

## Question:

Can we use low voltage to make beach sand harder to prevent erosion?

## Hypothesis:

If low voltage (about 3 volts) is added to beach sand that is soaked in seawater using graphite rods to conduct electricity, then the sand will become noticeably harder (measured by a drop test, and shows resistance to being scooped) compared, because this process will use the sand with no voltage, because sand and seawater to bind minerals in the beach sand (like glue).

## Background/Research:

I researched the background of beach erosion and found that it is a major problem in many coastal areas. I found that beach erosion is caused by a variety of factors, including natural processes like waves and wind, and human activities like building structures and driving off-road vehicles. I also found that beach erosion can be prevented or slowed down by using artificial beach nourishment, dune stabilization, and beach nourishment. I found that beach erosion is a major problem in many coastal areas and that it is caused by a variety of factors, including natural processes like waves and wind, and human activities like building structures and driving off-road vehicles. I also found that beach erosion can be prevented or slowed down by using artificial beach nourishment, dune stabilization, and beach nourishment.

## Hardening Beach Sand to Prevent Beach Erosion

By JD Hoyts

### Materials Used:

- Three New Containers
- 4 Fresh Graphite Sticks
- Two Battery Holders with Alligator Clips
- 4 AA Batteries
- 1 bag of Beach Sand (Hemlock Creek Sand)
- 1 box of Salt Water (Aluminum Salt Mix 1/2 cup for 1 gallon)
- 3 cups of Fresh Water
- 1 Spoon
- 1 Metal Chop Stick (No Drop Ball)
- 1 Small Spoon for Scoop Test

### Procedures:

- Step 1: I filled three containers with equal amounts of beach sand.
- Step 2: I labeled the first container as the control with Salt Water and Beach Sand Only.
- Step 3: I labeled the second container as my test with Salt Water and Beach Sand with low voltage.
- Step 4: I soaked the test container as my comparison test with Fresh Water and low voltage.
- Step 5: I then mixed the Salt Water from the Salt Water Aquarium mix, I added 1/2 cup for 1 gallon of water.
- Step 6: I poured equal amounts of the salt water mix in the Control Container (about 3 cups), and the Salt Water Only in the Control Container (about 3 cups).
- Step 7: I then poured the same amount of Fresh Water (3 cups) in the comparison test container.

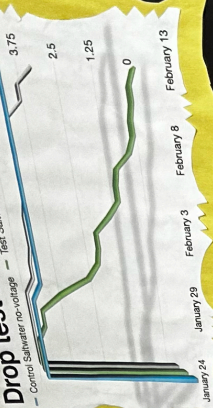
### Daily Test Procedures:

- Step 1: I would look at each container and write down any changes.
- Step 2: I would do the Drop Test to see how far the metal can go into the sand for each container.
- Step 3: I then measured the depth a metal chop stick went into the sand using a ruler. I then wrote down the results for each container.
- Step 4: I then wrote down the results for each container.

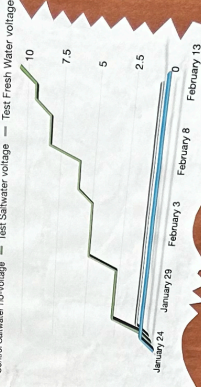
### Test Key

- Visual inspection I would look at each container and write down any changes.
- Drop Test I would use the metal chop stick to see how far it went into the sand.
- Scoop Test I would use the metal chop stick to see how much sand I could scoop up.
- Strength Test I would use the metal chop stick to see how much force it could exert.
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### Drop test Results



### Poke and Scoop Test Results



### Conclusions:

The results of my experiment show that when I added low voltage to beach sand that was soaked in seawater, the sand became noticeably harder. This was measured by the drop test, the scoop test, and the strength test. The sand in the test container was significantly harder than the sand in the control container. This was true for all three tests. The sand in the test container was also significantly harder than the sand in the control container. This was true for all three tests. The sand in the test container was also significantly harder than the sand in the control container. This was true for all three tests.

