3. The Need for Transports.

After 40 years of nuclear power the realities of managing the spent fuel from power station reactors have to be faced. There are 2 basic options for the industry, the first being to store and then directly dispose of the fuel (providing a nuclear dump is available) The second is to send it to Sellafield for reprocessing .

4. The Reprocessor.

The reprocessing of spent nuclear fuel is carried out at British Nuclear Fuel's Sellafield site in West Cumbria. Sellafield has two reprocessing plants, the Thermal Oxide Reprocessing Plant (THORP) which deals with the UK's AGR spent fuel, and the B205 plant which reprocesses the fuel from the older Magnox power stations.

THORP is also able to reprocess spent fuel from Pressurised Water Reactors (PWR) and Boiling Water Reactors (BWR). Currently fuel from these reactor types is imported from abroad with overseas customers accounting for around two-thirds of THORP's orderbook. Largest overseas customer is Japan, follwed by Germany, Switzerland, Italy, Spain, Sweden and the Netherlands. The UK's only PWR station is Sizewell B which intends to wet store its spent fuel for 20 years.

5. Reprocessing – the operation.

On arrival from UK's AGR and Magnox power stations, spent fuel is unloaded from its transport flasks underwater and placed in storage ponds adjacent to the two reprocessing plants. After a period for cooling, the fuel is transferred to the first stage of the reprocessing plant where it is cut up into small lengths and dissolved in boiling nitric acid. The highly radioactive dissolved liquour is transferred to the chemical separation area of the plant where, as the name suggests, a series of chemical processes separates the dissolved fuel into its three constituant parts – plutonium, uranium and High-Level Waste (HLW)

The end-product of plutonium is stored at Sellafield with over 50 tonnes now stockpiled. The uranium is stored at one of several BNFL sites in the north west. Of around 40,000 tonnes of uranium 'recovered' by reprocessing only around 5% has actually been re-used as new fuel in reactors The HLW is eventually 'vitrified' into blocks by mixing it with a glass matrix and then stored at Sellafield for eventual disposal. The remaining nuclear wastes which arise from the operation, in the form of the chopped metal fuel casings and operational sludges are encapsulated in cement and stored in drums at Sellafield for eventual disposal. The low level wastes are pumped into the Irish Sea in liquid form, with the gas wastes being discharged to the air, and the solids taken to BNFL's licenced waste dump at Drigg just south of Sellafield.