr. Catherine Matthews (BSU), and guest speakers.

The DCI's Jeff Craig and Kelly McLeod coordinated the event.

ITEACH participants set up Starlab planetarium. Photo: Goodheim

The Energy of the Young

by Lane Bettencourt

"Energy crisis" has a quaint ring to it nowadays. Those under the age of 30 may never even have heard the phrase. It was on everyone's lips, however, in the mid-1970's, as America lined up at gas pumps and lowered living room thermostats in the wake of the Arab oil embargo.

The phrase washed away when oil spigots were turned back on, but energy as a political and social issue was here to stay.

The next generation faces an expanding list of decisions on energy-related issues: more dams on rivers, yes or no?; nuclear power, yes or no?; reduce vehicle and factory emissions, yes or no?; save the salmon, yes or no?

It is safe to say that the power of understanding will be an important energy source the world will look to in the next century. The DCI's "Burst of Energy" exhibit opens to the public on September 30. The thirteen exhibits are designed to increase understanding of energy issues. (For more information, see "New Exhibits," page 3.)

"Exhibits like this at science museums," says education director Jeff Craig, "are one of the motivating factors to get kids interested in a career in science."

Less sweeping, but just as important, the exhibit will enlighten visitors of all ages on the basic principles behind many small energy decisions—from buying lightbulbs to installing insulation—made every day.

Craig says the DCI approached the entire project with the view that the subject of energy, as intimidating as it may seem, is a subject that is understandable and interesting.

Working day and night on the exhibits prior to the opening, exhibit director Bill Molina, would appear in danger of running a bit low on energy himself. The importance of the project, however, keeps him as fully energized as that pink bunny. "The more people know about energy," he says, "the more likely they are to make good decisions about energy."

The topic of energy doesn't have to be all serious, though. In fact, Craig likens the DCI exhibits to a "scientist's laboratory where kids can come in and play with all the stuff."

The "Burst of Energy" exhibit isn't guaranteed to inspire youngsters to discover new energy sources. But it certainly doesn't hurt.

Director's Corner

by Lorette Williams

It is with great pleasure that I recognize the following corporations, foundations and state agencies for their significant support, and extend a very special thank you. Such support of science education in Idaho, enables the DCI to continue its mission.

A $25,000 grant was received through the Idaho State Department of Education Science Education Grant Program. The DCI plans to use the money to expand informal science education programs at the center, and to supplement formal science education throughout Idaho.

The Steele-Reese Foundation donated $14,000 to purchase a Starlab planetarium and related materials to be sent to rural Idaho schools under the ITEACH program.

The Optimist Club of Boise donated $4,285, for the purchase of equipment and materials necessary to initiate a new third-grade assembly program. The "Magic of Electricity" was developed by the Lawrence Hall of Science GEMS, and will begin at the DCI this fall.

Hewlett-Packard has donated a Vectra computer and LaserJet III printer to track DCI programs.

The U.S. West Foundation Leadership and Professional Development Fund donated $1,000 to send me to represent DCI at the ASTC Annual Conference in Toronto. This will be the first conference attended by a DCI representative since 1988.

The M-K Foundation donated $15,000, and Ore-Ida contributed $4,000, to our general operating fund. This unspecified financial assistance is essential in maintaining quality services.

Favorite Inventions

by Lisa Oppedyk

Response to our two questionnaires about inventions has been great. One questionnaire asks "What is your favorite scientific invention and why?" The other asks, "If you could invent anything, what would it be and why?"

For the first question, different forms of transportation were the most popular answers. Respondents liked cars, planes, and bikes because they get people where they want to go faster, and save them the trouble of walking. One person pointed out that life would be very unpleasant without the toilet.

There were many creative answers to the second question. These are some of the best:

"A device to turn garbage into new products and energy."

"A Nintendo that gives you money for all the points"

"A money tree."
(we'll let you guess why)

"The cure for all diseases, or a machine that will make medicine for all the diseases, so no one would have to suffer."

We're anxious to hear your responses, so next time you're at the Discovery Center, fill out the questionnaires. Your answers might be printed in the next newsletter.

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Lyn Misner
Kathy Sterndahl

*Special Kudos to...

Tammy Pratt for the wonderful energy wall art displayed during the ITEACH workshops.

Bob Flannery for pulling double duty and substituting on Saturday.

Bill Griffith for being such a willing substitute.

Jane Wallich for recruiting a new member for our volunteer staff.

Lois Schwarzkoff for taking on the big job of bookkeeper for the science store.

Byron Puzey for all his extra effort keeping the DCI in good shape during the ITEACH workshops.

Summer Stevens for responding to our "We Wish We Had" column in the newsletter and donating a computer to DCI.

Betty Catterson for being such a willing substitute.

New Exhibits

"Burst of Energy"

by Kathy Sterndahl

Thanks to a grant from the Department of Energy, and nearly round-the-clock work by Bill Molina, the Discovery Center will unveil "Burst of Energy," a series of thirteen new exhibits, on September 30. The focus is on solar energy, energy conversion, and energy conservation.

Sun Tracker is a six-inch image of the sun brought inside the building through a pinhole on the roof. Because sunlight is our ultimate energy source, **Solar Atmosphere** explores the make-up of our sun. Using **Sun Tracker** and a combination of mirrors and lenses, this exhibit displays the spectrum of colors created by the sun's light. Dark lines across the spectrum, called Fraunhoffer Lines after the 19th-century German physicist who discovered them, demonstrate which elements are absorbed by the sun's atmosphere.

Photovoltaics uses solar cells to convert sunlight into electrical energy. Visitors experiment with the effect of the angle of the sun on a solar panel and compare the power of an incandescent light with the power of the sunlight.

Pedal Power demonstrates energy relationships by showing the conversion of chemical energy (food), to kinetic energy (pedalling), to electrical energy, to light energy. Visitors control the amount of light produced with the amount of effort they put into pedalling. Those taking part develop an appreciation for the work it takes to generate electricity.

An improved version of the **Energy Over Time** exhibit develops an understanding of the relationship between power and energy, and energy conservation.

By comparing the power consumption and light output of two kinds of lightbulbs, **Incandescent vs. Fluorescent** illustrates the energy wasted producing heat, rather than light, in the incandescent bulb.

Radiant energy emission and absorption is demonstrated in the **Heat Transfer** exhibit. A radiant heat source and a heat sensitive liquid crystal show the relationship between color and the amount of heat absorbed and emitted.

Two exhibits illustrate heat conduction through different materials. **Cold Metal** uses wood, metal, and insulation, which are at the same temperature but feel very different. **Insulators** is a little house with doors made of metal, wood, stone, and insulation. A heat lamp placed inside represents a home heating system, while the temperature of each door represents the amount of heat lost through that material.

Hand Battery has two metal touch plates to display the electric current generated by the human body. **Dominoes** shows the chain-reaction effect of releasing potential energy when a very small block of wood causes a much larger block to fall down. **Water Freezer** demonstrates how water in a vacuum will first boil, and then freeze.

Jeff's Space

On New Friends

by Jeffrey Craig, Education Director

I just said farewell to a fine group of Idaho educators who participated in our summer astronomy institute, Idaho Teachers Excited About Cruisin' the Heavens (ITEACH). During ITEACH, participants and instructors alike developed a sense of camaraderie and mutual support that all people need, especially teachers. Throughout the upcoming school year, we will be doing a variety of activities designed to maintain the friendships we've developed, and I thought I'd mention them here.

Good friendships don't survive without time and effort. Because ITEACH participants are separated by hundreds of miles, we decided to use the computer and modem as a medium of communication. Teachers and administrators will be using an electronic bulletin board called Learning Link to send letters back and forth on "E-mail." We will also post information on current astronomical happenings, and participate in discussion centers on lessons and activities that really work.

We've planned three visits to each of the participating schools. This means trips to Buhl, Coeur d'Alene, Council, Nampa, New Meadows, Snake River and Twin Falls. During the first trip, we'll ask teachers to reflect on their ITEACH experience to help us plan for next year, as well as to work out any kinks they might be having with Learning Link. The next trip will involve teaching a one-credit course called, Awareness of the Night Sky, at each of the schools. Finally, we will do a third visit to determine how much ITEACH helped participants in presenting astronomy to their students in a fun, hands-on manner.

Well, to all the teachers and administrators who participated, I miss you; I enjoyed your enthusiasm, effort and professionalism. I'll do what I can to help people appreciate the quality of instruction you provide their children. Idaho is lucky to have such exceptional teachers, and I'm lucky to have so many new friends.

DISCOVER: *Electricity*

THE DISCOVERY CENTER OF IDAHO

Jumping Salt

You Need:

1 balloon

a wool sweater

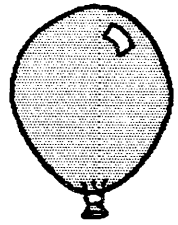
salt

1 plate

Make:

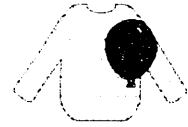
1. Pour a little salt on the paper plate.

2. Blow up the balloon and tie it shut.

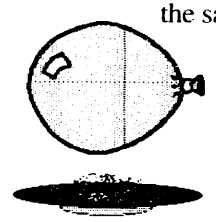


Do:

3. Rub the balloon briskly on the wool sweater for about a minute.



4. Hold the balloon over the salt.



Ask:

5. What happens? Write your observation's here.

How it Works

The salt jumps up and sticks to the balloon because of static electricity. Static electricity is an electrical charge that builds in one place instead of flowing through a conductor like electrical current.

When you rub the balloon on the sweater, electrons are rubbed off the sweater and onto the balloon. Because electrons have a negative charge, the more electrons that collect on the balloon, the stronger the negative charge it has.

The salt has a more positive charge than the balloon, so when you bring the balloon close, the positive and negative charges attract each other, and the salt jumps up to the balloon.

Written by Jeffrey Craig, 1992 • Published by The Discovery Center of Idaho

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Microwave
Stepstool
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Typewriter
Clocks for museum halls

The "Magic" of Electricity

by Martha Jaworski

The Discovery Center invites Idaho third-graders to learn about electricity at this fall's The "Magic" of Electricity program.

Classes that attend the program will begin the visit with a demonstration designed specifically for this age group. Following the demonstration, the DCI's energy exhibits will be available for students to learn about electricity through hands-on experience. The DCI will also provide pre- and post-visit educational materials to teachers to help create a unit on electricity within the classroom. These materials will be sent to teachers when they schedule their visit.

The DCI will be open on Tuesdays exclusively for third-grade classes, but drop-ins will be allowed to visit also. The program will run from September 8 through December 15, 1992. Teachers can schedule a visit by calling Jane Baird (343-9895) at the Discovery Center.

Welcome New and Renewal Members!

Scientist Memberships:

West One Bank

Friend Memberships:

Alice & Kevin Hayward, Bill & Jane Lloyd, Avery & Tim Pratt, Richard & Georgian Raimondi, Celeste Ventura Ttee

Family Memberships:

Randy & Kathie Bergquist, Scott & Annie Brown, Paul & Mary Jo Butler-Dawson, Joel & Cora Caldwell, Cliff Callow, Mick & Martina Chandler, Richard & Roxanne Cummings, Chuck & Susan Durick, John & Roberta Fields, Tara Flume, Jon & Evelyn Fox, John & Becky Hine, Kate Hogge, Bill & Chris Jonakin, J.R. & Jeanne King, Jeff Larsen, Ron & Virginia Lenz, Cindy & Randy Lock-Smith, Eric & Deborah Lucas, Betty Maki, DelRay Maughan, Nancy Napier, Kevin & Becky Nielsen, Megan & Howard Olivier, Pat Patterson, Lois & Robert Powell, Paul & Nancy Rolig, Gary & Julie Slee, Ludee & Ted Vermaas, Pam & Rick Vycital, Pat Ware, Felicia Williams

New Staff Members for *Discovery News*

Claudia Druss, editor of *Discovery News* for the past year, has left to pursue personal interests. Her contribution to the professionalism of the newsletter is greatly appreciated, and we wish her continued success in the future.

Cindy Schuppan has taken over the editorial duties, beginning with this issue. She is employed in the communications field, and has experience in writing and editing.

Lane Bettencourt has joined the newsletter staff as a writer. He is self-employed as a public relations consultant, and has experience as a reporter.

Janis Goodheim, Martha Jaworski, Lyn Misner, Raylinda Rich, Stella Schneider, and Kathy Sterndahl, will continue in their current staff positions. They have done outstanding work in the past, and we appreciate their decision to stay with us.

We extend a warm welcome to our new staff members, and thank the others for continuing their efforts. We are very fortunate to have so many talented people volunteering their time.

Hands-on Learning

While the majority of middle and high school students may know the basic principles of science, they lack the ability to apply the knowledge, according to a recent report in the Wall Street Journal.

The report was based on a test conducted by the National Assessment for Educational Progress. More than 19,000 students in the fourth, eighth and twelfth grades took the test in 1990.

Education Secretary Lamar Alexander believes that schools should place more emphasis on science. "We've put more priority on English and math, and we've seen results. We do not have a priority on science in this country," he said.

Dull teaching practices may be one reason behind the poor scores. Experiments and computers were listed as possible remedies; hands-on learning is best!

DCI Calendar

September

3 13th Dimension Mtg. 7 p.m.

6 STARLAB Sunday

10 DCI Board Mtg. 7 p.m.

18 Volunteer Harvest Picnic

29 "Burst of Energy" Preview (by invitation only)

30 "Burst of Energy" Grand Opening

October

1 13th Dimension Mtg. 7 p.m.

2-6 ASTC Conference, Toronto

8 DCI Board Mtg. 7 p.m.

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Science Saturdays

CLASSES IN THE FALL EDITION OF THE BOISE SCHOOLS COMMUNITY EDUCATION BULLETIN

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Spouse
Address
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Phone: Day Night
Children's Names and Ages:

TYPE OF PAYMENT ENCLOSED
Charge VISA MC Check
Account #
Expiration Date
Signature

Membership Categories
Circle One

Individual	*$15*
Family	*$35*
Friend	*$50*
Adventurer	*$100*
Guide	*$250*
Explorer	*$500*
Investor	*$1000*

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The Discovery Center of Idaho
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"I hear and I forget; I see and I remember; I do and I understand!"

DISCOVERY NEWS

THE DISCOVERY CENTER OF IDAHO

A Bi-Monthly Publication of The Discovery Center of Idaho, Inc.

131 Myrtle Street • Boise, Idaho 83702 • (208) 343-9895 • November/December 1992

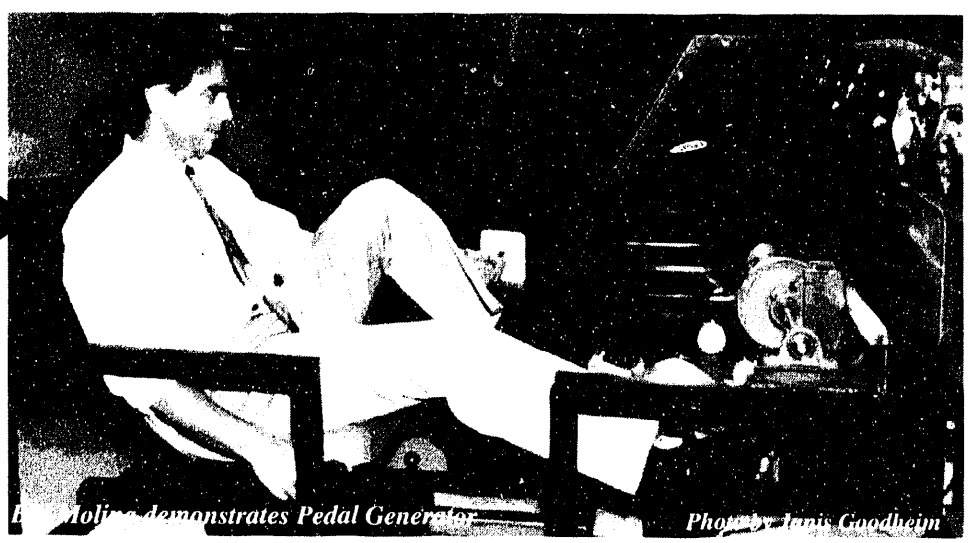
Overcoming the Fear of Science

by Lane Bettencourt

Sitting in science classes in the 1950's, 60's, and 70's, helped many of us make career decisions right then and there. Yes, it dawned on us, any career *but* science was the one we wanted.

That sinking feeling hit us about the fourth week in class, when the chalkboard became decorated with formulas and terms that, as far as we were concerned, might as well have been written in Chinese. It may never be known how many careers in law, business, politics, and journalism resulted from the age-old condition called "fear of science."

Unfortunately, most young people still see skill in science as "a natural talent, not something to be learned," says chemistry teacher Mark Purdy of Borah High School in Boise. The notion is that you're either born with it or you're not. Purdy tries to make the study of science "not so academic." He says, "Kids need hands-on experience. The academic part will take care of itself."



Bill Molina demonstrates Pedal Generator *Photo by Janis Goodheim*

For people of a certain age, the only memorable "hands-on" exposure to science as a youngster may have been that plague-to-all-parents known as the "chemistry set." The resulting concoctions that blew up, or stunk, were considered breakthroughs worthy of neighborhood bragging rights.

With the full flowering of the computer age, today's students are more comfortable with science on a day-to-day basis than previous generations. However, this may be a bit misleading according to Dave Marquart, a Boise High School computer science teacher and national finalist in the "Teacher in Space" program in 1985. He says this increased familiarity with science is "shallow," and that the average student still has a long way to go to become well-grounded in the basics.

Centennial High School biology teacher Bob Beckwith says DCI, in a "fun" way, forces the visitor "to become involved" with science. In fact, educators and science professionals are in wide agreement that students of all ages need more "up close and personal" contact with science.

Museums such as the Discovery Center of Idaho go a long way toward filling that need. Simply walking through the doors of the DCI is a good place to start on the road to recovery from a "fear of science."

"Burst of Energy" Exhibits Open

Treasurer Robert Grover's words, "from concept to reality," describe the process culminated by the preview and grand opening of the "Burst of Energy" exhibit at DCI in September.

In October 1991, the Department of Energy (DOE) selected DCI as one of only 10 museums nationwide to receive a Museum Science Education grant of $27,100. This program seeks to provide hands-on exploration of energy-related issues.

Tiajuana Cochnauer, Academic Programs Specialist at the DOE Idaho Field Office, stressed Idaho Nuclear Energy Laboratories' and the DOE's support of DCI and excitement about "Burst of Energy" at the preview September 29.

"Burst of Energy" is the first project undertaken by DCI to build a number of exhibits around a central theme. For Bill Molina, Exhibit Director, this was a unique opportunity. "We were able to do some more expensive things," said Bill, "instead of trying to piece what we have together." All 13 exhibits were built either in the DCI workshop, or in the home workshops of volunteers. Some exhibits are replications of those at other museums, and Bill designed the rest. In order to complete the project on time, Bill worked hundreds of extra hours. Now he can return to a more normal schedule. "I have my life back," Bill said.

Director's Corner

by Lorette Williams

"Science So Kids (and Teachers!) Love It" is a new model program at DCI, but unless you have a third-grader, you may not hear about it. This new facet of our educational mission is receiving both community and corporate support.

The model, supported by a three-year grant of $40,000 from Hewlett-Packard's K-12 Education Support Program, encourages businesses (like DCI) to become 'vendors' of their expertise to schools. Students benefit from innovative enrichment provided by business professionals outside the classroom's four walls.

DCI's implementation of this model is a 20-minute demonstration, "The 'Magic' of Electricity," for third-grade classes. DCI's energy and electricity exhibits are integrated with the demonstration to provide the hands-on experience necessary to "do and understand." Tuesdays through January are reserved for this program and are booked solidly.

Community involvement comes through the generosity and commitment to youth of the Boise Noon Optimists. The group contributed $4,285 to provide materials for 12 demonstrations, a slide projector, an amplification system, and an overhead projector. The demonstrations are taken from a unit of the Lawrence Hall of Science GEMS (Great Explorations in Math and Science) program. The equipment will enhance many of DCI's programs.

The 'vendor' concept is rich in potential for improved education of today's students. Opportunities to be in the workplace, to learn from professionals in a variety of fields, and to experience the real world as it relates to school subjects, will excite students about possible future roles. We at DCI are proud to be a vendor of a unit on electricity, often regarded as a difficult subject by both teachers and students, thanks to the support of Hewlett-Packard and the Treasure Valley Optimist Clubs.

Welcome New and Renewal Members!

Adventurer Memberships: Humbert & Evelyne Valenti
Friend Memberships: Bob Beckwith, Rita & Steven Loughrin-Sacco, Pat & H.A.P. Myers, Kyle & Linda Palmer, Pat Zuroeveste
Family Membership: Irene & Stephen Asher, Laura & Tim Broughton, Charlene & Todd Burt, John & Debbie Caldwell, Susan Chaloupka, Thomas & Eve Chandler, Mary & Joe Christy, James & Kathy Cornell, Vicki & Tim Cronin, Donald & Ellen Cryder, Martin & Margaret Danner, Russ & Rena Firkins, Onita Foster, Jacqueline Groves, Warren & Sandra Hill, Barry & Norma Hope, Walden & Monica Hughes, Ray & Charlotte Jensen, Richard & Kathy Kartchner, John & Janet Kee, Ken & Judy Knipple, Andy & Lisa LePay, Stephen & Julie Lord, Mike Mahoney, Susan & Steve Mann, Cherllynn & Paul McAndrew, Brian & Susan McGrath, Pat & Lisa McMurray, Pamela Nagel, Russell & Mary Jo Nieser, Jean & Ken Parker, Maurizio & Jane Pellicciotta, Lydia & Ray Powers, Keith & Renee Rasmussen, Rick & Kathy Reierson, Nick and Cathy Silak-Miller, Patricia & Columbu Smith, Clarence & Marie Sonderman, Ray & Linda Sorensen, Chuck Story, Greg Surabian, Harry & Barbara Tumanjan, Robin & Mimi Wallis, Michael & Marta Watson, Paul & Deborah Weatherspoon, Ron & Cathy Yoder, Joseph & Kristina York, Bruce & Tracey Zignego
Individual Memberships: Kathy Chatterton, Bradley Downs, Joe Gawron, Sharon Ireton, Esther Porges, Judith Porges, R.M. Wood, Fran Worth

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Lane Bettencourt
Martha Jaworski
Lyn Misner
Kathy Sterndahl

*Special Kudos to . . .

* ***Kim Lippoth for coordinating "Burst of Energy" preview night festivities.***
* ***Bob Flannery, Gladys Dahm and Tyan Carter for working on Labor Day weekend.***
* ***D'Pauly Corporation for cleaning the carpet in the volunteer lounge.***
* ***Jill Hummel for being such a willing substitute in The Science Store.***
* ***Jennifer Kossa and Lois Schwartzhoff for substituting on the reception desk.***
* ***Debi Rule and Cheryl Dunham for covering weekend staff duties, allowing staff to concentrate on preparation for "Burst of Energy."***
* ***Chuck and Susan Durick for donating a microwave to DCI.***
* ***Sean Von Lindern for the graphic art on the front of the Volunteer Handbook and for the design of The Science Store logo.***
* ***Tyan Carter for "reluctantly" missing a day of school to attend the volunteer fair at Fairmont Junior High.***

DISCOVER: *Gravity*

THE DISCOVERY CENTER OF IDAHO

Free Fall!

You Need:

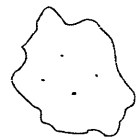
1 sheet
8 1/2 x 11 paper

1 rock
(the same size as the paper wadded into a ball)

Make:

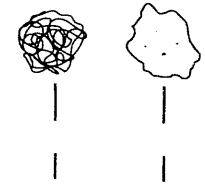
1. Wad the paper into a tight ball.

2. Pick a rock about the same size as the paper ball



Do:

3. Hold them the same height above the ground. Drop them at the same time.



4. Do this several times, watching for which ball hits the ground first.

Ask:

5. Did the rock and the paper hit at the same time? (Check your answer)

- ☐ **Yes**
- ☐ **No**
- ☐ **Not Sure**

How it Works

Many people think that heavier objects fall faster than lighter objects, and for good reason. For example, if you were to drop a feather and a rock, the rock would hit the ground first. This is because air slows the feather more than the rock. Strangely, when astronauts did this on the Moon, where there is no air, the feather and the rock hit at exactly the same time.

So, why did your paper ball and rock hit at the same time? First, the air slows, both objects about the same, so we just ignore its effect. Second, how fast an object falls depends only on how far it moves, the objects weight makes no difference at all! Since the rock and the paper fall at the same rate, and are dropped at the same time, from the same height, they hit the ground at the same time.

Written by Jeffrey Craig, 1992 • Published by The Discovery Center of Idaho

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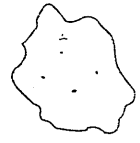

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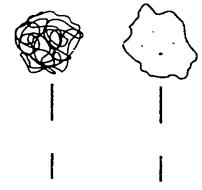

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Written by Jeffrey Craig, 1992 • Published by The Discovery Center of Idaho

Jeff's Space

On Murphy's Law and Voice Mail

by Jeffrey Craig, Education Director

There was a time when people looked toward nature for affirmation of their place in the world. The comforting cycles of changing seasons, migrating animals, and the moon's march through its phases, all served to reassure ancient people that some things were indeed predictable.

To some extent this continues among rural people, but to the urbanite, natural "law" has been replaced by another, more capricious paradigm. I speak of Murphy's Law — anything that can go wrong, will go wrong. As nature long ago did, this law helps modern humans forecast what a future filled with new and exciting technologies might hold for them.

Before I launch into an example, I want you to take a minute and use Murphy's Law to predict what might happen in a situation that includes the following elements:

a) college registration by phone

b) a new voice mail system

c) a part-time student (me), desperate to take one and only one specific class

"Yeah, right, register by phone, that will really happen" the cynical among you are saying now, but I'm an adventurer and I decided to give it a try. It's not that I really expected to get through, I just wanted to see what would happen. Still as a Murphy's Law practitioner, what did happen exceeded my wildest expectations.

At 7:00 a.m., I dialed the handy register-by-phone number and predictably got a busy signal (Murphy's Law already applies). Undaunted, I dialed again....

Twenty minutes, and 119 punches of the re-dial button later I got through. Relieved and somewhat amazed I listened to the voice mail recording at the registrar's office. Here is how I remember the message:

"You have reached the Registrar's Office," the machine said kindly. "Blah, blah, blah, wolf, wolf, *press number one*, now. If you blah, wolf, wolf, blah, *press number two*. Those part-time students wishing to register by phone, *press number three now*," the recording said.

I could hardly contain myself, a new technology was actually working and I was alive to witness the great event! With not a little ceremony and flushed with pride, I pushed that button. I braced myself, expecting the next few words to have the emotional impact of hearing the National Anthem on Veteran's Day....

"I am sorry, all our operators are busy. Please call back. Click. Buzz," the machine said in a cheerful little voice. At that moment, I came back to Earth. I remember thinking, "Apparently, voice mail doesn't understand the concept of putting someone on hold."

So, I was disappointed. Who wouldn't have been? But a feeling of peace came quickly. If I'd lived a thousand years ago I would have imagined herds of caribou running South, the leaves turning and the full moon shining down. Instead, I experienced the calming impact of Murphy's Law and faced the day knowing that despite our best efforts, some things never change.

New Exhibits

by Kathy Sterndahl

As part of the 1850 Paris Exposition, Jean Bernard Leon Foucault, a French physicist, suspended a 62-pound cannon ball from the dome of the Pantheon, using 200 feet of piano wire.

A stylus affixed to the bottom of the ball traced a line through sand on the floor, as the ball swung from side to side. Within minutes, the pattern in the sand began to resemble the outline of a two-bladed propeller. The only explanation was that Earth had turned beneath Foucault's Pendulum, while the ball continued to swing on the same plane. This proved the theory of Earth's rotation set forth in 1543, by Nicolaus Copernicus, and ridiculed by many for over 300 years.

DCI's Foucault Pendulum exhibit demonstrates this same phenomenon by knocking down small pegs as the Earth turns under the swinging ball. At Boise's latitude of 43 degrees north, the ball appears to swing 245.5 degrees each day. The swing of a pendulum suspended at the Equator would not appear to change at all, while the North or South Pole would produce one complete rotation every 23 hours and 56 minutes.

The back and forth swing of the pendulum is maintained through the use of an electromagnet mounted near the point of suspension in the ceiling.

Many Idaho Power Company employees were involved in making the pendulum. Byron Flynn worked with the California Academy of Sciences in its design and machinist John Thiel fabricated many of the components. Numerous other Idaho Power Company personnel were involved with such tasks as winding the electromagnet, designing and building the electronic components, and installing the pendulum. For their efforts, these people received an inter-company Outstanding Volunteers Award. Along with the recognition, they received $100 which they donated to DCI.

Also contributing to the pendulum was independent metal worker Vaughn James who donated a 140 pound Caterpiller tractor part which serves as the pendulum's swinging weight.

Volunteers Honored

Pumpkins and streamers in fall colors set the scene for the annual Volunteer Harvest Picnic held September 18 at Julia Davis Park where volunteers enjoyed the chance to become better acquainted and learn about each other's duties. An excellent performance by the Treasure Valley Cloggers Team #7 ended the festivities. Sally Belcher, Volunteer Services Director, and the rest of the DCI staff organized the event to recognize the contribution volunteers make to DCI.

The following representatives spoke about the tasks performed by volunteers in each area and their accomplishments during the past year: Docents/Greeters-Clara Erickson; Education-Marsha Berlin; Exhibitry-Mike Keegan; Newsletter-Cindy Schuppan, Editor; Receptionists-Jane Wallich;The Science Store-Kit Knox, Manager; Youth Volunteers-Tyan Carter, President13th Dimension; Board of Directors-Doug Oppenheimer,V.P. Operations.

Volunteers who have performed 100 or more hours of service were recognized and are listed in the next column.

Treasure Valley Cloggers at DCI Picnic *Photo by Janis Goodheim*

Volunteer Hours

100 HOURS: Marsha Berlin, Bonnar Bray, Vern Buchta, Betty Catterson, Gloria Drinkard, Alec Gloth, Jennifer Kossa, Alan Lambuth, Rae Ann Leach, Pat Patrick, Del Stivison, Isaiah Vering.

200 HOURS: Cliff Barber, Kim Beeman, Ashley Dunham, Kim Hoppie, Mike Keegan, Mark Lliteras, Craig Marshall, Jan Marshall, David Pedersen, Jesse Prettyman.

300 HOURS: Guy Hurlbutt, Bill Lloyd, Joe Terteling, JoAnne Thompson, Jena Vasconcellos.

400 HOURS: Jill Hummel, Kit Knox, Pat Myers, Tyan Carter, Clara Erickson, Debi Rule.

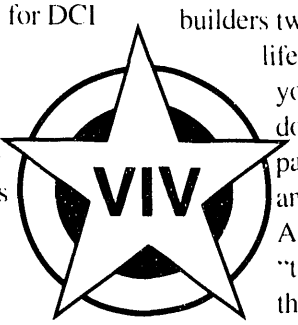
500 HOURS OR MORE:

Awarded Plaques (1991):
Mary Burnett, Gladys Dahm, Parker Massman.

Awarded Plaques (1992):
Marie Biaggne, Russell Biaggne, Bob Flannery, Jane Wallich, Walter Wallich, Cheryl Dunham, Robert Grover.

. . . Very Important Volunteers . . .

Rae Ann Leach became a member of The Science Store's sales staff when she responded to a request for DCI volunteers in *The Idaho Statesman* in November of '91 Since that time Rae Ann has dedicated every Wednesday morning to The Discovery Center Science Store. "I especially like the people I get to work with," said Rae Ann. Her co-workers like her, too. Billie Baker, who also works in The Science Store, said Rae Ann's "friendliness and openness" make her a special asset to DCI. Rae Ann also finds time to volunteer as a reader for the blind on radio every Tuesday, as well as assist at the El-Ada soup kitchen. Reading is a popular pastime for Rae Ann, and she enjoys making button bracelets and collecting yarn.



Bill Lloyd heard of DCI's need for volunteer exhibit builders two years ago, and has been making Bill Molina's life a little easier ever since. "I can ask Bill, 'can you make this work?' and know he'll find a way to do it," said Bill Molina, Exhibit Director. Bill is a part-time water resource engineer at CH2M Hill, and volunteer watermaster for the Home Owners Association. His volunteer work at DCI gives him "the satisfaction of seeing needs and fulfilling them," said Bill. He enjoys putting scientific and engineering principles to work. "Being hands-on is a kick for me," he said. In his home workshop, Bill pursues his interest in working with wood and metal, unless he's gone fly-fishing!

DCI Calendar

November

5 13th Dimension Mtg.
7 Science Saturday Classes
7 Roller Pigeon Saturday—
Real Pigeons at DCI!!
10:00-4:00 Public Viewing
1:00 Scheduled Flying Demo
12 DCI Board Mtg.
14 Science Saturday Classes
26 DCI CLOSED
HAPPY THANKSGIVING!

December

3 13th Dimension Mtg.
24 Christmas Eve Hours 9-2:00
25 DCI CLOSED
MERRY CHRISTMAS!
26 Hours 9:00-5:00
27 Hours 12:00-5:00
28-31 Extended Hours: DCI
Open 9:00-5:00 Daily

January

1 DCI CLOSED
HAPPY NEW YEAR!

Grandparent Membership and Holiday Giving

Grandparents! Grandkids! A grand holiday gift idea...the new Grandparent membership category at the Discovery Center of Idaho!

For only $35, a Grandparent membership allows for *free admission to grandparents and their grandchildren accompanying them* to DCI. A grand way to entertain visiting grandkids from out-of-town, as well as those who want to come back again...and again...and again.

DCI membership is a year-long pass to entertainment, exploration, and education. Consider it when you make your holiday gift list. It's a two-for-one gift — a gift to family or friends, as well as a gift of support to The Discovery Center of Idaho.

Give us a call if using your Visa or MasterCard, or return the form below.

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Sign Up Today...Enjoy The Fun All Year Long!

Membership Application

Mr./Mrs./Ms.
Spouse
Address
City State Zip
Phone: Day Night
Children's Names and Ages:

Is this a gift? **Yes** **No**
From:
Mr./Mrs./Ms.
Address
City State Zip
Phone: Day Night
Should gift membership be sent directly to individual or your address ?
Is this membership new or renewal?

Membership Categories:
(Circle One)

Individual	*$15*
Family	*$35*
Grandparent	*$35*
Friend	*$50*
Adventurer	*$100*
Guide	*$250*
Explorer	*$500*
Investor	*$1000*

TYPE OF PAYMENT ENCLOSED:
Charge: VISA MC Check
Account #
Expiration Date
Signature

Make checks payable to:
The Discovery Center of Idaho
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"I hear and I forget; I see and I remember; I do and I understand!"

Budget mailed. dr

END

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