**Scancan Technologies**
**Introduces**

**A Unique and Recently Patented* Cost-Effective Method for Storing High-Level Nuclear Waste (HLW) Safely Above Ground in Military-Grade Concrete Bunkers. The Quantum Energy-Based Sheath and Age-Hardened French Oak Red Wine Barrels Involved in This Method Ensure that 99% or More of the Alpha, Beta, Gamma, and Neutron Radiation Released by Spent Fuel Rods are Absorbed and Transmuted Into Harmless Molecular Particles and Safe Gases such as Hydrogen And Ozone.**

**HLW Contains or Emits Radiative Particles that are a Risk to Human health and the Environment. Today, the Majority of High-Level Nuclear Waste Around the World Continues to be Stored at Sites Near the Nuclear Reactors.**

**Currently, there are More Than 400,000 Metric Tons of High level Nuclear Waste (Spent Nuclear Fuel) in Storage at Ground Level in Spent Fuel Ponds or Dry Storage Casks.**

**This Scancan™ method for storing high-level nuclear waste was patented internationally with the World International Patent Authority (WIPO) on April 18, 2024 (see References below). Deliverable within six months of contract and costing less than 1% of geological depositories, it is now available from Scancan Technologies. This method is applicable to all high-level nuclear waste.**

## The Technology Involved

**High-level nuclear waste (HLW) releases alpha, beta, gamma, and neutron radiations comprised solely of quantum particles. Specifically, alpha radiation is composed of two proton-neutron pairs. Beta radiation involves only highly energetic electrons. Gamma radiation consists of photons in the gamma region of the electromagnetic spectrum, and neutronic radiation involves only single neutrons. These particles are extremely dangerous to health.**

**Transmutation of alpha, beta, gamma, and neutron radiation requires an in-depth knowledge of the discoveries of five Nobel Prize Laureates in Physics. Such knowledge enabled Scancan's team of quantum physicists to invent new ways of managing high level nuclear waste. The first of these were Pierre and Jacques Curie, who, in 1880, discovered the 'piezoelectric effect' that explains how photons could be ejected naturally from pure white shocked piezoelectric quartz powders. The next was Albert Einstein, who discovered the photoelectric effect that describes how highly energetic photons can eject electrons from the surface of metal powders in 1921. A few years later in 1929, the third, Werner Schrodinger, formulized the basis of quantum theory. Fourth was Enrico Fermi, who discovered nuclear fission in 1937 and fifth was Carlo Rubbia et al, who, in 1984 discovered the W and Z bosons that are released during collisions between quantum particles.**

**Combining all five of these quantum discoveries, Scancan scientists developed a unique method for storing high-level nuclear waste safely above ground. First, they created a quantum energy-based sheath made of pure medical-grade silicone resin and incorporating Scancan's proprietary pure white shocked piezoelectric quartz powders as well as a titanium-doped zirconia catalyst, and seven pure metal and non-metal powders. This quantum energy-based sheath encases the spent fuel rods and initiates the processes of absorption of radiation from high-level nuclear waste and its transmutation into harmless molecular particles and stable gases.**

**Scancan scientists chose age-hardened French oak red wine barrels to house the sheath-encased spent fuel rods because they are known to have useful lifetimes of over 600 years. A more detailed description of the above processes is provided in the attached Annex.**

**A Scancan™ barrel can store up to one metric ton of spent fuel rods. The entire assembly consists of the barrel, the Scancan™ quantum energy sheath encasing the spent fuel rods, a stainless-steel cylinder for containing the sheath inside the barrel and two concrete crowns that are bolted onto the barrel covers to secure the cylinder and its contents safely in place inside the barrel.**

**To load the assembly, the concrete crown is unbolted from the barrel cover and the barrel cover and concrete crown are removed. The spent fuel rods are then inserted directly into the sheath which is fixed in place inside the cylinder. Once the fuel rod bundles have been installed inside the sheath, the concrete crown seals the cylinder, and the barrel cover is bolted to the crown. The loaded assembly is now ready for safe storage above ground in readily available military-grade concrete bunkers.**

The processes of absorption and transmutation of radiation from nuclear waste release small amounts of hydrogen and ozone gases. To manage these, a twin borosilicate glass air lock is installed on top of each barrel to allow immediate evacuation of these gases into two separate gas cylinders that are subsequently removed from the site.

Images of the main components involved are shown below.


Age-hardened French Oak Rod Wine Barrel


Silicone Resin Sheath


Spent Fuel Rod Bundles


Stainless-steel Cylinder


Concrete Crown


Military-grade Concrete Bunker

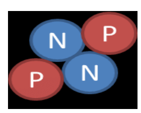

Borosilicate Twin Airlock

## Annex: Description of the Quantum Processes involved

Transmutation of radiation released by nuclear waste into safe molecular particles and stable gases takes place inside a Scancan™ barrel in 5 separate but inter-connected steps.

### Step 1. Absorption and Transmutation of Alpha Radiation

Alpha radiation consists of two neutron-proton pairs. See below.




Silicon atoms inside the pure white shocked piezoelectric quartz ($SiO_2$) powders are known for their natural ability to capture neutrons. When a silicon atom in the Scancan™ quantum energy-based sheath absorbs a neutron, three different events take place:

- The silicon atom transmutes directly into a stable $^{28}$Si isotope;
- The capture of a neutron by a silicon atom causes the neutron-proton pair to split apart, releasing a single free proton in the process;
- This single free proton then absorbs a free photoelectron ejected previously by a gamma photon from the surface of graphite powders inside the liner. This process produces a single hydrogen atom.

The combination of these three events neutralizes and eliminates the majority of the alpha radiation's neutron-proton pairs.

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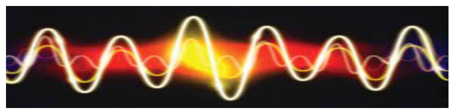
Zirconium is important to this process because the zirconium isotope inside the titanium-doped zirconia catalyst ($ZrO_2.Ti$) has 48 neutrons instead of the usual 50 neutrons. This enables the catalyst to absorb neutrons from alpha radiation's neutron-proton pair, releasing free protons, a recent discovery of nuclear physicists at the Lawrence Livermore National Laboratory in the USA.

## Step 2. The Absorption and Transmutation of Gamma Radiation

Gamma radiation consists of highly energetic photons. See below.



Gamma photons easily penetrate up to 15 centimetres of lead and are extremely dangerous to health.

The Scancan™ method for storing high-level nuclear waste above ground absorbs and neutralizes gamma radiation in several different ways, namely:

- Gamma radiation's gamma photons ionize all seven of the pure metal and non-metal powders embedded inside the sheath. This process generates large quantities of positively charged zinc, copper, silver, titanium, lithium oxide iron oxide and graphite ions;

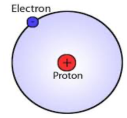
- Whenever a gamma photon encounters an oxygen molecule, the photon's higher ionizing potential enables it to break apart the oxygen molecule into two separate oxygen atoms. These two oxygen atoms then combine with other oxygen molecules to create additional ozone molecules;

- Silicone polymers embedded inside the silicone-based sheath naturally absorb gamma photons;

- Concrete crowns inside the barrels naturally absorb parasitic gamma photons.

## Step 3. Absorption and Transmutation of Beta Radiation

Beta radiation consists of highly energetic single electrons, as depicted below.



**The Scancan quantum energy sheath neutralizes beta radiation in several different ways:**

- **Beta electrons attach themselves automatically to single, lone protons associated with alpha radiation (as described above), creating stable hydrogen atoms in the process;**

- **Beta electrons generate stable metal powders by re-inserting themselves onto the ionized metal ions' outer valence shells;**

- **Beta electrons are negatively charged and therefore naturally attracted to and absorbed by the seven positively charged metal and non-metal ions located inside the sheath. This process creates stable and reusable molecular particles;**
- **Beta electrons are also infinitely small, i.e. circa $10^{-11}$ m. Despite their small size, they are easily absorbed naturally by the age-hardened red wine oak casks whose porosity values are close to zero - a feature that prevents beta electrons from escaping from the casks.**

## Step 4. The Absorption and Transmutation of Neutron Radiation

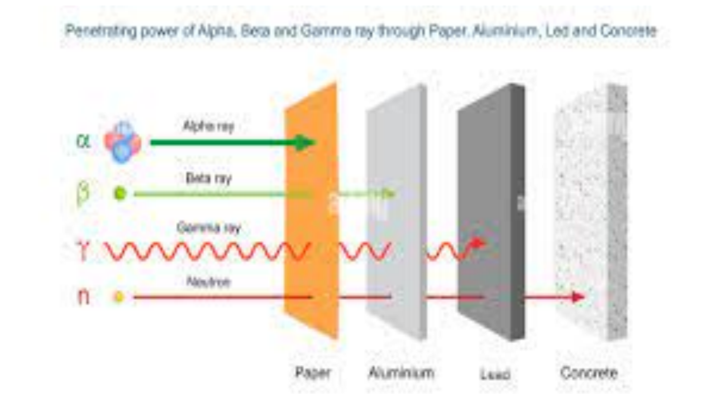
- **Key to this step is the titanium-doped zirconia ($ZrO_2$) catalyst embedded inside the sheath. The Lawrence Livermore National Laboratory in the USA recently discovered that the $^{88}Zr$ zirconium isotope in the catalyst has an extraordinarily large neutron cross-section. This enables it to easily absorb neutrons.**

- **Silicon atoms inside the shocked piezoelectric quartz ($SiO_2$) powders are known for their ability to capture neutrons naturally, according to an article published by the IAEC entitled "Neutron Transmutation Doping of Silicon at Research Reactors".**

- **Silicon rubbers were also found to be useful in absorbing neutrons, as per an earlier US patent.**

- **Graphite is an efficient neutron moderator as well as having a high resistance to wear and tear.**

- **Finally, although single neutrons can easily penetrate lead, they are ultimately blocked by concrete, as depicted in the image below.**




## Step 5. The Management of Hydrogen and Ozone By-products

**Ozone and hydrogen gases generated during the transmutation process exit the casks naturally via two borosilicate glass air locks located at the top of each barrel (see image below). These two gases are stored separately in appropriate gas cylinders and eventually transported to a secure location.**

## References

### The Inventor's Main Patents and Publications

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4. J-W Manconi et Hong Yan Miao: WIPO Patent No. **WO 2015/048893A1** entitled: “Piezoelectric Heat Dissipation and Conversion Devices”, 9 April 2015.

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16. Mohammad Abdul Kadar et al: The Effect of Using Iron oxide in Radiation Shielding”, 2020, Materials Science Engineering, 928, 072033.

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