# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Christy L. Ahlbach

**Project Number**
**J0601**

**Project Title**
## Liquefaction

**Abstract**

**Objectives/Goals**
I wanted to find out which soil is the safest to build a structure on in the earthquake-prone area of San Francisco Bay.

**Methods/Materials**
I took two clear plastic cups and cut off the bottoms. I placed them upside down in the middle of a pie plate. I then filled one cup with sand and one with clay soil, with a one ounce sinker on top of each. I filled the plate with 40 mls. of water and waited 90 seconds. I then tapped the cup six times within three seconds.

**Results**
With the cup of sand, the water saturated it within 90 seconds and the sinker had completely disappeared before I tapped the cup. With the clay, the sinker did not move and the clay did not liquefy.

**Conclusions/Discussion**
I concluded that clay is MUCH safer to build on than sand in an earthquake area.

**Summary Statement**
i wanted to find out which of two types of soil in the S.F. Bay Area was safer in an earthquake.

**Help Received**
My mom helped me type the report and a geologist friend helped select the soil samples and with the dig.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Elizabeth Avalos

**Project Number**
**J0602**

**Project Title**
## What Effect Does Soil Particle Size Have on Water Absorption?

**Abstract**

**Objectives/Goals**
My goal was to test the absorption ability of different soils in the local area. I thought that soils which were heavier in sand would absorb more water. I also hypothesized that the more absorbent the soil, the closer it would be located to the riverbed (dry). From my research, I learned that the finer a soil is, the more eroded it has become. Based upon this, I felt that the older, more eroded sands of the riverbed would be the most absorbent.

**Methods/Materials**
I collected soil samples from the local area, to include riverbed samples. I poured a set amount of water on each sample. I controlled the amount of time each soil was exposed to water. The water left on the top of the soil was poured off and measured as "run-off." The remainder of the water was calculated as absorbed.

**Results**
Results showed that the higher the gravel content of a soil, the higher is its absoption; less water was collected as run-off in gravel samples. The higher the silt content of a soil, the lower is its absorption; more water was collected as run-off.

**Conclusions/Discussion**
Results were not exactly what I'd expected. The sands in the riverbed were not the most absorbent soils in my trials. I had not given enough attention to gravel when I formulated my hypothesis. Gravel is the most absorbent soil material. However, it is not in great supply in riverbed samples because riverbeds experience greater erosion over time.

As soil texture increases in size, so does its ability to absorb water. Because we depend on underground water sources in our desert, I thought that the sands in the riverbed would and act to absorb water quickly, allowing it to pass into underground aquifers. While the riverbed soil was not the fastest at absorbing water, neither was it the slowest. From my research, I also learned that this could be due in part to a natural filtering capability of graded sands. It would be necessary to have a moderate absorption rate to allow filtering to occur while maintaining water absorbency.

**Summary Statement**
As a soil increases in particle size, so does its ability to absorb water.

**Help Received**
Teacher acted as facilitator.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Jasleen K. Bains

**Project Number**
**J0603**

**Project Title**
## Comparing Different Soil Types in Transporting Toxic Chemicals

**Abstract**

**Objectives/Goals**
The objective of my experiment was to determine which soil type (clay, loam, or sand) transports toxic gasoline fumes the quickest.

**Methods/Materials**
Three different soil types - loam, clay, and sand were collected. I then added each soil type to a plastic container. Next, I placed a plastic tube on the soil. I then placed two crickets into each plastic tube and taped off the exposed end. I then poured 12 oz. of gasoline onto the soil. I waited for the crickets to die to determine how long it took the fumes of the gasoline to transport through the soil and into the tube.

**Results**
The sand soil transported the gasoline fumes the fastest. Therefore, gasoline or other toxic chemicals travel through sandy soil very quickly. The crickets in the clay soil took the longest to die. Therefore, toxic chemicals do not travel through clay soil very quickly.

**Conclusions/Discussion**
All soil types allowed toxic gasoline fumes to travel through and kill the crickets. In conclusion, gasoline fumes are toxic and should not have any contact with the environment

**Summary Statement**
The purpose of my project was to compare different soil types in transporting toxic chemicals.

**Help Received**
Teacher helped put display board together.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Flora E. Barbash

**Project Number**
**J0604**

**Project Title**
## From Colors in the Sky to Air Pollution

**Abstract**

**Objectives/Goals**
The objective of this project was to see if and how weather causes and / or affects the colors in sunrises and sunsets.

**Methods/Materials**
For 30 days, twice a day (at sunrise and sunset) from the same location, using
Weather measuring instruments and close observation, I recorded the date, time, temperature, humidity, weather, wind, sunrise/sunset time, barometric pressure and colors and their brightness in the sky. By rating each observation and taking photographs, I made a scale 1-5 (Dull to vibrant). During this process, I went to the library and internet to do research. Using all of the data and information, I made a chart and looked for connections between my recorded data and the weather patterns and colors.

**Results**
Through a great amount of research, not only did I find out about nature#s color spectrum and how the sun#s light-rays are different color wavelengths scattering off different types of particles in the atmosphere (forming colors in the sky), I also learned how human activities and natural processes cause air pollution which, in many different ways, harms people, animals, plants, building materials & fabrics, and causes damage to the earth#s atmosphere and our environment. (depletion of the ozone layer, greenhouse effect and acid rain)

**Conclusions/Discussion**
I discovered that weather, along with latitude, time of day, season of year and quality of the air all contribute to the formation of colors in the sky. I#m curious to find out more about the causes and effects of earth's polluted atmosphere and want to continue research to see how scientists are dealing with these serious problems which concerns me about the future and quality of life on our planet.

**Summary Statement**
I began this experiment to see if the weather effects the colors in sunrises and sunsets, but more importantly, my through research about atmosphere revealed to me the dangers of air pollution to our health and environment.

**Help Received**
My dad helped me when I needed it on the computer and he printed photographs. My mom helped me by driving me to the libraries and to my interview at the North Coast Air Quality Management District Office in Eureka, as well as some organization,

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Hilary N. Bernstein

**Project Number**
**J0605**

**Project Title**
## Rain Drops Are Falling on My Head

**Abstract**

**Objectives/Goals**
My objective was to learn what factors affect the acidity of rain. I thought that the rain would be more acidic after it had not rained in awhile, if it was not windy, and if it was during rush hour, because if it had not rained in awhile there would be more pollution in the air; if it was not windy the pollution could not be blown away, and there would be more pollution in the air during rush hour.

**Methods/Materials**
In this experiment I used pH indicator solution to test the acidity of the rain. The factors I tested include: the outside temperature, how long it was raining, how much it rained, if it was during rush hour, how hard it rained, whether it was windy, if the sun came out, and how many days it had gone since the last rain. To test for these factors I used a thermometer, a cup to collect rain, a ruler, a clock, a dropper, pH indicator solution, the color chart and a test tube. For fourteen different rains from October to January, I collected rainwater and kept track of the data.

**Results**
When it was windy, the average pH was 6.5, which was more acidic than when it was not windy. During rush hour the rains had a pH of 6.5, which was more acidic than when it was not during rush hour. When it had rained the day before, the rain was not very acidic, having a pH of 6.8. The longer it was raining for, the less acidic the rain became, but if it rained more than 25ml the rain was more acidic. Finally, the rain was less acidic when the sun was out, having an average pH of 6.72. I found out that windiness, the duration of the rainfall, whether it was during rush hour, the amount of rain and the sunlight affect the acidity of rain. Temperature, how hard it is raining, and the length of time between rains do not affect the acidity.

**Conclusions/Discussion**
My hypothesis was not completely correct. I thought that the rain would be more acidic after it had not rained in awhile, but the rain was more acidic after just two days than twenty days since the last rain. I thought that the rain would be more acidic if it was not windy, but it turned out to be the opposite. I was right about it being more acidic during rush hour. I was able to attain my objective. I learned that certain factors do affect the acidity of rain, but here in a suburb of Los Angeles we do not have acid rain.

**Summary Statement**
This project is about what factors affect the acidity of rain.

**Help Received**
Mother helped acquire materials.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Chelsey M. Bittar

**Project Number**
**J0606**

**Project Title**
## Nitrates from Reservoirs to Your Faucet

**Abstract**

**Objectives/Goals**
My objective was to discover the drinking water source with the highest nitrate level. I hypothesized that Lake Hodges would have the highest nitrate level due to the fact that its sole source of water is run-off.

**Methods/Materials**
Three local water sources were tested, 21 trials each, using a nitrate color chart test kit bought at a local fish store. I took a sample of water and added nitrate test powder. The test powder reacted with the nitrates in the water and changed the color of the water if nitrates were present. I compared the color of the water to the color chart to determine the nitrate level. This process was completed over a two week period.

**Results**
Results showed that Lake San Vicente had the highest level of nitrates. Its nitrate level was 7.5 ppm. Tap water had the lowest nitrate level with 2 ppm. Lake Hodges had a 5 ppm nitrate level. For water to be drinkable, the nitrate level must be no more than 10 ppm.

**Conclusions/Discussion**
The results of this experiment did not support my hypothesis. In conducting this experiment, I learning about the affects of nitrates on people and nature.

**Summary Statement**
This experiment was conducted to discover the nitrate levels of three local water sources.

**Help Received**
My father helped obtain water samples. My mother helped type the report. My teacher, Ms. Gross, helped with organization and the presentation.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Hannah E. Bossenger

**Project Number**
**J0607**

**Project Title**
## Shapes of Erosion

**Abstract**

**Objectives/Goals**
The purpose of this experiment is to find out "What is the effect of different shapes on erosion?"

**Methods/Materials**
The experiment was conducted with four troughs made out of a plastic type material set onto a wooden slab set at an angle. In each trough (except the control) there were three barriers of different shapes held in place by glue. Each trough was filled with sand. To conduct the experiment each trough, including the control, had one gallon of water from a bucket poured into it. The experiment was tested six times within a 24 hour period.

**Results**
The control trough was found to be the worst at stopping the sand from pouring out with the water and the 1.5" barrier was found to be the second worst. The trough with the straight barrier was found to be the second best at stopping the sand eroding and the three-inch "zigzag" barrier was found to be the best at stopping the sand from eroding.

**Conclusions/Discussion**
The results of the experiment supported the hypothesis but not significantly enough.

**Summary Statement**
Trying to understand how different shapes of barriers can prevent or lessen erosion.

**Help Received**
Father helped with construction of model, Ms. Thornton (Science Teacher) helped with board layout

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**

Joshua J. Compton

**Project Number**

**J0608**

**Project Title**

## An Assessment of Barrier Designs in Minimizing the Impact of Tsunami Waves on Shorelines

**Abstract**

**Objectives/Goals**

The objective is to determine whether barriers placed offshore can effectively minimize the impact of tsunami waves. Which barrier design is most effective in reducing the amount of energy transferred to the shoreline, also referred to as the run-up area?

**Methods/Materials**

A wave tank (244 cm long)was designed and constructed using plexiglass. A run-up was constructed in one end of the tank, using plexiglass, to simulate a shoreline. A wave generator was constructed at the opposite end of the tank, using a hinged plexiglass plate and a 4.56 kg weight. Barriers were also designed and shaped out of wood. Ten experiments were performed for each; the control, triangular barriers, circular barriers, and elliptical barriers. In each experiment, the amount of run-up, wave speed, and wave level was measured. Wave amplitude, height, energy, and energy fluctuation were calculated using measured values.

**Results**

The elliptical barriers had the least amount of run-up, with a mean value of 59.41%. The triangular barriers were second at 61.36%, circular barriers at 82.53%, and control at 89.59%. The circular barriers had the least amount of wave energy measured at the point of impact, with a mean value of 5.99 Joules per meters squared. The triangular barriers had the greatest amount of energy measured at the point of impact, with a mean value of 6.96 Joules per meters squared.

**Conclusions/Discussion**

The elliptical barriers were the most effective in minimizing the impact of the waves, dissipating the waves' energy and reducing the amount of energy transferred to the run-up. When the waves hit the elliptical barriers, energy was transferred into smaller waves that collided with one another. This action dissipated much of the energy, possibly turned some of the energy into heat and some reflected back into the water, reducing the amount of run-up. The placement of elliptical shaped barriers along the shoreline could help prevent the loss of life and the destruction from tsunami waves.

**Summary Statement**

Three barrier designs were analyzed, using a wave tank, to determine how effective they were in minimizing the impact of a tsunami wave along a shoreline.

**Help Received**

My father helped construct the wave tank; My mother helped record data during the experiments; Dr. Crawford, Humboldt State University Oceanography Department, gave me advice on energy formulas.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Bradley J. Cruce

**Project Number**
**J0609**

**Project Title**
## What Is the Best Way to Minimize Erosion?

**Abstract**

**Objectives/Goals**
The objective of the project was to learn about erosion. I designed a project that would simulate erosion in the real world. By doing this I have learned that the more energy built up by wind or water increases the ability of erosion. If I use three different methods on minimizing erosion, then I think that using a series of small upside-down V shapes will do the best job.

**Methods/Materials**
Three separate methods were used in this erosion experiment. Method #1 used no barriers to prevent erosion. Method #2 used long logs in a zigzag pattern so the water will wash back and forth to the bottom. Method #3 used small logs in a series of upside-down V shapes so the water will funnel its way to the bottom. The following materials were used in this project: 132.5 cm. long plywood sheet, 2ea. 120 cm. long plywood sheets, 4ea. sprinklers heads, 1ea. 90 cm. PVC pipe, 2ea. 90 degree PVC elbow connections, 4ea. PVC tee connections, Copper wire, Window screen, 3ea. bags potting soil, 50ea. Screws, 20ea. Staples, Garden hose, PVC hose thread connection and 1ea. PVC end cap.

**Results**
In order to get more accurate results we tested the experiment twice in case of any problems there were with the water system or with any leaking. As the data on the bar graph shows, the small barriers did minimize the erosion most. It also shows that no matter what size the barrier was the barriers always minimized erosion more than with no barriers.

**Conclusions/Discussion**
My hypothesis was right. The small barriers did minimize erosion the most. I thought that if you had rushing water going down a hill, it needs to be funneled fast. Otherwise it will just rush right over anything else. I would probably recommend this information to the government during rainy season. This way they would know that a hill with no plants or barriers in it would be washed away.

**Summary Statement**
This project is about determining the best way to minimize erosion on bare hillsides using manmade barriers.

**Help Received**
My Dad helped with construction and my Mom helped with portions of the typing and formatting.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Joshua R. Escobedo

**Project Number**
**J0610**

**Project Title**
## Tornado in a Box

**Abstract**

**Objectives/Goals**
I am comparing a simulated Tornado with a heat source from the bottom, to a naturul Tornado where the heat source comes from the top.

**Methods/Materials**
I tested different cake pans with the chamber simulator, to find that a regular cake plate helped make the best simulated tornado, I will tried to make it bigger if possible.

**Results**
I was able to simulate a contanined man made tornado in a simulator chambor. It raises almost 4ft. above the chamber opening,

**Conclusions/Discussion**
In conclusion I found that I could simulate a tornado that has a heat sorce from bottom.

How does the simulator actually compare to a tornado? The proportions in the model need to be correct in order to create a vortex. This is probably true of tornadic vortices also. Too little updraft, too much updraft, too little inflow (too narrow a slit), too much inflow at too low a speed (too wide a slit), and no vortex will form. You will get circulation, but no concentrated vortex at the center. This particular model is more of a model dust devil than a tornado. This is because the heat source is at the bottom. Real life tornadoes have their energy sources overhead, so you will need to introduce a small fan at the top to better model a tornado. If you use a fan, you begin to get beyond the scope of this design. But if you introduce a small, weak fan, make the box wider and taller.

**Summary Statement**
Comparing heat sorces from a natural tornado and a simulation

**Help Received**
my mother help type my report, and my father helped with the assmbly of the simulator

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Laura Essyah; Sydney Frazer

**Project Number**
**J0611**

**Project Title**
## Testing Turbidity

**Abstract**

**Objectives/Goals**
For our project we decided to test turbidity where the vegetation along the banks is different. We tested turbidity where the banks were sandy, rocky, and grassy. We used a turbidmeter to test the fifteen samples of turbidity we had taken. We thought the turbidity would be highest where it was sandy and lowest where it was rocky. Our results turned out to be the exact opposite of what we guessed.

**Methods/Materials**
1. Turbidity Meter
2. River
3. Data Table
4. Testing Tubes
5. Galoshes

**Results**
During sunny weather the average of the grassy spot was 15, the rocky spot was 15.5 and the sandy spot was 12.25. We decided not to add the turbidity tests into the average when it was raining because would throw the whole average off. During the rain the grassy spot was 647. As you can see, there was a huge change in turbidity when the weather changes. In our graphs we averaged the four samples during the sunny weather, and in our other graph we took the turbidity sample from the rainy weather.

**Conclusions/Discussion**
From doing this project we have concluded that there is more turbidity where it is rocky. Therefore, our hypothesis was wrong. We guessed the rocky area would have the least amount of turbidity.
If we were to do this project again, we would test turbidity when the weather is different. As you can see from our graphs, there would be a drastic change in turbidity when the weather changes. We would test turbidity when it is raining, windy, and sunny. We think it would be fun to test turbidity in different weathers and compare them.
One thing we could have done better was test turbidity in similar weather conditions. We both very much enjoyed doing this project.

**Summary Statement**
We tested turbidity.

**Help Received**
Julie helped glue and cut. Heidi, Colleen, and Katie took us to the river

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Eric E. Eyre

**Project Number**
**J0612**

**Project Title**
## Polar Auroras: Is the Season the Reason?

**Abstract**

**Objectives/Goals**
Before modern-day science, different cultures tried to explain what Polar Auroras were. Eskimos thought that polar auroras were the souls of deer, seals, salmon, or whales. Now we know that Auroras are not made of the souls of animals, but that they are made by excited atoms emitting photons of light. I wanted to make a model that would simulate Polar Auroras. Additionally, I wanted to know if my Aurora model would show that different seasons caused Auroras to be more frequent or stronger.

**Methods/Materials**
To make an Aurora model, I simulated three things: solar activity, the earth#s upper atmosphere, and its magnetosphere. I researched experiments that successfully created an aurora. For example, Kirkland made a vacuum-sealed box with a terella in the middle. When he fired particles at the terella, he created an aurora. Based on this research, I built a model using a tesla coil to simulate the energy of solar activity, a plasma globe for the earth#s upper atmosphere, and foil rings to mimic the magnetosphere. Further research showed that auroras are most frequent on the equinoxes, so I planned an experiment wherein the independent variable would be eight different dates selected at 45-day intervals with the earth in its corresponding seasonal rotation, and the dependent variable would be the rate and strength of auroral occurrence.

**Results**
When I completed my experiment, I found that the model#s auroral high points were different from the natural auroral high points. In reality, the best time for viewing is during the spring and fall equinoxes, but my simulated results showed high points in the summer and the winter. To explain the results of my experiment, I did some more research and found that while Auroras are viewed most often in the spring and fall they actually occur every day and night, whenever there is solar activity. It is just that they are easier to see at certain times. Another thing that could explain my results is that the model I made does not have an actual magnetosphere. The foil rings merely mimic the lines of a magnetic field.

**Conclusions/Discussion**
A new question did arise from my results. Were my results correct that high points of auroral activity are actually in the summer and winter? For this question, I would not be able to look at actual aurora sightings because while auroras may be present in the summer and winter, they are not as easy to see during these times.

**Summary Statement**
I built a model that simulated polar auroras, and then I tested to see if the different seasons of the year affected the frequency or strength of auroral occurrence.

**Help Received**
Mother helped find and purchase the equipment for the simulation model.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Isabella E. Firpo

**Project Number**
**J0613**

**Project Title**
**Survey Says . . .**

**Abstract**

**Objectives/Goals**
Before you can build or plant anything you should have properly graded piece of land. Determining the boundaries or elevations of a piece of land is called surveying. Professional surveyors use a tool called a transit with special measuring poles and levels. This "high-tech" method can be very expensive. I was curious if a "low-tech" method, using a basic hose from a hardware store filled with water can come up with comparable measurements as a professional surveyor with "high-tech equipment". My hypothesis was that the results would be very close due to the fact that water levels itself.

**Methods/Materials**
The materials I used were, one clear 100-foot hose, water, a tape measure, a notebook, a pen and pencil, surveying markers, a level, a professional transit and a measuring pole. My procedure was to find an empty lot to survey and survey it using the hose and water system. I laid out the hose and filled it with water about 10 inches from each end without bubbles. Then I sealed both ends of the hose and placed both ends in the center of one end of the lot and unsealed them. After measuring from the ground to the water level, I wrote down the measurements at this zero point. (Reference) I chose 8 other points on the lot, and marked there exact location. I measured each location with the hose and water system first and then another day repeated these measurements using a professional transit from my reference point.

**Results**
My hypothesis was correct. Since water always levels itself out my results for both techniques were very close. My experiment proved that an old fashioned (and less expensive) system can compare favorably to our current high-tech method of surveying land.

**Conclusions/Discussion**
My results were very close, but the hose technique probably wouldn't be the most practical method for surveying a large or steep graded piece of land. The problem with measuring a large piece of land is that the hose could get kinked and you wouldn't get accurate measurements. The hose would be very long and awkward to handle, too. However, the hose and water method, could be used effectively for small lots with low grades for planting or construction.

**Summary Statement**
My project compares a "low-tech" and inexpensive method versus a "high-tech" method of surveying land.

**Help Received**
My dad drove me to the site and carried equipment to the site. I borrowed a transit from the Engineering Department of the City of San Bruno and received example maps and information from the Planning Department in South San Francisco.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Ryan M. Fox

**Project Number**
**J0614**

**Project Title**
## Determining the Ability of Various Soils to Prohibit Ground Water Contamination

**Abstract**

**Objectives/Goals**
The Goal of my project is that by testing how different types of contaminates travel through different types of soils, I predict that I will be able to estimate how far a contaminate might travel from the inital point of a spill.

**Methods/Materials**
My project is to measure how far different contaminates travel through different types of soils. I will take five plastic cylinders and create a rack to hold each type of soil. I will next take five different types of soils-Clay, Sand, Sandy-loam, Decomposed Granite and Topsoil (control) and fill one type of soil in each cylinder. I will then pour one of three different contaminates- Gasoline, Used Motor Oil, and Malathion- into each cylinder and wait ten minutes. I will measure how far and how fast each contaminate travels in each type of soil. This help me will determine the average time and speed it takes an contaminate to travel through different types of soils.

**Results**
The data I recorded from my investigation enabled me to determine the speed different contaminants travel through different types of soils. It allowed me to determine how much soil in cubic feet would become contaminated by a specific amount of a contaminant. I proved my Hypothesis by comparing my data to that of an actual spill.

**Conclusions/Discussion**
After completing my project I found that my hypothesis was correct. By testing how contaminates flow through various types of soils, I was able to determine the flow rate of those contaminates through those soils. By measuring the area of the cylinder I was able to determine how much soil was in the cylinders in cubic feet. I could then measure the contaminated part of the soil and determine how much area would be contaminated by one cup of the contaminate. By using this data I can now predict how far a contaminant will move through different soils and how much of the soil will be contaminated.

**Summary Statement**
My measuring how fast and how far different contaminates travel through different soils, I can determine the depth and amount of soil that has been contaminated at a spill site.

**Help Received**
Dad- helped with testing and gathering materails; Mom- helped with gathering materials and board construction

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**

Kathryn D. Fukumoto

**Project Number**

**J0615**

**Project Title**

## High Resolution Uranium Mapping of School Sites in the Palos Verdes Peninsula Unified School District, Palos Verdes, CA

**Abstract**

**Objectives/Goals**

The objectives of my study were to 1) produce a high resolution soil uranium map of a radon-prone school site since uranium is the ultimate source of radon, and 2) to investigate the correlation between building perimeter uranium concentration measurements and average indoor radon levels.

**Methods/Materials**

Equivalent uranium (eU) measurements were made at ninety positions at a radon-prone school site using a gamma-ray spectrometer, focusing primarily on the perimeters of the classroom buildings. Using a recent United States Geological Survey (USGS) aerial photograph of the school site, an accurate scale map of the school was produced. The positions and values of the eU measurements were then carefully transferred to the site map. Indoor radon measurements from past studies were analyzed from three separate data sets to produce average building indoor radon levels. The average perimeter values of soil uranium concentrations were then compared with average indoor radon levels of the school buildings to determine if any correlations existed.

**Results**

Soil eU concentrations ranged from 2.5 - 17.6 parts per million (ppm), with 44% of the measurements from areas surrounding the classroom buildings exceeding 10 ppm (typical soil averages are 1 - 2 ppm). Large and reproducible changes in surface eU concentrations were found to occur over distances as short as 20 ft. Even between two fields approximately 100 ft. apart, the area averages of eU concentrations differed significantly. Classroom radon concentrations recorded in past studies were correlated with the present surface measurements, demonstrating that building perimeter eU measurements can be a useful predictor for the occurrence of elevated indoor radon levels.

**Conclusions/Discussion**

For the first time, a high resolution site map of soil uranium concentrations was generated that revealed widely varying eU concentrations. Area averages of eU concentrations from two field areas approximately 100 feet apart were found to change significantly. In addition, building perimeter eU measurements were found to be a good predictor for the occurrence of elevated indoor radon levels. The present data suggest that gamma-ray spectrometry can be used to evaluate the potential of building lots to support elevated indoor radon prior to construction.

**Summary Statement**

Gamma ray spectrometry was used to produce for the first time a fine scale equivalent uranium (eU) map of a radon-prone school site, and a strong correlation was discovered between building perimeter uranium concentrations and indoor radon.

**Help Received**

Father helped with experiment design and edited report, Mr. Phill Castillo helped print display board, Dr. Ron Churchill and Dr. Joseph Duval gave expert guidance.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Geena N. Garabedian

**Project Number**
**J0616**

**Project Title**
## Earthquakes! Which Soil Mixtures Reduce Damage? A Second Year Study

**Abstract**

**Objectives/Goals**
When pressure builds along a fault the earth can slip and move fast causing an earthquake.People build their houses on different kinds of soils. I believe an experiment could be designed to see if small soil particles mixed with larger particles,in the soil, can reduce damage during an earthquake.

**Methods/Materials**
A construction company donated large pieces (1/4 and 1/8 inch rock)and sand. Equal amounts of controls,with large soil particles alone and then separately experimental groups, with half large mixed with half small(sand)particles,were put into a test box and lightly compacted with a wood block to a mark line. For each individual test 20 dominoes spaced the same, standing up and buried to a measured 1/4 inch were placed into the test soil.These dominoes were like the houses on the earth. A swinging hammer,was raised to the same height and let go hitting the box, and dominoes, to create the rapid movement of an earthquake.A count was then made to see how many dominoes fell over or leaned more than 45 degrees using a protractor.Three different controls,and then three experimental groups of the same large particle now mixed with sand were each repeatedly tested three times in this manner.

**Results**
Controls and experimental groups were math averaged. In experimental groups fewer dominoes fell out of 20, on average, in mixtures of large and small particles than the controls with large particles alone.The safest combination was 1/4 inch lava rock and sand. This mixture had an average of 7.4 less dominoes that fell than the control with 1/4 inch lava rock alone.In this test an average of 9 out of 20 fell with 1/4 inch lava rock alone while only an average 1.6 out of 20 dominoes fell when the same large particles were mixed with sand. So soils of mixed sizes may be safer, because fewer dominoes fell.This agrees with my objective, or hypothesis that mixtures might be safer.

**Conclusions/Discussion**
My test box and dominoes were just a model but there were diffences. Because fewer dominoes fell that were on top of mixtures these soils may be safer in an earthquake.How can this happen? Well maybe the quick movement of the earth causes the small particles to fall in between the spaces of the large particles. This slows down the movement of energy that can destroy a house. Maybe now, people should try to build their houses on these kinds of soils or even mix large and small pieces then build on this safer start.

**Summary Statement**
I studied if the kind of soil the house is built on may help or hurt the chances of it surviving an earthquake.

**Help Received**
Mother typing,brother graphs , father test box.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Garen Gevorkian

**Project Number**
**J0617**

**Project Title**
## Petros "rock", Oleum "oil" Petroleum: Oil from Rocks

**Abstract**

**Objectives/Goals**
The purpose of this project is to see how the hydraulic conductivity of water and crude oil is different. I conducted two separate set of experiments, and compare the data collected. I used three different porous medium to calculate the hydraulic conductivity for water and crude oil. In the set of the crude oil experiments, used motor oil was used instead of crude oil. I chchose used motor oil, because the viscosity of the used motor oil is very close to crude oil.

**Methods/Materials**
I made two permeameters, one using plastic bottles (for water experiments) and one using syringes (for oil experiments). My first set of experiments was with water. I filled one bottle with 500mL water, and used the other one for porous medium (gravel, sand and gravel, and sand, all saturated with water) chamber. I recorded the time for falling head from 500mL to 200mL. The second set of experiments was with used motor oil simulating crude oil. I filled one of the syringes with 50mL oil. I used the other one for porous medium (the same with water experiments, gravel, sand and gravel, and sand, all saturated with used motor oil) chamber. I recorded the time for falling head from 50mL to 30mL. I used the falling-head equation Ks=at/Ac*L/T* ln (h0/h1) to find the hydraulic conductivity.

**Results**
I learned that the hydraulic conductivity does change with the viscosity, and the porous medium. My findings which agree with the literature are that the more porous the medium the higher the hydraulic conductivity, and also water has higher hydraulic conductivity compare to crude oil.

**Conclusions/Discussion**
I learned from my research that one other factor that will affect the hydraulic conductivity is the temperature. I would like to compare the data of hydraulic conductivity of liquids with different viscosities in different temperatures.

**Summary Statement**
Finding hydraulic conductivity by using falling head

**Help Received**
I received help from my parents and my uncle.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Elison A. Hernandez

**Project Number**
**J0618**

**Project Title**
## Determining the Temperature Absorption Rates of Various Soils

**Abstract**

**Objectives/Goals**
From my project I learned how the weather affects various soils and for how long. I also learned which soils will cultivate better in different temperatures. I found a lot of information on the many differences between soil and dirt in my research.

**Methods/Materials**
I used clay, dirt, and sandy loam for my project. I also applied the high and low temperatures using a heat lamp and a bowl of ice. The reason I decided to use these things is because they worked best to apply heat to the soil and not the thermometer.

**Results**
After investigating my project I found that dirt would be best to use in the winter. I also found that the sandy loam and the clay would cultivate better in the summer. The dirt was the extreme of both the high and low temperature tests. It did not absorb any low temperatures but absorbed the high temperatures the whole time I observed it.

**Conclusions/Discussion**
Although I found that dirt would culitvate better in the winter; after researching my project I found that dirt cannot substain plant life like soil can. It does not have the nutrients pants and crops need.

**Summary Statement**
My project is about how long various soils are affected by high and low temperatures.

**Help Received**
Pier took pictures that were not used in project; dad helped me get the different types of soils.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Erik B. Holliday

**Project Number**
**J0619**

**Project Title**
## Sediment Deposition Patterns in Varying Water Velocities

**Abstract**

**Objectives/Goals**
With my science fair project, I hoped to successfully observe and record the deposition of sediment particles within my apparatus. I used two different water velocities in my experiment to observe and record the effects of this change in the water velocities. I would be observing the SLOPES of the end of the sediment bank, and the general patterns of the deposition that would occur (and confirming which theory, concerning deposition, the patterns supported). These theories were basically: diagonal deposition and horizontal deposition.

**Methods/Materials**
I would be using a working hydraulic apparatus to get my results. It is simulating a river or stream emptying out into a larger body of water. I allows for a decrease in water velocity to have the deposition occur. It was made of:
-glass tank 48# long x 4# wide x 8# deep (Courtesy of Aquatic Gardens); -4 gpm submersible pump; -7 gpm enclosed pump; -5/8# clear vinyl tubing; -sediment (fine sands); -fireplace concrete; -water; -funnel (for sediment insertion); -funnel holder (thin wooded plank w/ drilled hole); -filter (cloth); -velocity valve; -tubing fittings; -tank/tubing attachments; -tubing adhesive (GOOP); -water bucket; -electricity; -clear desk (in garage); -tools for assembly; -spare pieces of wood for tubing stabilization; -clasps; -cm rulers; -Sharpie #; -video camera (it keeps track of time as well as footage); -tripod.

**Results**
I was able to observe successful deposition within my experiment. I observed that with the faster water velocity, the sediment deposited at a steeper slope. As well, I was able to confirm that my results and observations of my experiment supported the depositional theory of DIAGONAL DEPOSITION. Thus the sediment particles depositing in a diagonal, overlapping manner.

**Conclusions/Discussion**
Using the results of my experiment, I can conclude that the faster the velocity of the water that is flowing, then the steeper of the sediment bank that is depositing. As well, I can state, that my observations and results, support the theory of diagonal deposition. This theory happens to contradict the common knowledge of the deposition process. Several thought provoking questions came up from my results. Doing my science project has allowed me to research the facts and question, if modern day knowledge concerning deposition, within the vast topic of geology, is actually correct.

**Summary Statement**
I utilized a working hydraulic model to observe the patterns of deposition in varying water velocities (to look at slopes and theories).

**Help Received**
My mom and dad were my main support in helping me developement of my idea and the dislpaying it appropriately. Mr. Rob Almy was another main support in getting axcess to crucial research and background information. The aquarium store "Aquatic Gardens", was the resource that I used to order my

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Danielle R. Hollywood

**Project Number**
**J0620**

**Project Title**
## Wind City

**Abstract**

**Objectives/Goals**
The purpose of my research and experimentation was to determine if San Carlos has enough wind speed to support wind powered generators

**Methods/Materials**
1. Velometer
2. Anemometer
3. Pencil
4. Notebook for writing data
5. Computer/Internet

**Results**
While experimenting I found spots that would be successful in providing enough wind and I found spots that would not necessary be a great location for providing wind. Crestview Drive would be the best place to put wind powered generators and provided the most wind speed because of the high elevation. Crestview Drive is the highest point in San Carlos. The San Carlos Train Station provided the least amount of wind speed.

**Conclusions/Discussion**
The average wind speed in San Carlos could be enough to turn small or large wind powered generators. But there are other issues to consider such as economics (how much it would cost), environmental issues, and regulatory issues. The next problem would be where to put one for a homeowner or many for an entire city. The area around Crestview drive would be the best place to put smaller wind generators, because of limited amount of space in the residential area. Bair Island could be a place for much larger wind generators because of the massive amount of space. There are other problems with putting many generators on Bair Island, such as animal concerns and other environmental issues. Although if those concerns can be resolved San Carlos is in good shape to have wind generators not just at Bair Island and Crestview but at our homes as well.

**Summary Statement**
Determining if the region of San Carlos, has enough average wind speed to generate wind powered wind speeds.

**Help Received**
My Father helped me build my anemometer and record obsevations since it takes two people to operate.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Tera M. Hoover

**Project Number**
**J0621**

**Project Title**
## Water's Powerful Force Erodes Rock

**Abstract**

**Objectives/Goals**
The goal was to determine if and how fast water erodes different types of rock. The rocks chosen were granite, asphalt, Monterey Formation and sandstone.

**Methods/Materials**
A paint tray was placed inside of a large clear rubbermaid tub. The study rock was placed at the high side of the tray. A water pump was positioned in the rubbermaid tub and clear rubber tubing was connected to the pump so that water could flow down on top of the rock in the paint tray. The total flow was one gallon per minute.

Each rock was weighed on a Pitney-Bowes scale. The pump was plugged in and primed. The water flowed over the rock for 24 hours. After 24 hours, the rock was removed and the water was poured from the paint tray through a coffee filter to collect the remnants. The rock and filter were set aside to dry. This exact procedure was repeated for each rock type. A second experiment was conducted, repeating the same procedures explained above, for four days at the same flow rate. Each coffee filter and rock were weighed after they dried.

**Results**
After the 24 hour experiment was complete, the granite, asphalt and Monterey Formation each had a very small amount of remnants in the bottom of the filters. The sandstone was the fastest to erode in less than 30 minutes. After the four day experiment, the coffee filters were examined. The same or fewer particles were in the coffee filters than for the 24 hour experiment. The coffee filters were weighed on a digital food scale which was not sensitive enough. Each of the filters weighed 0.05 ounces, the same as an empty coffee filter. The rocks were weighed again after the experiments. The asphalt weighed 0.5 ounces less than the original weight after 5 days of water flowing over it. The granite weighed the same amount. The sandstone had completely eroded away. It weighed 1.6 ounces less than the original rock weight. A different piece of Monterey Formation was used for the 4 day test and it did not get weighed prior to the experiment, therefore there is no data for that rock.

**Conclusions/Discussion**
The sandstone eroded faster than the other three rock types. It completely eroded within the first 30 minutes of being exposed to water. The Monterey Formation did erode but the design of this study was not able to accurately measure how much of the rock eroded. The asphalt was less than the original weight by 1.6 ounces. The granite did not erode at all.

**Summary Statement**
The force of water erodes different types of rock at different rates.

**Help Received**
My mother helped me design this project and helped me with the report and my father helped me to set it up.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Annemarie R. Kelleghan

**Project Number**
**J0622**

**Project Title**
## Salty Science: How Much Salt Is in Ballona Creek?

**Abstract**

**Objectives/Goals**
The objective of this project is to measure the salinity at various points along Ballona Creek at both high and low tide.

**Methods/Materials**
Water samples were taken at various points along Ballona Creek at both high and low tide. Density, electrical resistance, pH, and non-volatile residue (NVR) tests were used to evaluate the amount of salt in the water samples. The results were graphed versus the distance inland from the ocean and the amount of residue determined in the NVR testing was calculated in parts per thousand (ppt). Bottled fresh water, rainwater, and salt water taken from the ocean were used as control samples. Plant and animal life was observed along the creek giving clues to the presence of salt in the water.

**Results**
At both low and high tide, the water at the ocean outlet of the creek tested comparable to the salt water control sample. As the samples progressed inland, the salinity levels decreased. At low tide, samples taken 2700 feet and more inland from the ocean end of the creek tested similar to the fresh water control samples. At high tide samples had to be taken much further inland to reach fresh water. The presence of bay mussels and California sea mussels at various points along the creek, gave evidence as to the general salinity of the sections of the creek.

**Conclusions/Discussion**
My conclusion is that the salinity level of Ballona Creek varies depending upon the tide. At high tide, the saltwater reaches much further inland than at low tide.

**Summary Statement**
Water samples were taken along Ballona Creek as it enters the ocean to see the changes of the salinity levels in the water.

**Help Received**
My parents drove me to the creek so I could collect test samples.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Laurel A. Kroo

**Project Number**
**J0623**

**Project Title**
## Earthquake Mathematics: Fact and Friction

**Abstract**

**Objectives/Goals**
The purpose of my project is to study how likely it is that a large earthquake will strike, compared to how likely it is for small, or medium size earthquakes to happen. This sort of information will not predict when the next earthquake will be, but rather what is the probability that a certain size earthquake would occur. My objectives in this project are to find these probabilities, and to reproduce this data in several experiments. These tests show me some similarities between static friction and plate tectonics.

**Methods/Materials**
The design of my experiment was fairly simple. I measured how much weight it took to start a brick moving against another brick. Static friction is the physical characteristic that both my experiment and earthquakes share. I measured the force needed to move the brick dozens of times. I took three sets of data, each more accurate as I slowly improved my apparatus. After this, I put weights on top of the brick, to see how this would affect the data.

**Results**
I sorted the points from least to greatest magnitude, and divided them into #bins#. Each bin contains all the points within a certain range. The numbers of entrees in the bin are then plotted against the average magnitude of the bin. I first plotted data from the USGS website, (10,000 points in about three months in California). To understand and analyze this data I needed to look at the shape of the plot. The data followed almost a perfect power law curve. I then graphed my experimental data and found that this data also follows a power law curve, particularly in the tail.

**Conclusions/Discussion**
In the end, I found that the data from my experiment and the data from the real earthquakes looked very similar. I#d like to continue to learn about the mathematics and mechanics of earthquakes. To me, earthquakes are fascinating and I think that someday scientists will be able to unravel the mystery around their prediction. We can do this by improving our understanding of earthquake physics and learning more about these powerful movements in the earth.

**Summary Statement**
This project involves finding probabilities of earthquake magnitude and reproducing these results in an experiment.

**Help Received**
Father helped with general disscusions about the topic and ideas about statistics; Mother helped paste up board.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Erin R. Lacour

**Project Number**
**J0624**

**Project Title**
## What Are the Effects of Weather on Star Visibility?

**Abstract**

**Objectives/Goals**
The purpose of this experiment is to see if temperature, humidity, wind, and dew point affect how well you can see the stars at night. My hypothesis is that when temperature, dew point, humidity, and wind are low, star visibility is better than when these weather elements are high.

**Methods/Materials**
Every night at 7:00 pm, during the month of December, 2004, I viewed seven faint stars surrounding the Pleiades star cluster and recorded the temperature, humidity, dew point, and wind for that particular night. I viewed the stars at the same spot in my backyard every night, and recorded how many of the seven faint stars I could see, and how well I could see them. Each night, I entered this information on a star chart, and graph, so that I could see if there was any pattern. The materials that I used are writing utensils, a clock, a clipboard, a computer, an Astro flashlight, a weather station, computer software, and my eyes.

**Results**
The results that I am looking for are low temperature, dew point, humidity, and wind readings, which will result in good star visibility. After I entered all the data on my graphs, I examined it, and I did not find any pattern that showed what I was looking for. There were only six nights where I could see all seven faint stars on my star chart. On these nights, the readings were both high and low on one night and the opposite on the other nights.

**Conclusions/Discussion**
I conclude that temperature, dew point, humidity, and wind do not affect star visibility very much, if at all. The reason for this is because there was not any pattern that showed that when the data for these weather elements were low, it made star visibility any better than when the data was high. This study raises further questions. Will my results be different if I did it at a different time during the night, a different location, or even a different time of year? Will my results be different by doing it in a month with barely any clouds, and an area with less light pollution? Also, will doing the experiment for a longer period of time, or even choosing different faint stars to look at change my results?

**Summary Statement**
My project is about finding out if stars are more visible when the weather elements of temperature, humidity, dew point, and wind are low, as compared to when these elements are high.

**Help Received**
My dad helped me to learn how to use Microsoft Word and Excel software programs so that I can type my report and create the graphs for my data. He also showed me how to use the Starry Night Pro 4 software program to create my star charts.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Beverly S. Levene

**Project Number**
**J0625**

**Project Title**
## Salinity of Eschuaries and Lagoons in San Diego County

**Abstract**

**Objectives/Goals**
The purpose of my study was to compare water salinity in estuaries and the open ocean. My hypothesis was that the closer you are to the estuary inlet, the less salty it will be.

**Methods/Materials**
I used density and conductivity to measure salinity of samples taken from Mission Bay, the San Diego River, Bataquitos Lagoon, and the ocean.

**Results**
I found that the salinity did not vary much between most of these places. Most places in the eschuaries and lagoons were about as salty as the ocean. The exception was the San Diego River.

**Conclusions/Discussion**
I found that my hypothesis was wrong; the salinity did not vary much between most of these places because the tides cause mixing between the ocean and the estuaries. In the river the salinity was very low because the river flow keep the salty tides from flowing upstream.

**Summary Statement**
My project compared water salinity in the ocean to that in two estuaries and lagoons.

**Help Received**
Used balances and pipettes at Isis Pharmaceuticals. Discussed results with Mr. Jerry Wanetick of Scripps Institute of Oceanography.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Anna M. Nelson

**Project Number**
**J0626**

**Project Title**
## Building the Beach: Sediment Transport to Goleta Beach

**Abstract**

**Objectives/Goals**
To find out if the natural creeks can support the beach without manmade help. Recently the County Parks Department put a large amount of sand on the beach to try and save it.

**Methods/Materials**
I studied Maria Ygnacio Creek, Atascadero Creek, and San Jose Creek (local creeks that empty to Goleta Beach). I studied the time period of March 2004 to March 2005.
I measured the sediment in the creek water by filtering a known amount of water through a coffee filter and weighing the dried filters.
I compared the amount of sediment to the amount of water that went through the creeks each day and computed the amount of sediment for the whole year, using the discharge data from the USGS web sites.

**Results**
During the time period I studied, the creeks produced the most sediment during three large storms. I eventually found out that the creeks produced almost twice as much sediment as was put on the beach artificially.

**Conclusions/Discussion**
I concluded that if there were two or more large storms in a year (estimate), then the creeks will need artificial help. If there are less then two effective storms, the creeks should be able to support the beach.

**Summary Statement**
Will the three creeks of Goleta be able to support Goleta Beach without the County Parks Department's help?

**Help Received**
Father helped acquire USGS data and helped do calculations on a spreadsheet.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Joshua D. Newton

**Project Number**
**J0627**

**Project Title**
## Sinking Soil

**Abstract**

**Objectives/Goals**
The researcher's goal was to determine which soil additive out of polymers, bark or styrofoam, when mixed with soil, would be the most stable when water is added and after a simulated earthquake.

**Methods/Materials**
Materials: Plastic container, 4 wooden dowels, dirt, bark, styrofoam, polymers, hammer, force measuring device, water, shovel, ruler, data sheet.
Method: The steps for each additive were the same. Fill the container with soil/additive, measure to the top of container, insert dowels at four depths, add water, place weight on top, wait 1 hour, measure comaction, log results, tap all sides with hammer, measure compaction, log results, pull out each dowel with force measuring device, log results.

**Results**
The soil alone compacted 3" after saturation and another .5" after stimulus. The pounds of pressure needed to remove dowel #1 was 3lbs, #2 was 5lbs, #3 was 7lbs and #4 was 9lbs. The polymers and soil mixture compacted 3.5" after saturation and another .25" after stimulus. The pounds of pressure needed to remove dowel #1 was 2lbs, #2 was 4lbs, #3 was 4lbs and #4 was 3lbs. The bark and soil mixture compacted 3.5" after saturation and another 1" after stimulus. The pounds of pressure needed to remove dowel #1 was 4lbs, #2 was 6lbs, #3 was 2lbs and #4 was 12lbs. The styrofoam and soil mixture compacted 3" after saturation and another 1.25" after stimulus. The pounds of pressure needed to remove dowel #1 was 5lbs, #2 was 3lbs, #3 was 3lbs and #4 was 2lbs.

**Conclusions/Discussion**
The polymers were the most successful soil additive. The soil and polymers mixture sank a total of 3.75 inches. The soil alone sank a total of 3.5 inches. Although the soil alone sank the fewest total inches, the polymers and soil mixture showed the less compaction after the simulated earthquake.

**Summary Statement**
The most effective soil additive with the least amount of compaction after saturation and a simulated earthquake.

**Help Received**
Mother helped type report. Father helped with graphs.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Rachael A. ORiordan

**Project Number**
**J0628**

**Project Title**
## Waves of Fury

**Abstract**

**Objectives/Goals**
My experiment was to find out why does an earthquake occurring on thrust or subduction fault displace more water, creating a tsunami, than an earthquake occurring on a slip strike fault?

**Methods/Materials**
My Dad and I made a model to simulate the two earthquakes. In the model to show the earth#s plates, we used fixed and movable rocks. To create a slip strike fault earthquake, I slid the rock back and forth. To make a thrust fault earthquake, I let the rock drop through the water against the other rock

**Results**
Graph paper at the water and the shore lines captured the data and is noted in the data book. I created a DVD that shows my experiment with water and can show it on a portable DVD player which I will provide. The thrust fault earthquake showed a much higher watermark than the slip strike fault earthquake.

**Conclusions/Discussion**
An earthquake on a thrust fault may create a tsunami while slip strike fault motion won#t create a tsunami, but could create large waves. An earthquake on a slip strike fault motion doesn#t create big waves. A thrust fault has a violent up and down motion which may cause a tsunami.

**Summary Statement**
My science experiment proves that a thrust fault creates a tsunami and a slip strike fault is not as like to create a tsunami.

**Help Received**
I came up with the idea for the model, but my Dad helped me to find the parts and build it. My Dad and I built the model. My Dad also helped me to make the DVD.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Garrett G. Reid-Storm

**Project Number**
**J0629**

**Project Title**
**Tsunami**

**Abstract**

**Objectives/Goals**
The objective of my project was to determine which "release of energy" (balloon exploding- small, medium, or large) would cause the fastest and highest tsunami wave.

**Methods/Materials**
Connect air compressor hose to balloon. Sink balloon/hose unit to 8 foot depth of pool. Inflate balloon to size of balloon (3 sizes of balloons were used- small, medium, and large). Use poker to explode balloon. Record time and height of tsunami wave. Repeat 3 times each for each size of balloon. Materials used were air compressor, extension cord, electrical outlet, tape, small, medium, and large balloons, rope, 80 lbs. of bricks, stop watch, and ruler.

**Results**
The largest balloon caused the fastest tsunami wave, followed by the medium, and then small. All 3 balloon sizes however, caused the same height of wave.

**Conclusions/Discussion**
My conclusion was that the largest balloon size caused the fastest tsunami wave, followed by the medium, and then the small balloon size. This was what I had originally hypothesized. In regards with height of wave, I found that all three balloon sizes were the same. This was not what I had hypothesized. This may have been due to human error (using the human eye to measure on the ruler), and possibly not enough difference in balloon size.

**Summary Statement**
Which "release of energy" would cause the fastest and highest tsunami wave.

**Help Received**
Mother helped with board and showed use of dictation machine.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Rachel E. Schmidt

**Project Number**
**J0630**

**Project Title**
## Locating Epicenters

**Abstract**

**Objectives/Goals**
To determine the location of earthquakes by using the time differential for P and S waves.

**Methods/Materials**
A. Locate the Stations:
1)I Looked at USGS Web site to see the 21 stations that report seismogram data; 2)The Berkeley Seismograph Network has precise coordinates for all of the stations; 3)The station coordinates were entered into Topozone. The location of the station was shown by a red target; 4)Stations were plotted on a 1:500,000 series map; 5)To locate the stations I would locate points on the Topozone map and then find them on my actual map. Some of these points were: highways and roads, mountain peaks, rivers, county lines, parks, cities and towns.
B. Locating the Epicenter: 1)I collected seismograms for earthquake events from Nov 1, 2004 to Jan 18, 2005. Data was retrieved from the USGS Northern California Seismic Network; 2)I determined the time difference between the P waves and S waves using the times scale at the bottom of each seismogram. P waves travel at 7 km per second, S waves travel at 4 km per second, so the difference is 3 km per second; 3)I converted the time difference into km using (time difference x 3 = distance an epicenter is from a station); 4)Using a piece of wire, a pushpin and a sharp pencil, I drew a circle around the station at the distance determined; 5)I repeated the steps to get a location where three circles intersected; the earthquake's epicenter.

**Results**
Out of the seismograph data for the 5 incidents, one came up with a good location, two came up with location where the epicenter could be estimated within 30km, and 2 had no 3-way intersections

**Conclusions/Discussion**
Though it was easy to see when a P wave started, it was not always easy to find the spike or pulse that usually shows the beginning of the S wave. Reflection and refraction can produce false S wave spikes. During my visit to the USGS, Lynn Dietz, a geophysicist, explained how determining the time distance in most cases can only be accomplished accurately using some of the tools that they have that allow the time to be stretched out, or can increase or decrease the amplitude of the waveform. To determine the time differentials of P and S waves using the seismograms, Lynn suggested I use only big events. Many smaller events could not be located using this technique because the S wave could not be identified on most of the seismograms.

**Summary Statement**
The purpose of this project was to determine the location of earthquakes by using the time differential for P waves and S waves.

**Help Received**
Lynn Diets, USGS, gave me a tour of the USGS and showed me how to interpret P waves and S waves. Father helped me collect data. Mom edited report. My teacher,Shama Hinard,helped guide me through my research.

# CALIFORNIA STATE SCIENCE FAIR
## 2005 PROJECT SUMMARY

**Name(s)**
Jeremy R. Schultheiss

**Project Number**
**J0631**

**Project Title**
# Washed Away: The Effect of Underwater Structures on Tsunami Wave Characteristics

**Abstract**

**Objectives/Goals**
My objective was to find a way of stopping a tsunami wave in the open ocean using man-made structures.

**Methods/Materials**
For this project, I built a 7 foot long wave tank out of plywood. I caulked its joints to prevent leaks and built an incline of sand to simulate the ocean floor. I placed nails at 1 inch intervals on the simulated beach as reference points to measure the waves.

I generated waves using the wave tank#s underwater paddle, which was attached to bungee cords. For each configuration of ocean floor structure # short wall, tall wall and canyon # I generated and measured 10 waves.

**Results**
The six inch wall stopped the tsunami waves more than any of the other obstacles. When the wave came towards the six inch wall it sucked most of the water from the top of the wall. The waves that made it past the wall were in scale with normal wind waves.

**Conclusions/Discussion**
My hypothesis was, #If a tsunami encounters a taller wall, it will be stopped more effectively than in an encounter with a shorter wall, a canyon, or no obstacle.# I accept my hypothesis because the data supported it.

**Summary Statement**
My project explores using man made structures to stop Tsunamis in the open ocean before they reach land.

**Help Received**
My dad cut the plywood I used to make the wave tank.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Melissa E. Weyant

**Project Number**
**J0632**

**Project Title**
## The Water Quality of Two Bayland Ponds

**Abstract**

**Objectives/Goals**
My objective was to compare the water quality of two bayland ponds and a nearby creek. I asked several questions. How does the water quality of the ponds and nearby creek change over a day? How does wind increase dissolved oxygen? How well do surface measurements at the pond edge reflect water quality? How do bayland pond and creek habitats compare? What is the source of water for the bayland ponds?

**Methods/Materials**
At first I used a multi-meter to test seven sites at my ponds and nearby creek once a week. I wanted more data so I conducted multi-meter testing at the seven locations three times a day for four days. Now I am continuing my multi-meter testing at eight sites, including a bay site, three times a day, once a week, for eight weeks. The multi-meter measures several values including dissolved oxygen, temperature, salinity, and pH. I also monitor wind speed, air temperature, turbidity, and rainfall. At home I test water samples for ammonia, nitrate, and nitrite. A pipe is used to extend the measurement site away from the pond edge and to allow measurements at different depths. I mark water level using wooden poles. I use an excel spreadsheet to organize my data and collect digital photographs.

**Results**
Wind increases dissolved oxygen in pond water. In a day, dissolved oxygen starts low, goes up high, and then slightly decreases. Surface measurements from the edge are comparable to measurements away from the edge and below the surface. Dissolved oxygen is higher and more consistent in creek water than pond water. The salinity in the creek was much lower than the salinity in the ponds, including the pond with the fish kill. The results of the ammonia, nitrate, and nitrite testing are so far negative.

**Conclusions/Discussion**
Wind increases dissolved oxygen in ponds by increasing water surface area. The changing of dissolved oxygen in a day is due to the effects of wind and photosynthesis. Surface measurements from the pond edge adequately reflect pond water quality because of convection currents. The ponds receive water mostly from groundwater linked to the bay and not from the nearby creek. Creek habitats are healthier than bayland pond habitats because of faster flowing, new water, more water surface area, and less build-up of debris. It was not possible to show if the fish kill was caused by storm drainage or a waste problem; this emphasizes the need for continuous testing.

**Summary Statement**
This project shows how the water quality of two bayland ponds and a nearby creek change over time.

**Help Received**
The Environmental Compliance Group in the City of Palo Alto let me borrow their multi-meter and gave me good advice. My mother drove me to my testing sites.

# CALIFORNIA STATE SCIENCE FAIR
# 2005 PROJECT SUMMARY

**Name(s)**
Stacie R. Woo

**Project Number**
**J0633**

**Project Title**
## What Can Be Put On or In Soil to Help Prevent Mudslides?

**Abstract**

**Objectives/Goals**
The purpose of my project was to find what type of hillside had the least amount of mudslide. The different types of hillsides used were clay, topsoil on clay, topsoil and grass on clay, topsoil and grass and trees on clay, and topsoil and trees on clay. Since so many people lost their lives this year as a result of mudslides, I wanted to find a way to help prevent mudslides.

**Methods/Materials**
I formed a hillside with a 45° slope out of clay dirt. On 4/5 of the hillside, I pressed wet topsoil onto the clay. On 2/5 of the hill (with topsoil already), I put grass and the topsoil that its roots were in. On one of the sections with grass, I put in toothpicks to act like tree roots. I also did this for one of the remaining sections with only topsoil. Drawings of trees were propped above the toothpicks. 35 pieces of paper were labeled according to the time and which section it would show results for. One paper was put under each section and a small piece of wood was used to hold them down. A table with holes on the top was put over the hill. A piece of screen was placed on top of the table. Four liters of water was poured from a bucket through the table and screen to evenly "rain" over the five sections. The papers from the bottom of the hill were removed and placed aside to dry. This process was repeated in an hour, and then every half-hour after that until all the data-collecting papers were used up. After the data dried, each of them was put in an individual Ziploc bag and labeled with the time and section of hill it was from. All the bags were weighed and the average weight of each section was found.

**Results**
The section consisting of topsoil with grass and trees on clay had the least amount of mudslide. The section with topsoil and grass on clay had the next least amount of mudslide.

**Conclusions/Discussion**
The direct impact of rain upon the ground causes mudslides. Topsoil on hills, with no plants present, will wash away in the rain and result in mudslides since it absorbs water more and is not really stuck to the clay dirt. Trees, plants, and roots help hold the soil in place. Trees, grass, and plants act like a shield so the rain does not impact the topsoil with such a hard force. The amount of mudslide is determined by the amount of plants and roots in and on the ground - the more of them, the better protection a hill has from impact-caused mudslides.

**Summary Statement**
In this project, I worked with five different types of hillsides on a single hill, made it "rain", and found which type of hillside had the least amount of mudslide occur.

**Help Received**
Dad helped think of this subject; Mom helped take pictures.