Sequence 6: Nuclear energy

Sommaire des activités ETLV :

ACTIVITY 6: Nuclear accidents

Objective: Learning about the Tchernobyl and Fukushima accidents

DOCUMENT 4: The Chernobyl Disaster How It Happened

https://www.youtube.com/watch?v=f5ptI6Pi3GA

Source: RFE

On April 26, 1986, a routine safety test at the Chernobyl nuclear power plant in Ukraine spiraled out of control. Follow the dramatic events that led to the world's worst civilian nuclear disaster.

Gathering information:

Watch the video carefully. Write down the keywords/expressions/definitions you heard on a piece of paper.

_____
_____
_____
_____
_____
_____

Acquiring vocabulary:

Fill in the blanks using the following words:

- disaster spread backup overheating aftermath
- hastily shortage crumbling scheduled dismantled

English	French
	surchauffe
	suites
	prévu
	démantelé
	qui s'effrite
	sauvegarde
	propagation
	hâtivement
	pénurie
	catastrophe

Going into details:

Watch the video and find the missing words (numbered from 1 to 15):

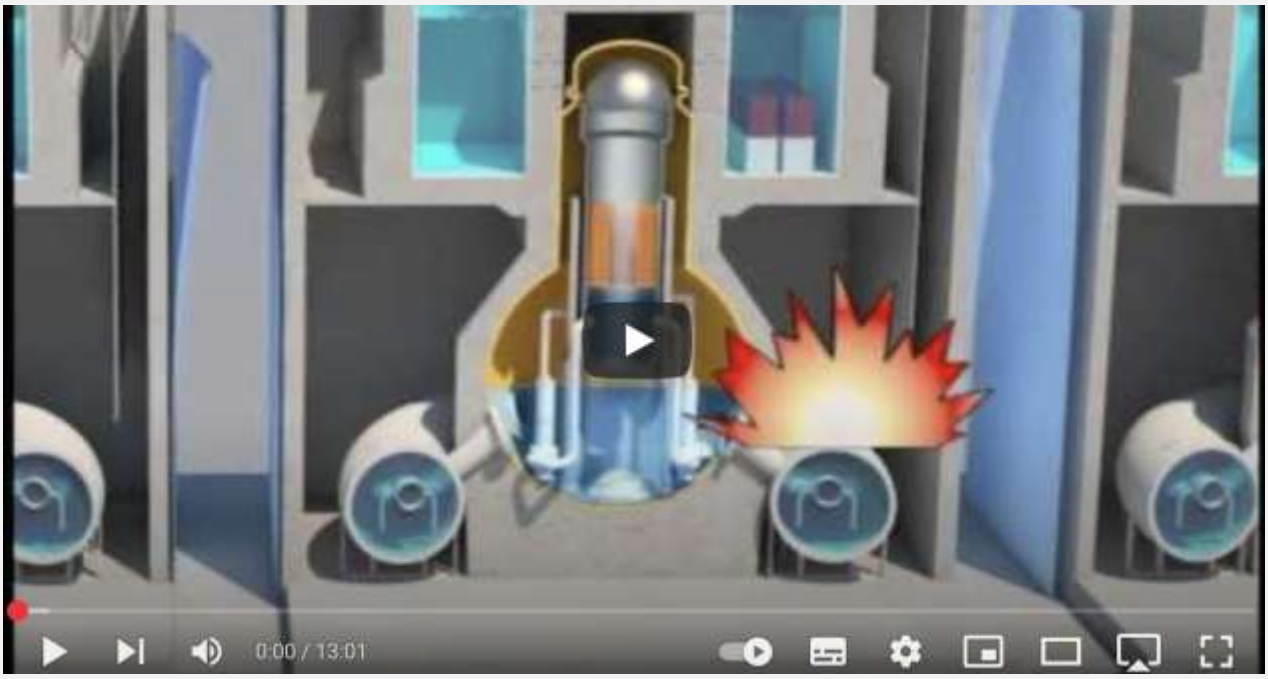
The world's worst civilian nuclear disaster took place when a reactor exploded at the Chernobyl power plant in Ukraine then part of the Soviet Union.
Present-day Belarus received **(1)** percent of the initial fallout.
The radioactive cloud spread further to cover most of Europe.
The Chernobyl nuclear power plant was one of the Soviet Union's most advanced facilities.
The first two reactors became operational in the late **(2)**.
The fourth reactor was the newest going online in **(3)**.
On April 26th 1986, technicians prepared to test the backup cooling system in reactor number four, but the routine safety drill went horribly wrong.
A nuclear reactor is like a giant steam engine.
Uranium fuel rods react to produce a massive amount of **(4)** that converts water into steam, which drives huge turbines to generate electricity.

Control rods are inserted in between the uranium to slow the reaction and it's crucial for cooling water to be pumped around the **(5)** to prevent overheating.
But as the test began, almost all of the control rods were removed and technicians lost control of the flow of coolant temperatures soared and extreme heat began to melt the core.
At 1:23 a.m. reactor four exploded, it spewed eight tons of radioactive debris into the atmosphere.
(6) people were evacuated from a thirty-kilometre zone around the plants.
The battle to put out the fires inside lasted for 15 days.
More than **(7)** military and civilian personnel were drafted to deal with the accident and its aftermath.
(8) of the initial firefighters and plant workers died within days from acute radiation sickness.
The toxicity of the radioactive cloud was equivalent to **(9)** Hiroshima atomic bomb explosions.
Crews hastily built a concrete sarcophagus to encase the entire reactor to prevent more radiation from spreading inside there remain **(10)** tons of radioactive fuel.
The remaining three reactors continued to operate due to energy shortages in Ukraine.
It wasn't until the year 2000 that the Chernobyl complex was completely shut down with the concrete sarcophagus crumbling.
The international community began to build a new confinement structure for reactor **(11)**.
It stands a **(12)** meters tall, higher than the Statue of Liberty and it's wide enough to fit a ship the size of the Titanic.
At a projected cost of **(13)** billion dollars, construction is scheduled for completion in **(14)**.
One of Chernobyl's iconic red and white chimneys will be dismantled and the massive steel dome will slide over reactor number four.
The confinement structure is expected to last for at least **(15)** years.

- **Write your answers in a Google Form or below:**

1. _____	**2.** _____
3. _____	**4.** _____
5. _____	**6.** _____
7. _____	**8.** _____
9. _____	**10.** _____
11. _____	**12.** _____
13. _____	**14.** _____
15. _____	

DOCUMENT 5: Understanding the Fukushima accident



https://www.youtube.com/watch?v=YBNFvZ6Vr2U

Source: IRSN

This film presents the sequence of the accident at the Fukushima Daiichi plant in March 2011.It explains how the boiling water reactor (BWR) operated in Japan, describes the scenario of the accident and details the actions conducted during the crisis. For more information: http://www.irsn.fr/fuku-lessons/.

Gathering information:

Watch the video carefully. Write down the keywords/expressions/definitions you heard on a piece of paper.

_____
_____
_____
_____
_____
_____

Fill in the blanks:

1. On Friday March the 11th 2011, at 3.36 pm, …….. swept over the east coast of Japan.
2. How many victims (dead or missing) did the wave produce? ……..
3. Fukushima Daiichi is 250 km ……. ……. of Tokyo.
4. Each reactor of the Fukushima Daiichi was successively commissioned during the ……..
5. How many reactors were fully operating when the tsunami hit the Fukushima Daiichi power plant? ……..

Going into details:

Watch the video and find the missing words (numbered from 1 to 10):

Fukushima reactors have a different technology than the **(1)** water reactors built by the French operator EDF, they are boiling water reactors called BWRs. We say reactor because the heat in the **(2)** is produced by fission reactions and boiling water because the water that removes the heat from the core turns into **(3)** and the steam goes directly to the turbine. The turbine **(4)** the generator that produces electricity.
Afterwards the steam is condensed with the help of the sea water **(5)** system and returns to the core.
A **(6)** water reactor has only one single system combining feed water and steam. The core is composed of fuel assemblies containing **(7)**. It is controlled by control **(8)** introduced from the bottom that can stop the fission reactions in case of an emergency. Fission of uranium **(9)** produces radioactive atoms that in turn produce heat and this continues to occur even after reactor shutdown.
This is called residual **(10)**.

Write your answers in a Google Form or below:

1. _____	**2.** _____
3. _____	**4.** _____
5. _____	**6.** _____
7. _____	**8.** _____
9. _____	**10.** _____

Going into details:

Rewrite the following sentences in the right order:

1. fuel | confined | cooled | and | Keeping | is | major | the | issue. | safety | a |

_____

2. environment | isolated | from | like | different | famous | containment | Russian | fuel | barriers, | just | the | by | The | dolls. | is |

_____

3. fuel | cladding | zirconium | barrier: | of | alloy. | first | A | the |

_____

4. steel | vessel | cooling | second | systems. | water | combination | and | with | barrier: | in | reactor | A | steam | the |

_____

5. third | containment | in | concrete | tight | the | liner. | the | lead | building | a | steel | Finally | with | barrier: |

_____

Activities summary

What you must remember:

- **nuclear accident**
- **cooling system**
- **concrete liner**

Skills linked to the curriculum**:**

Compétences	Capacités à maîtriser	Où dans cette séquence ?
APP	Utiliser du vocabulaire spécifique	Activités 1 à 6
	Lire et comprendre des documents scientifiques	Activités 1 à 6
COM	S'exprimer à l'écrit et à l'oral en utilisant le vocabulaire adapté	Activités 1 à 6

Objectifs de la séance :

- *Compétences linguistiques* : Améliorer la capacité des élèves à parler en anglais sur un sujet technique.
- *Compétences techniques* : Renforcer les connaissances sur l'énergie nucléaire.
- *Compétences de présentation* : Développer les compétences en communication et présentation en anglais.

Durée : 2 séances de 1 heure

Matériel nécessaire :

- Support visuel (vidéo courte).
- Accès à internet (pour recherches rapides si nécessaire notamment un Google form)