# ONKALO Nuclear Fuel Repository

Repository and Associated Facilities

Posiva


# Underground Tour - Security

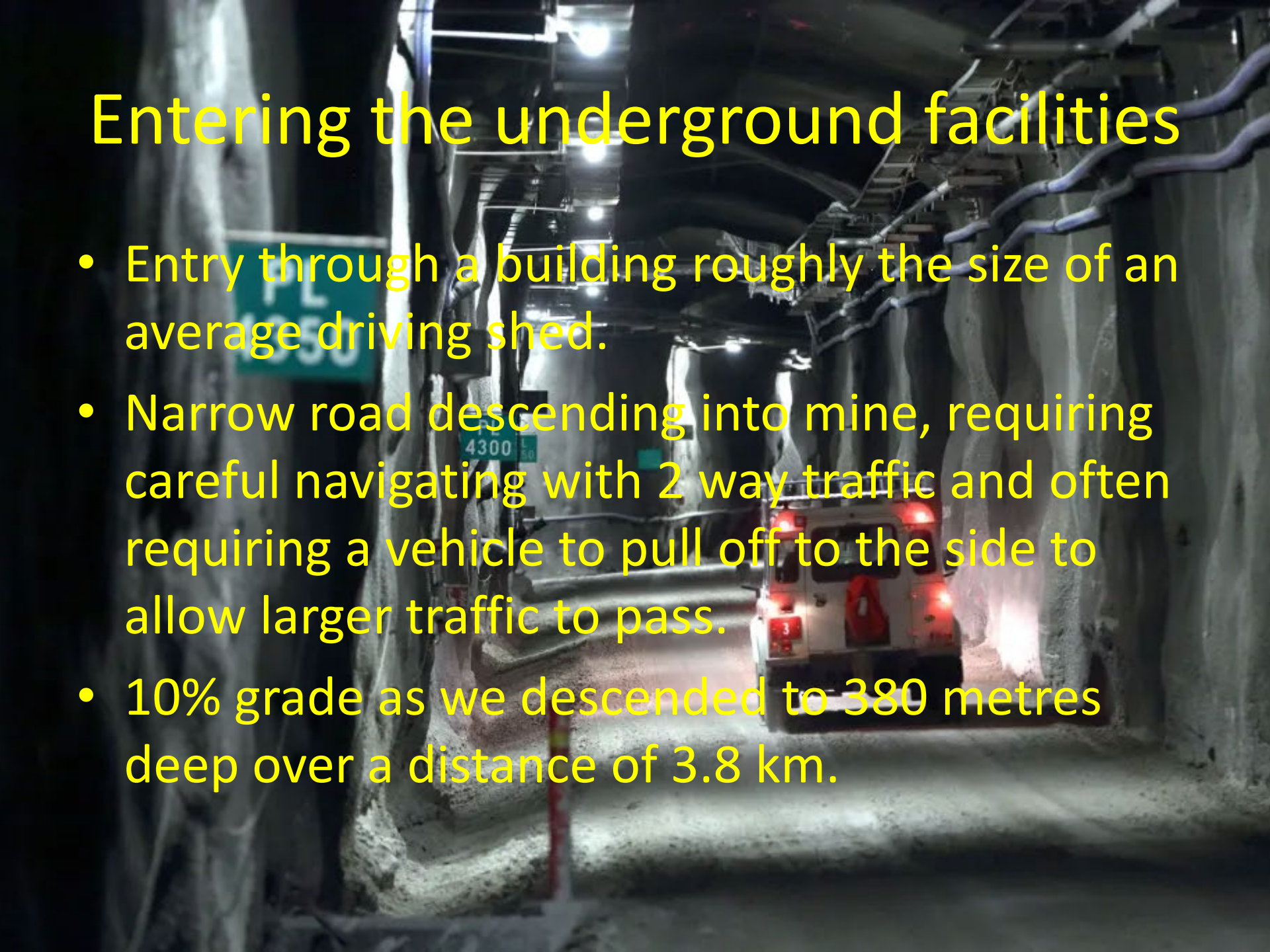
Area was set up much like the Bruce Nuclear site. Special badges were required for entry and fences, gates, and turnstiles in place around the perimeter.

At current, the area was not staffed with full time guards attending all access points as the area is currently just a construction site and does not contain any nuclear material.

Full time security is employed at nearby nuclear plant

# Above Ground Facilities

# Entering the underground facilities




- Entry through a building roughly the size of an average driving shed.
- Narrow road descending into mine, requiring careful navigating with 2 way traffic and often requiring a vehicle to pull off to the side to allow larger traffic to pass.
- 10% grade as we descended to 380 metres deep over a distance of 3.8 km.

# Entering the underground facilities continued…

- Large ventilation ducting visible throughout the facility.
- Fire suppression plumbed into the facilities
- Large use of stainless steel for plumbing
- Not extremely bright but reasonably well lit.
- Damp atmosphere – attributed partly to water seeping in through rock fractures, but also to the use of water to assist in keeping dust at bay and for washing excavated areas for inspection and additional preparations.

# Underground Storage Tunnels

- All storage tunnels are first core drilled to verify rock structure before opening up to full size and adjusted in length based on core samples

- Entrance to each storage tunnel is bored with a slightly larger diameter to accommodate the closure plugs

- In each storage tunnel, there are several vertical shafts drilled to accommodate the fuel. This is in part due to the higher activity of their fuel and placing it into vertical shafts allows the natural rock to help reduce the gamma radiation until the tunnels are closed

# Underground Storage tunnels

Standing at end of a test tunnel, sealed off with a closure plug.

This particular test tunnel has instrumentation used for observation and analysis

# Encapsulation Plant

- Currently no spent fuel storage besides fuel pools

- Fuel transported from spent fuel pool in special flask into encapsulation plant

- Fuel in flask transferred into hot cell for processing

- In hot cell, fuel is removed from transfer flask, dried and placed into storage flask via remotely operated equipment

# Encapsulation Plant Continued…

- With fuel in its storage canister, it is blanketed with argon gas

- Fuel and canister is then transferred to a welding and machining station where the copper outer canister is welded and machined

- Canisters will be lowered into repository via a lift similar to an elevator.

- Built in special arms are in hot cell to provide access for repair in the event of a machine malfunction where radiation fields would prohibit entry by personnel. Similar to space arm and capable of intricate tasks

**ENCAPSULATION PLANT VIDEO ANIMATION (5 MINUTES)**

# Operation of the encap-sulation plant

1. Reception of fuel and storage of the transport cask
2. Hot cell (fuel handling chamber)
3. Measurement of surface contamination and cleaning. Welding, machining and inspecting the copper lid
4. Reception and storage of empty deposition canisters
5. Canister lift


Posiva


Spent Fuel Storage
No current dry fuel storage
Sample of fuel bundle from Finland Reactors requiring storage

# Spent Fuel Storage Continued…

- 12 spent fuel rods placed into steel canister (grey canister in photo)
- Steel canister is sealed and placed into copper canister
- Copper canister is welded closed for permanent storage

# Spent Fuel Storage Continued…


This photo is to help provide perspective to the size of the canisters used for the spent fuel at Onkalo.

# Transportation

- From Olkiluoto Nuclear Plant, fuel bundles will be transported via local roads.

- Olkiluoto is located on an Island, with road access from the mainland. Onkalo repository is located on the same island as Olkiluoto nuclear plant.

- This would be similar to if Bruce Power was to develop a repository on their existing site.

- Onkalo will also be accepting fuel from another nuclear site , Loviisa, in the South East of the country. Transportation details have not yet been completed, however the most likely solution would be transportation by boat as both Nuclear plants have harbours to accept large marine vessels.

# Transportation Continued


Olkiluoto Nuclear Plant and
Onkalo Nuclear Fuel Repository

Loviisa Nuclear Power Plant

# THIS

# V/S

# THAT

# Differences

Many design differences are present between the repository under construction slated for Finland and the one Proposed for construction in South Bruce.

Main differences noted are as follows:

1) Rock structure will differ from the sedimentary rock found at the proposed South Bruce location vs the Igneous Rock at Onkalo

2) Main mine access through vehicle traffic tunnel. South Bruce's proposed access will be via lift / elevator only. Onkalo still uses a lift/elevator for nuclear fuel transport into mine from the repackaging facility

# Differences Continued

3) Onkalo is located on same lands as local nuclear plant, Olkiluoto

4) Final fuel storage containers for NWMO project differ in design from those developed for use in Finland by Posiva for use in Onkalo

5) Used fuel from Finland's Nuclear Fleet has very different physical and radiological characteristics than the fuel from Canada's CANDU fleet.

# Differences Continued

6)Finland's geography provides simpler transportation development due to smaller distance to travel and opportunity to better utilize marine transport.

7) Rock structure will differ from the sedimentary rock found at the proposed South Bruce location.

8) Onkalo will place their cannisters vertically into vertical "wells" developed into their disposal tunnels.

# ??? Questions ???