# NAYGN Drawing Contest 2017

30 - 45 minutes – Presentation *(includes activities)*

Then coloring time! Be sure to make arrangements with the teacher to pick up any unfinished drawings!

**1. Slide 1: Introduction**

* My name is…
* North American Young Generation in Nuclear is an organization of young professionals in the nuclear industry.
* Today we are here to discuss nuclear power. Does anyone know what a nuclear power plant makes? Electricity!

**2. Slide 2: What do you need electricity for?**

* *Have students shout out answers or raise hands*
* Do we all agree that electricity is an important part of our every day lives? *Everyone should answer yes!*

**3. Slide 3: What is Nuclear Energy Production?**

* Since electricity is such an important part of our everyday lives that means the companies that make electricity are pretty important.
* What do you think nuclear energy production is? *Let students answer. If you hear “bomb” dispel that correlation and let them know nuclear weapons and nuclear energy production are not the same.*
* Nuclear energy production is using atoms to make electricity. Nuclear energy harnesses the energy of atoms to make carbon free electricity 24 / 7 / 365.
* So, what is an atom?

**4. Slide 4: What is an atom?**

* Atoms are the building block of all matter. They’re extremely small and are in everything around you. The sun, the starts, the air, the grass and birds. Even you are made of atoms.
* Nuclear energy production uses radioactive atoms called Uranium in a process called fission to make electricity. Uranium is a rock that is mined and processed into fuel pellets that are used to fuel nuclear reactors.

**5. Slide 5: Atoms have a lot of energy!**

* All this energy in atoms is important for how we make electricity at the nuclear power plant. Those atoms are used to make heat in a process called fission.
* What is fission?

**6. Slide 6:** **What is Fission?**

* Fission is when a neutron smashes into an atom (Uranium) making it unstable causing it to split.
* When it splits it releases enormous amounts of energy in the form of heat.
* It also releases more neutrons.
* Let’s take a closer look.

**7. Slide 7:** **Fission Continued… Before**

* Here you see a neutron smashing into a Uranium atom.

**8. Slide 8:** **Fission Continued… After**

* When the atom is hit by the neutron it splits releasing energy in the form of heat.
* It also release more neutrons. Those crazy neutrons are then free to smash into other atoms causing a nuclear chain reaction.
* Nuclear power plants capture the heat released every time an atom splits and used it to turn water into steam.
* Let’s take a look at what a chain reaction looks like.

**9. Slide 9:** **Nuclear Chain Reaction Demonstration**

* YouTube Pepsi Max Video - <https://youtu.be/v7YQT6BCuAE>
* Every time a mousetrap goes off it signifies an atom being split which releases what two things? Heat and more neutrons.
* The ping pong balls flying in the air are the neutrons.

**10. Slide 10: Turbines**

* The nuclear chain reaction, like the one you just saw, heats water which nuclear power plants use to make steam. That steam is then used to turn a turbine.
* Turbines transform rotational energy into usable energy.
* Who knows what a turbine is? *Let students answer.*
* A turbine has blades attached to a shaft which captures rotational energy and uses it to turn an electric generator.
* Turbines can be turned by steam, water, or wind.
* Nuclear power plants, coal power plants, and natural gas power plants use steam.
* Hydro dams, like the Hoover Damn, use water.
* Windmills, like a pinwheel, use the wind.

**11. Slide 11: Basic Nuclear Power Plant**

* So far we’ve talked about fission, a nuclear chain reaction, and turbines. So I bet you’re wondering how all this works together to make electricity?
* Nuclear power plants use fission to create heat which is used to make hot water. That hot water is then turned to steam.
* The steam produced is used to turn a turbine, like the ones you just saw.
* The turbine is attached to an electric generator which spins to make electricity!
* The fission process that is used to make hot water uses radioactive atoms which give off radiation.
* So what is radiation?

**12. Slide 12: What is radiation?**

* Radiation is energy that moves from one place to another. Light, sound, heat, and X-rays are examples of radiation.
* Sometimes you can feel radiation like when you feel the heat from the sun.
* Other times, you can’t sense radiation but can measure it with detectors.
* Not to worry radiation has been around since the beginning of time and is everywhere.

**13. Slide 13: We live in a radioactive world!**

* We live in a radioactive world – humans always have.
* Radiation is all around us. It’s part of the earth, the atmosphere, and all living things. The radiation we get exposed to everyday comes from natural and man-made sources.
* Natural sources of radiation include the sun and starts, the earth (rocks, soil, water), and even you!
* Let’s look at some of the common natural sources of radiation.

**14. Slide 14: Some radiation occurs in food**

* How many of you ate a banana today? Bananas contain potassium which is radioactive. Fun Fact - You would have to eat 10 million bananas at once to get radiation poisoning.
* Red mean and carrots have radiation in them.
* Drinking water contains radon and other radioactive elements.
* Who here love potatoes? Potatoes are also radioactive. If you eat one medium potato every day for a year you will receive about 4 millirem of radiation. But that’s okay, our bodies know how to deal with these small exposure levels.
* These are just a few examples of natural sources, now lets look at a few man-made sources.

**15. Slide 15: Some radiation is man-made.**

* Smoke detectors have Americum which is a radioactive element.
* Cell phones and microwaves give off radiation too.
* How many people have had an x-ray before? X-rays are radioactive as well.
* Remember, radiation is energy moving from one place to another in waves or fast particles. You can’t see it but it’s all around us!

**16. Slide 16: Radiation Exposure Q&A**

* How is radiation measured? Radiation is measured in millirems with special equipment. Dosimeters are one example of this special equipment.
* What can impact a persons exposure to radiation? Where they live. People who live in higher elevations receive more radiation than those who live in lower elevations because they’re closer to the sun.
* Also impacting your radiation exposure are the number of medical procedures you receive, your travel limits, and the food you eat, among other things.
* Let’s calculate your estimated annual radiation dose!

**17. Slide 17: Personal Annual Radiation Dose**

*Use the Radiation is RAD – Dose Calculation Worksheet*

* Cosmic Radiation – Presenter should pre-determine this based on where they’re located. Provide this number to the students.
* Terrestrial – Help the students answer this question based on location.
* House Construction – Help students answer this question based on the material their home is made of.
* Power Plants – Determine if the general area falls into the 50 mile radius and help the students answer this.

**18. Slide 18: Personal Annual Radiation Dose Continued**

* Food, Water, Air – Give examples to students if you want. This is already pre-determined.
* How You Live – Help students answer each question. For the Jet Plane Travel have them determine how many plane rides they’ve taken in a year and then assume each ride is 3 hours.

**19. Slide 19: Personal Annual Radiation Dose Continued**

* Medical Tests – Based on the type of x-rays students have received, or other medical procedures, help them calculate their mrem.
* Calculate the total estimated annual radiation dose based on all their answer above.
* Even though we all receive radiation in our everyday lives, nuclear workers can be exposed to more than that.
* Let’s talk about how nuclear workers protect themselves from radiation.

**20. Slide 20: Radiation Protection**

* Time – The less time you spend near the source of radiation the less radiation you receive. Think of this like a fire, the more time you spend next to the fire the hotter you will get.
* Distance – The farther you are from the source of radiation the less radiation you receive. Think of this like a fire, the closer you are to the fire the hotter you feel. Move away and feel less heat.
* Shielding – Workers use protective shielding to receive less radiation. Lead (like the apron they put on you when getting an xray), concrete, and water are all common types of shielding in nuclear power plants. Think of it like a fire, if you put a wall between you and the fire it protects you from the heat.
* You can use these methods to protect yourself at home as well.
* Let’s do an activity to demonstrate these concepts.

**21. Slide 21: RP Activity**

* If you were going to the beach, how would you keep yourself from getting radiation from the sun (aka sunburn)?
* Time – Spend less time at the beach. Go for two hours instead of three.
* Distance – Go to a beach in a lower elevation. You’re not as close to the sun so you can stay longer!
* Shielding – Use sunscreen, put on a hat, wear a shirt, us an umbrella.
* Nice work everyone! Now that we all have a better understanding of nuclear energy production and radiation lets see what we learned!

**22. Slide 22: What did we learn?**

* Nuclear power plants make electricity using **Fission**
* Fission is when a neutron smashes into an **atom** causing it to split releasing **heat** and more neutrons. This creates a **chain reaction.**
* Nuclear power plant suse the radioactive atom **Uranium**
* Electiricty is made when the steam created by fission turns a **turbine** which is attached to an electric **generator.**
* Effects from this fission process are **radiation.**
* Radiation is **energy** traveling in waves.
* Radiation that occurs naturally and is all around us is called **background radiation.**
* Radiation sources include: **Cosmic**, **Terrerstrial, internal**
* Radiation is measured in **millirems** using a **dosimeter.**
* The average American receives **620** millirems of radiation exposure per year.
* Nuclear workers use **time, distance, and shielding** to protect themselves from radiation.

**23. Slide 23: Radiation is totally RAD**

**24. Slide 24: Nuclear Energy is RAD**

**25. Slide 25: 2017 Drawing Contest**

* Theme: Radiation is RAD
* 8.5 x 11 sheet of paper
* Draw what you think makes RADiation RAD!
* On the back include: you name, you age, you grade, t-shirt size, school name, you teacher’s name
* Drawings due March 8, 2018

**26. Slide 26: Answer Questions**

**27. Slide 27: Prizes**

* The top three finalists will each receive an NAYGN T-shirt, a science kit, an award certificate, and an honorary membership in NAYGN. The first place finisher will also receive a book collection of his/her own.