核動力技術　　Nuclear Power Technology

4.1 基本名詞	4.1 Basic Terms
4.1.1 核動力廠；核能電廠　使用動力反應器產生電能或熱能的動力廠。	4.1.1 Nuclear power station A power station that employs one or more power reactors to generate electric or thermal energy.
4.1.2 核反應器　能維持且控制核分裂鏈反應自行持續進行的裝置，本名詞有時亦適用於能產生且控制核熔合反應的裝置（熔合反應）。「核反應」亦稱「反應」或「堆」。	4.1.2 Nuclear reactor A device in which a self-sustaining nuclear fission chain reaction can be maintained and controlled (fission reactor). The term is sometimes applied to a device in which a nuclear fusion reaction can be produced and controlled (fusion reactor). (Also called reactor or pile.)
4.1.3 動力反應器　主要目的在於產生能量的反應器。此類反應器包括（A）電力反應器；（B）處理熱用反應器；（C）推進反應器。	4.1.3 Power reactor A reactor whose primary purpose is to produce energy. Reactors in this class include; (a) electric power reactors; (b) processheat reactors; and (c) propulsion reactors.
4.1.4 熱中子反應器　主要由熱中子（亦稱慢中子）引發核分裂的反應器。	4.1.4 Thermal reactor A reactor in which fission is induced predominantly by thermal neutrons.
4.1.5 均質反應器　核心不同構成材料的布置，可假設係均勻分布，足以準確描述其中子特性的反應器。	4.1.5 Homogeneous reactor A reactor in which the core materials are distributed in such a manner that its neutron characteristics can be accurately described by the assumption of a homogeneous distribution of the materials throughout the core.
4.1.6 混質反應器　核心不同構成材料的分隔布置情形已達到某一程度，若假設其均勻分布，則不能準確描述其中子特性的反應器。	4.1.6 Heterogeneous reactor A reactor in which the core materials are segregated to such an extent that its neutron characteristics cannot be accurately described by the assumption of homogeneous distribution of the materials throughout the core.
4.1.7 快中子反應器　主要由快中子引發核分裂的反應器。	4.1.7 Fast reactor A reactor in which fission is induced predominantly by fast neutrons. Also called fast neutron reactor.
4.1.8 孳生反應器；孳生器　可分裂材料的生產	4.1.8 Breeder reactor; breeder A reactor which

量多於消耗的反應器，亦就是轉化比大於 1 的反應器。	produces more fissile material than it consumes, i.e. has conversion ratio greater than unity.
4.1.9 核燃料　含有可分裂核種能在反應器中維持核分裂鏈反應的物質，亦包括含有可孕核種能轉化為可分裂核種的物質。	4.1.9 Nuclear fuel A substance containing one or more fissile nuclides capable of maintaining a chain reaction in a reactor; also a substance containing one or more fertile nuclides that can be transmuted into such fissile nuclides.
4.1.10 分裂產物　核分裂後產生的核種，或再由核種經放射性衰變後產生的核種。	4.1.10 Fission products Nuclides produced either by fission or by the subsequent radioactive decay of the nuclides thus formed.
4.1.11 放射性　某些核種具有下列現象之一的特性：（1）從其原子核自發放出粒子或加馬輻射的現象；（2）其原子核具有自發分裂的現象；或（3）其原子核在捕獲軌道電子後放出 X 輻射的現象。	4.1.11 Radioactivity The property of certain nuclides of spontaneously emitting particles, including gamma radiation, from their nucleus, of undergoing spontaneous fission or of emitting X radiation following orbital electron capture by their nucleus.
4.1.12 源物料；饋料（英國名詞）　天然鈾（含有鈾各種天然同位素的混合物）；235 同位素耗乏後的鈾；釷；或以金屬、合金、化合物、或濃縮物形態的上述各物料之任何組合。	4.1.12 Source material; feed material (UK) Uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope 235; thorium; any of theforegoing in the form of metal, alloy, chemical compound, or concentrate.
4.1.13 特種可分裂材料；特種核料　鈽 239；鈾 233；含有濃化 235 或 233 同位素的鈾；含有一種或多種上列成分之任何材料；「特種可分裂材料」一詞不包括源物料。（註）含有「濃化 235 或 233 同位素的鈾」係指鈾中含有 235 或 233 同位素，或兩者都有，這些同位素的含量總和與 238 同位素含量的豐度比，較天然鈾中 235 同位素與 238 同位素的比例為高。	4.1.13 Special fissionable material; special nuclear material Plutonium-239; uranium-233; uranium enriched in the isotopes 235 or 233; any material containing one or more of the foregoing; but the term “special fissionable material ” does not include source material. Note. The term “uranium enriched in the isotopes 235 or 233”means uranium containing the isotopes 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature.

4.1.14 燃料存量　按規範投資於一反應器，一羣反應器，或一整個燃料循環的核燃料總量。	4.1.14 Fuel inventory The total amount of nuclear fuel invested in a reactor, a group of reactors, or an entire fuel cycle, according to specification.
4.1.15 可分裂材料存量　按規範投資於一反應器，一羣反應器，或一整個燃料循環的可分裂材料總量。	4.1.15 Fissile material inventory The total amount of fissile material invested in a reactor, a group of reactors or an entire fuel cycle, according to specification.
4.1.16 燃料循環　核燃料從生產、製造、使用、用過燃料中未耗盡的可分裂材料之再處理回收、再製造、以至再放在反應器中使用等一系列程序。	4.1.16 Fuel cycle The sequence of steps, such as utilisation, reprocessing, refabrication and eventual re-utilisation in reactors, through which nuclear fuel may pass.
4.1.17 核分裂　一個重原子核分裂為質量相差不遠的兩個較小原子核（或偶而分裂為兩個以上）通常伴隨著放出中子與伽馬輻射。	4.1.17 Nuclear fission The division of a heavy nucleus into tow (or, rarely, more) parts with masses of equal order of magnitude, usually accompanied by the emission of neutrons and gamma radiation.
4.1.18 分裂能　原子發生核分裂時釋放的能量。	4.1.18 Fission energy The energy released when an atom is split.
4.1.19 熱中子　與其所存在的介質達到熱平衡的中子。	4.1.19 Thermal neutrons Neutrons in thermal equilibrium with the medium in which they exist.
4.1.20 快中子　動能超過某一定值的中子，在反應器物理中，此值通常選定為 0.1 百萬電子伏。	4.1.20 Fast neutrons Neutrons of kinetic energy greater than some specified value. In reactor physics the value is frequently chosen to be 0.1 MeV.
4.1.21 分裂中子　在核分裂過程中獲得能量的瞬發中子與遲延中子。	4.1.21 Fission neutrons Prompt and delayed neutrons originating in the fission process that have retained their original energy.
4.1.22 瞬發中子　同時伴隨核分裂產生的中子。	4.1.22　Prompt neutrons Neutrons accompanying the fission process without measurable delay.
4.1.23 遲延中子　在核分裂後，經可量度時間的遲延才放出的中子；這些中子係因分裂產物的放射性衰變而放出，或因某些核種受核分裂產生加馬輻射的照射而放出。	4.1.23 Delayed neutrons Neutrons resulting from fission which are emitted with a measurable time delay due to the radioactive disintegration of fission products or which are formed late such as photoneutrons.
4.1.24 臨界狀態　核分裂鏈反應使核分裂能維	4.1.24 Criticality The condition of being critical.

持自行持續穩定進行的狀態。	
4.1.25 核鏈反應　引發核反應的必要媒介（例如中子）為核反應本身所產生，因而促發一系列連續進行的相同核反應。一個核反應直接引發次一代核反應的平均數目，隨著其小於 1，等於 1，或大於 1 的情況，此一系列的核鏈反應遂成為收斂（次臨界）的，自行持續進行（臨界）的，或發散（超臨界）的。	4.1.25 Nuclear chain reaction A series of nuclear reactions in which one of the agents necessary to the series is itself produced by the same reactions Depending on whether the number of reactions directly caused by one reaction is on average less than, equal to, or greater than, unity, the chain reaction is convergent (subcritical), selfsustained (critical), or divergent (supercritical).
4.1.26 緩和　中子與某核種碰撞後，僅有小部份中子被捕獲，而絕大部分中子均因散射而使中子能量減低的現象。	4.1.26 Moderation The reduction of the neutron energy by scattering without appreciable capture.
4.1.27 臨界質量　可分裂材料或具有某一特定濃化度之可分裂材料元件，在某一特定幾何布置及材料組合的環境下，能維持一臨界鏈反應的最低質量。	4.1.27 Critical mass The minimum mass of fissile material or of an element having a specified degree of enrichment in fissile material, with a specified geometrical arrangement, material composition and environment, that can sustain a critical chain reaction.
4.1.28 增殖因數；有效增殖因數同一在一時段內由核分裂產生的中子總數與　時段內經吸收及滲漏而損失的中子總數之比率（k）。 （註）「增殖因數」亦稱「有效增殖因數」，以與「無限（介質）增殖因數」有所分別。	4.1.28 Multiplication factor; effective multiplication factor The ratio, k,of the total number of neutrons produced during a time interval to the total number of neutrons lost by absorption and leakage during the same interval. Note. The “multiplication factor” is also termed the “effective multiplication factor” to differentiate it from the “ infinite multiplication factor”.
4.1.29 臨界　有效增殖因數等於 1 的狀態。	4.1.29 Critical A medium is critical when it has an effective multiplication factor equal to unity.
4.1.30 超臨界　有效增殖因數大於 1 的狀態。	4.1.30 Supercritical A medium is supercritical when its effective multiplication factor is greater than unity.
4.1.31 次臨界　有效增殖因數小於 1 的狀態。	4.1.31 Subcritical A medium is subcritical when its effective multiplication factors is less than unity.

4.1.32 孳生比　大於 1 的轉化比。	4.1.32 Breeding ratio The conversion ratio when it is greater than unity.
4.1.33 轉化比　由可孕材料轉化為可分裂核種的數目與同一時間內可分裂核種消耗數目之比。	4.1.33 Conversion ratio The ratio of the number of fissile nuclei produced from fertile material to the number of fissile nuclei consumed during the same period of time.
4.1.34 倍增時間 （1）一孳生反應器或一羣孳生反應器的一整個燃料循環之燃料存量內，可分裂核種的數量因孳生而增加一倍所需要的時間。 （2）某一孳生反應器之燃料裝置內，可分裂核種的原始數量由於孳生而增加一倍所需要的時間。	4.1.34 Doubling time 1. For the fuel inventory of an entire fuel cycle of a breeder reactor or group of breeder reactors, the time required for the amount of fissile nuclides to be doubled by breeding; 2. For a fuel charge in a given breeder reactor, the time required for the initial amount of fissile nuclides to be doubled by breeding.
4.1.35 反應度　表示核鏈反應介質偏離臨界狀態之程度，通常以參變數 p 代表之，其定義可列如下式： $P=\frac{k-1}{k}$ 式 p=反應度 k=增殖因數	4.1.35 Reactivity The parameter, ρ, giving the deviation from criticality of a nuclear-chain-reacting medium. It is defined as follows: $P=\frac{k-1}{k}$ where ρ=reactivity and k = multiplication factor.
4.1.36 核子安全　避免工廠情況或運轉情況由於放射性污染，游離輻射，或其他型式的能量釋放，危害及人或物的防止措施。	4.1.36 Nuclear safety The prevention of plant conditions or operating conditions that could lead to the endangering of persons or objects by radioactive contamination, ionizing radiation or other release of energy.
4.2 核燃料，製造與再處理	4.2 Nuclear Fuels, Manufacture and Reprocessing
4.2.1 天然鈾　含有天然存在的各種鈾同位素混合物之鈾。	4.2.1 Natural uranium Uranium with the naturally occurring mixture of isotopes.
4.2.2 濃化鈾　鈾中含有可分裂同位素鈾 235 的含量百分比，經增加至高於其天然鈾中的含量。	4.2.2 Enriched uranium Uranium in which the percentage of the fissionable isotope, uranium-235, has been increased above that

	contained in natural uranium.
4.2.3 可孕　核種在吸收中子之後能直接或間接地轉變為可分裂核種者，即視為「可孕」。	4.2.3 Fertile A nuclide is deemed to be fertile when it is capable of being transformed, directly or indirectly, into a fissile nuclide by neutron capture.
4.2.4 可孕材料　核種在吸收中子之後，能直接或間接地迅速轉變為可分裂材料之同位素，尤其是鈾 238 與釷 232；可孕材料有時亦稱為源物料或孳生器材料。	4.2.4 Fertile material Isotopes capable of being readily transformed, directly or indirectly, into fissionable material by the absorption of neutrons, particularly uranium-238 and thorium-232; sometimes called source material or breeder material.
4.2.5 濃化　同一元素的各種同位素混合物中，某一特定同位素的含量百分比，超過其天然混合物中的含量。	4.2.5 Enrichment The fraction of atoms of a specified isotope in a mixture of isotopes of the same element when this fraction exceeds that in the naturally occurring mixture.
4.2.6 濃化程序　使一元素中某一特定同位素的含量百分比增加之程序，已確認的鈾濃化程序包括：氣體擴散法、氣體離心法、噴嘴分離法。	4.2.6 Enrichment process Any process by which the content of a specified isotope in an element is increased. The following are, inter alia, recognized uranium enrichment processes; gas diffusion, gas centrifuging, nozzle separation.
4.2.7 濃化燃料　核燃料的鈾含量內，鈾 233 與鈾 235 同位素的總數量與 238 同位素的豐度比，較天然鈾中 235 與 238 同位素的豐度比為高；或核燃料的鈾含量內曾添加入化學性質不同的可分裂核種。	4.2.7 Enriched fuel Nuclear fuel containing uranium in which the uranium-233 and uranium-235 isotopes are present in amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 236 to the isotope 238 occurring in nature, or to which chemically different fissile nuclides have been added.
4.2.8 燃料再處理　核燃料在反應器內使用過後的處理，以移去分裂產物，並回收可分裂與可孕材料。	4.2.8 Fuel reprocessing The processing of nuclear fuel after its use in a reactor, to remove fission products and recover fissile and fertile material.
4.2.9 耗乏鈾　鈾中所含易分裂的 235 同位素含量，比天然鈾的含量為低；例如濃化廠或某些反應器的殘渣。	4.2.9 Depleted uranium Uranium having less than the natural content of the easily fissionable uranium-235, e.g. the residue from an

	enrichment plant or some reactors.
4.2.10 鈽回收　照射過燃料的再處理過程中鈽的回收。	4.2.10 Plutonium recovery The recovery of plutonium in the reprocessing or irradiated fuel.
4.2.11 鈽再循環　鈽經回收後再放入反應器內使用。	4.2.11 Plutonium recycling The re-use of recovered plutonium in reactors.
4.2.12 可分裂材料；易分裂材料　受慢中子撞擊後，其原子核易於生分裂的核種；例如鈾 235，鈾 233，鈽 239，鈽 241。	4.2.12 Fissile material; fissionable material A nuclide readily fissioned by slow neutrons, for example, uranium-235, uranium-233, plutonium-239, plutonium-241.
4.3 動力反應器，主件與附件	4.3 Power Reactors, Main and Auxiliary Components
4.3.1 壓力管反應器　燃料組件與冷却劑皆分布於許多壓力管內之反應器，這些管子足以承受冷却劑的壓力。	4.3.1 Pressure tube reactor A reactor whose fuel assemblies and coolant are confined in tubes that withstand the pressure of the coolant.
4.3.2 沸水反應器（BWR）使用水為冷却劑與緩和劑，並且讓水在核心內沸騰的反應器。對動力反應器而論，在反應器壓力容器內產生的略帶放射性蒸汽，係直接通至汽輪發電機。沸水反應器需要採用濃化燃料。	4.3.2 Boiling water reactor (BWR) A reactor in which water is used as coolant and moderator and allowed to boil in the core. In the case of a power reactor, the steam produced in the reactor vessel can be supplied directly to a turbo-alternator, but it will be slightly radioactive. It requires enriched fuel.
4.3.3 壓水反應器（PWR）　用水為冷却劑與緩和劑，並使水在高壓力之下以阻止其沸騰，在高溫之下仍能維持液態的反應器。對動力反應器而論，供應汽輪發電機的蒸汽，係間接由熱交換器（蒸汽發生器）產生。壓水反應器需要用濃化燃料。	4.3.3 Pressurised water reactor (PWR) A reactor in which the water coolant and moderator is kept at a high pressure to prevent it readily boiling and hence to keep it liquid. In the case of a power reactor, steam produced by heat exchange with the coolant is supplied to a turbo-alternator. It requires enriched fuel.
4.3.4 氣冷反應器（GCR）　以氣體為冷却劑，並以石墨為緩和劑的反應器。對動力反應器而論，供應汽輪發電機的蒸汽，係間接由熱交換器產生。鎂鋁鈹合金（Magnox）型氣冷反應器採用天然鈾為燃料，至於進步型氣冷反應器（AGR）與高溫氣冷反應	4.3.4 Gas-cooled reactor (GCR) A reactor in which gas is used as coolant and graphite as moderator. In the case of a power reactor, steam produced by heat exchange with the coolant gas is supplied to a turbo-alternator. The gas-cooled reactor, sometimes referred

器（HTGR），則均需要採用濃化燃料。	to as the Magnox type, uses natural uranium; the Advanced gas-cooled reactor (AGR) and the High-temperature gas-cooled reactor (HTGR) require enriched fuel.
4.3.5 重水反應器（HWR）使用重水為緩和劑的反應器。在「重水緩和，氣體冷却反應器」（HWGCR）中，冷却劑為氣體；在「重水緩和，沸騰水冷却反應器」（HWLWR）或「產汽重水反應器」（SGHWR）中，冷却劑為輕水；在「加壓重水緩和與冷却反應器」(PHWR)中，以重水為冷却劑。對動力反應器而論，供應汽輪發電機的蒸汽，有的重水反應器係直接在反應器壓力容器內產生，有的則係間接由熱交換器產生。重水反應器有的只要採用天然鈾為燃料，有的則需要採用濃化鈾為燃料，隨其型式而異。	4.3.5 Heavy-water reactor (HWR) A reactor that uses heavy water as its moderator. The coolant may be gas as in the "Heavy-water-moderated, gas-cooled reactor"(HWGCR), light water as in the "Heavy-water-moderated, boiling light-water-cooled reactor"(HWLWR) or "Steam-generating heavy-water reactor"(SGHWR), or heavy-water as in the "Pressurised heavy-water-moderated and cooled reactor "(PHWR). In the case of a power reactor, steam produced in the reactor vessel or by heat exchange with the coolant is supplied to a turbo-generator. According to the type of plant, natural uranium or enriched fuel are required.
4.3.6 高溫反應器（HTR 或 HTGR） 採用稀有氣體為冷却劑且核心係用陶瓷材料之反應器。反應器的冷却劑出口可在高溫下運轉。通常以石墨為緩和劑，且需要採用濃化燃料。	4.3.6 High-temperature reactor (HTR) (HTGR) A reactor that by the use of noble gases as reactor coolant and by the use of ceramic materials in the reactor core can be operated with high coolant exit temperatures. Graphite is employed as moderator and the reactor requires enriched fuel.
4.3.7 鈉冷却反應器 採用液態納為冷却劑之反應器。	4.3.7 Sodium-cooled reactor A nuclear reactor that uses liquid sodium as coolant.
4.3.8 輕水反應器（LWR） 以純淨的常用水或蒸汽與水的混合體為冷却劑之反應器。為與重水有所分別，故稱常用水為輕水。沸水反應器（BWR）與壓水反應器（PWR）均屬輕水反應器的一例。	4.3.8 Light-water reactor (LWR) A nuclear reactor in which ordinary water, as distinguished from heavy-water, or a steam/water mixture is used as reactor coolant and moderator. The BWR and PWR are examples of light water reactors.
4.3.9 主冷却劑迴路 主冷却劑的循環流動系	4.3.9 Primary coolant circuit A system for

統，用以抽取主熱源（例如反應器核心或圍包）產生的熱量。	circulating a primary coolant that serves to withdraw heat from a primary heat source, e.g. from a reactor core or blanket.
4.3.10 二次冷却劑迴路　二次冷却劑的循環流動系統，用以抽取主冷却劑迴路的熱量。	4.3.10 Secondary coolant circuit A system for circulating a secondary coolant that serves to withdraw heat from the primary coolant circuit.
4.3.11 反應器壓力容器　用以承受實際運轉壓力，並裝放反應器核心與冷却劑的容器。	4.3.11 Reactor pressure vessel A container, designed to withstand a substantial operating pressure, housing the reactor core and reactor coolant.
4.3.12 反應器核心　反應器內含有可分裂材料且容納核分裂鏈反應進行的區域。	4.3.12 Reactor core That region of a reactor that contains the fissile material and is designed to accommodate the nuclear fission chain reaction.
4.3.13 反射體 （1）反應器內放置於核心外圍附近的物體，以便將逃逸的中子散射回核心內。 （2）將入射的輻射反射出去的材料或物體。	4.3.13 Reflector 1. Part of a reactor placed adjacent to the core of the reactor or to another nuclear-chain-reacting medium to scatter some of the escaping neutrons back into the core or medium; 2. A material or a body of material that reflects incident radiation.
4.3.14 燃料元件　反應器中以燃料為主要成分，而且在結構上為最小的分立部分。燃料棒、燃料丸、燃料錠均為燃料元件特有的形狀。	4.3.14 Fuel element The smallest, structurally discrete part of a reactor which has fuel as its principal constituent. Rods, pellets and slugs are characteristic forms of fuel element.
4.3.15 燃料組件　一羣燃料元件的組合體，在反應器核心裝放或卸載燃料時仍保持一整體而不將其折散者。	4.3.15 Fuel assembly A grouping of fuel elements which is not taken apart during the charging and discharging of a reactor core.
4.3.16 緊急冷却系統　反應器正常冷却系統失效（例如，主冷却劑流失）時，用以移除反應器停機後餘熱的冷却系統。	4.3.16 Emergency cooling system A system that in the event of failure of the normal reactor cooling system, e.g. loss of primary coolant, removes the after-heat from the reactor.
4.3.17 燃料冷却裝置；燃料冷却池　充滿冷却	4.3.17 Fuel cooling installation; cooling pond

媒體（例如水或鈉）的大型容器，用以安放用過或已照射過的材料，尤其是自反應器內提出的用過燃料，以讓其放射性逐漸滾減。	(UK) A large container or cell filled with a cooling medium, e.g. water or sodium, in which spent irradiated material, particularly spent nuclear fuel from reactors, is set aside until its activity has decreased to a desired level.
4.3.18 圍阻體噴水系統　降低分裂產物在反應器圍阻體內的濃度，因而在嚴重冷却劑流失事件中可使圍阻體建築物（包封廠房）內部溫度與壓力減低的系統。	4.3.18 Dousing system; containment spray system A system that reduces the fission product concentration in the reactor containment and thus contributes to lowering temperature and pressure in the building in the event of severe coolant losses.
4.3.19 核心注水系統　在反應器正常冷却系統失效（例如，主冷却劑流失）時，注水入核心以移除反應器餘熱的緊急冷却系統。	4.3.19 Core flooding system An emergency cooling system that in the event of failure of the normal reactor cooling system, e.g. loss of primary coolant, removes the after-heat by flooding the reactor core.
4.3.20 核心噴水系統　在反應器正常冷却系統失效（例如，主冷却劑流失）時，向核心噴水以移除反應器餘熱的緊急冷却系統。	4.3.20 Core spray system An emergency cooling system that in the event of failure of the normal reactor cooling system, e.g. loss of primary coolant, removes the after-heat by spraying the reactor core.
4.3.21 燃料裝換機　將燃料組件或其他核心零件裝放入核心內，或自核心內移出的設備。	4.3.21 Fuel charging machine; refuelling machine Equipment for placing in the reactor core or removing from the reactor core fuel assemblies and other core components, and for their associated transport and handing.
4.3.22 硼酸系統　調配、饋送與回收硼酸的系統；此系統的功用在於控制並調節反應器冷却劑的硼酸濃度。	4.3.22 Boric acid system A system for preparing, feeding and recovering boric acid; it serves for controlled modification of the boric acid concentration in the reactor coolant.
4.3.23 反應器圍阻體　完全圍繞反應器周圍，且可承受壓力的包封圍阻系統，即使在反應器事故情況下，其設計仍可防止超出許可數量的放射性物質洩放到控制區之外。	4.3.23 Reactor containment A pressure resistant containing system entirely surrounding a nuclear reactor and designed to prevent the release, even under the conditions of a reactor accident, of unacceptable quantities

	of radioactive material beyond a controlled zone.
4.3.24 緩和劑　不會大量捕獲中子，而可由碰撞散射以減低中子能量的材料。	4.3.24 Moderator A material used to reduce neutron energy by scattering without appreciable capture.
4.3.25 反應器冷却劑　流動通過反應器核心或圍包用以移除熱量的液體或氣體。參閱「主冷却劑」。	4.3.25 Reactor coolant　A liquid or gas which is circulated through or about the core or blanket of a reactor to remove heat. (See also Primary coolant).
4.3.26 主冷却劑　從主熱源（例如反應器核心或孳生器圍包）移除熱量之冷却劑。	4.3.26 Primary coolant A coolant used to remove heat from a primary source, such as a reactor core or breeding blanket.
4.3.27 二次冷却劑　用以移除主冷却劑迴路熱量之冷却劑。	4.3.27 Secondary coolant A coolant used to remove heat from the primary coolant circuit.
4.3.28 反應器保護；反應器保護系統；反應器安全系統　經由各種儀器收集反應器安全上甚具重要性的運轉變動情況，並能促使某一種或某幾種安全措施自動動作以維持反應器在某一限制範圍內運轉的系統。	4.3.28 Reactor protection; reactor protection system; reactor safety system A system that receives information from the various instruments that check the levels of the operating variables essential to reactor security and is able to set in motion one or more safety measures automatically, so as to keep the operation of the reactor within certain limits.
4.3.29 排氣淨化系統；空氣過濾系統　核能電廠控制區空氣中放射性雜物的移除設備。	4.3.29 Air discharge purification system; air filtration system Equipment for removing radioactive impurities from the air in the controlled area of nuclear plants.
4.3.30 屏蔽　使進入某一區域的輻射強度減低之材料。	4.3.30 Shield Protective material intended to reduce the intensity of radiation entering a region.
4.3.31 孳生器元件　以可孕材料為主要成分的反應器內結構上最小的分立部分。	4.3.31 Breeder element The smallest structurally discrete part of a reactor which has fertile material as its principal constituent.
4.3.32 孳生器組件　一羣孳生器組件的組合體，在反應器核心的裝放與卸載時仍維持一整體而不將其拆散者。	4.3.32 Breeder assembly; breeder element assembly A grouping of breeder elements which is not taken apart during the charging and discharging of a reactor core.

4.3.33 圍包　放置於核心周圍或核心內部的可孕材料區；其目的在使可孕材料轉化為可分裂核種。廣義而言「圍包」一詞可用以表示放置目的在於使「非可孕材料」發生轉變的情形。	4.3.33 Blanket A region of fertile material placed around or within a reactor core for the purpose of conversion. By extension the term “blanket” may be used when the purpose is transformation of non-fertile material.
4.3.34 可燃性毒素　故意放置於反應器內的一種（中子）毒素，或稱「中子吸收劑」，由其逐漸燃耗以補償反應度因燃料消耗而逐漸降低的情形。	4.3.34 Burnable poison A neutron absorber (or poison) purposely included in a reactor which by its progressive burnup helps to compensate for loss of reactivity as the nuclear fuel in the reactor is consumed.
4.3.35 反應器控制系統　用以控制反應器每秒鐘核分裂反應的數目，或用以調節反應度，使反應器能達到或維持某一運轉狀態的設備。	4.3.35 Reactor control system Equipment for varying the reaction rate in a reactor or adjusting reactivity to achieve or maintain a desired state of operation.
4.3.36 中子吸收劑　組成反應器的一項零件，中子與其相互作用後幾全為其吸收捕獲而不再產生或釋放自由中子的物料。	4.3.36 Neutron absorber An object, incorporated as a component of a reactor, with which neutrons interact significantly or predominantly by reactions resulting in their disappearance as free particles without production of other neutrons.
4.3.37 控制組件；控制元件　可在反應器內移動的一種組件，其本質在影響反應度，用以控制反應器。控制棒為棒狀的控制組件。	4.3.37 Control member; control element A movable part of a reactor which itself affects reactivity and is used for reactor control. A “control rod” is a control member in the form of a rod.
4.3.38 安全組件；安全元件　單獨動作或與其他控制組件聯合動件，提供負反應度的儲備量，以達到反應器緊急停機之控制組件。	4.3.38 Safety member; safety element A control member which singly or in concert with others provides a reserve of negative reactivity for the purpose of emergency shutdown of a reactor. A “safety rod” is a safety member in which the control member is in the form of a rod.
4.4 動力反應器運轉參數	4.4 Operating Parameters of Power Reactors
4.4.1 燃耗　反應器運轉中經誘發變化的原子核數目，此名詞適用於燃料或其他材料。	4.4.1 Burnup Induced nuclear transformation of atoms during reactor operation. The term may be applied to fuel or other materials.

4.4.2 燃耗比度；燃料照射度　核燃料釋放的總能量除以核燃料原始質量後，所得之商，即核燃料每單位質量所釋放出的能量，通常以百萬瓦日／公噸為單位表示之。	4.4.2 Specific burnup; fuel irradiation level The quotient of the total energy released by a nuclear fuel and the initial mass of the nuclear fuel. It is commonly expressed in megawatt-days per tonne.
4.4.3 停機反應度　反應器按正常運轉步驟降低至次臨界狀態的反應度；停機反應度總是負值。	4.4.3 Shutdown reactivity The reactivity of the reactor when it has been reduced to the sub-critical state by normal operating procedures; shutdown reactivity is always negative.
4.4.4 反應度變值　更動反應器內某一零件的位置，或引進一物件或材料至反應器內，或更動某一運轉變數引起反應度的改變。	4.4.4 Reactivity worth The change in reactivity brought about by altering the position of a reactor component, or of an object or material introduced into a reactor, or by changing an operating variable.
4.4.5 反應度平衡　反應器在某一特定參考狀態下，過剩反應度與反應度變值問之平衡。 （註）特定參考狀態可指反應器核心全為新燃料時的最初起動之冷機狀態（適用於安全分析時應加以考慮的可能情況），但亦可指任何其他運轉狀態。	4.4.5 reactivity balance The balance between excess reactivity referred to a specific reference state of a reactor and the values or reactivity worth that result from the change of reactor state with reference to the reference state. Note. As “reference state” may be chosen the state of the cold reactor with a specific core at the commencement of initial start-up (preferably in cases where safety considerations are concerned), but also any other operating state.
4.4.6 過剩反應度　由調整控制組件隨時可獲得之最大反應度	4.4.6 Excess reactivity The maximum reactivity attainable at any time by adjustment of the control members.
4.4.7 反應度係數　反應度對於會影響其增減的某一特定參數之偏微分（例如，反應度對溫度或壓力之偏微分）。	4.4.7 Reactivity coefficient The partial derivative of reactivity with respect to some specified parameter that influences reactivity (e.g. temperature or pressure).
4.4.8 反應器時間常數反應器週期　反應器內中子通率密度ϕ，按時間的指數曲線遞增或遞減時，其變動倍數達到 e=2.718…所需的時間 T。通常 T 可由下式表示之	4.4.8 Reactor time constant; reactor period The time, T, required for the neutron flux density, ϕ, in a reactor to change by a factor e = 2.718…, when the flux density is

$$\frac{1}{T}=\frac{1}{\phi}\cdot\frac{d\phi}{dt\phi}$$	rising or falling exponentially, Generally, however, T is defined as: $$\frac{1}{T}=\frac{1}{\phi}\cdot\frac{d\phi}{dt}$$
4.4.9 功率密度　反應器核心每單位體積產生的功率。	4.4.9 Power density The　power generated per unit volume of a reactor core.
4.4.10 氙毒性效應；氙效應　由於氙 135 的捕獲中子，致使反應度降低的效應（氙為核分裂產物中的一種，係中子吸收劑，亦即中子毒素）。	4.4.10 Xenon poisoning effect; xenon effect The reduction in reactivity caused by neutron capture in Xenon-135, a fission product which is a nuclear poison.
4.4.11 燃料額定值　反應器核心產生的總功率除以可分裂與可孕核種的原始質量所得之商。有時係除以燃料原始裝載質量所得之商。	4.4.11 Fuel rating The quotient of the total thermal power evolved in a reactor core and the initial mass of fissile and fertile nuclides. Sometimes the quotient is formed with the mass of the initial charge.
4.4.12 餘熱；後續殘熱 （1）對暫停運轉之反應器而言，指剩餘放射性與核分裂所產生之熱。 （2）對從反應器內取出之反應器燃料或反應器組件而言，指剩餘放射性所產生之熱。	4.4.12 Residual heat; after-heat (1) For a shutdown reactor, the heat resulting from residual radioactivity and fission. (2) For reactor fuel or reactor components after removal from the reactor, the heat resulting from residual radioactivity.
4.4.13 直線功率密度　燃料元件產生的熱功率除以該元件長度所得之商。	4.4.13 Linear power density The thermal power generated in a fuel element divided by the length of the element.
4.4.14 設計基準事故　某一設備裝置，按規定在設計階段對保護措施之設計必須加以考慮的事故情況。	4.4.14 Design basis accident An accident in an installation that, by agreement, needs to be taken into account in devising protective measures at the design stage.
4.4.15 最大可信事故　反應器或核能設施，按規定在設計階段對保護措施之設計必須加以考慮的最嚴重事故。	4.4.15 Maximum credible accident The worst accident in a reactor or nuclear energy installation that, by agreement, need be taken into account in devising protective measures at the design stage.
4.4.16 臨界熱通率（偏沸熱通率）　通入液體的局部熱通率密度，隨著加熱於液體的表面溫度（t_s）與整個液體的平均溫度t_m間之差（t_s -t_m）而異。以局部熱通率密度為直坐標，以（t_s -t_m）溫度差為橫坐標所表	4.4.16 Critical heat flux (DNB heat flux) The local heat flux density between a surface and a cooling liquid which gives a maximum in the curve of heat flux density against temperature difference, associated

示的兩者間關係曲線之最高點，相當於由核沸騰轉化為膜沸騰時的局部熱通率密度，稱為臨界熱通率；亦稱為偏離沸騰的熱通率或簡稱偏沸熱通率。	with the change from nucleate boiling to film boiling. (Also called DNB (Departure from Nucleate Boiling) heat flux.)
4.4.17 反應器熱功率　核反應器每單位時間產生的熱量。	4.4.17 Reactor thermal power The heat generated in a nuclear reactor in unit time.
4.4.18 緊急停機；急停　突然將反應器急速停機的行動，以防止或減低某一種危險的情況。	4.4.18 Emergency shutdown; scram The act of shutting down a reactor suddenly to prevent or minimize a dangerous condition.
4.5 輻射防護與環境效應	4.5 Radiation Protection and Environmental Effects
4.5.1 輻射防護　為限制游離輻射對人體有害效應的一切措施，及限制輻射對各種材料誘發化學與物理損害之一切措施。	4.5.1 Radiation Protection All measures associated with the limitation of the harmful effects of ionizing radiation on people and all measures designed to limit radiation-induced chemical and physical damage to materials.
4.5.2 劑量　此為一通用名詞，指被吸收之輻射量或能量，此名詞用於特殊目的時，應加適當區別。 （註）「劑量」一詞，曾與各種具有特定含義之名詞聯用，例如，吸收劑量、曝露、通量等，但應避免混用。	4.5.2 Dose A general term denoting the quantity of radiation or energy absorbed. For special purposes, it must be appropriately qualified. Note. The term “dose” has been used with a variety of specific meanings, such as absorbed dose, exposure and fluence, but such uses are to be avoided.
4.5.3 劑量率　在某一段適當短的時間內，劑量與該段時間之比。	4.5.3 Dose rate The ratio of the dose in a suitably small time interval to the time interval.
4.5.4 吸收劑量　吸收劑量 D，是 $d\bar{\varepsilon}$ 除以 dm 所得之商，其中 $d\varepsilon$ 是游離輻射給與一個體積單元中物質的平均量，dm 是該體積單元物質的質量： $$D=\frac{d\bar{\varepsilon}}{dm}$$ 吸收劑量的專用單位是雷得。 1 雷得=10^{-2}（焦耳）（公斤）$^{-1}$	4.5.4 Absorbed dose The absorbed dose, D, is the quotient of $d\varepsilon$ by dm, where $d\varepsilon$ is the mean energy imparted by ionizing radiation to the matter in a volume element and dm is the mass of the matter in that volume element. $$D=\frac{d\bar{\varepsilon}}{dm}$$ The special unit of absorbed dose is the rad. 1rad=10^{-2}JKG^{-1}
4.5.5 曝露　（1）就空氣中的 X 或加馬輻射而論，在適當小體積單元的空氣中，由光子	4.5.5 Exposure (1) For X or gamma radiation in air, the sum of the electrical charges of all

釋放的所有電子，完全為空氣阻擋時所產生的一種符號離子的總電荷，除以此一體積單元內空氣質量所得之商。通常以侖琴為單位表示之。 （2）因意外事故或故意入射於生物體或非生物體的輻射。 （註）為避免混淆，第（2）項意義應儘量避免。	of the ions of one sign produced in air when all electrons liberated by photons in a suitably small element of volume of air are completely stopped in air, divided by the mass of the air in the volume element. It is commonly expressed in roentgen. (2)The incidence of radiation on living or inanimate material, by accident or intent. Note. To avoid confusion, meaning (2) of the above term should be avoided wherever possible.
4.5.6 射質因數　按原始或二次帶電粒子在水中之能量直線轉移而定的一種因數，依輻射防護界的作法，此因數乘以吸收劑量後所得之值，可用以對曝露於所有游離輻射的人員，按同一尺度，評估其遭受到的照射。	4.5.6 Quality factor A factor depending on the linear energy transfer in water of primary or secondary charged particles, by which absorbed dose is multiplied to obtain, according to practice in the filed of radiation protection, an evaluation on a common scale, for all ionizing radiations, of the irradiation incurred by exposed persons.
4.5.7 等效劑量　吸收劑量、射質因數、分布因數與其他各種調整因數的乘積；此項乘積為評估受曝露人員遭受到照射後的效應所需要，以便將各種不同曝露特性考慮在內。通常以侖目為單位表示之 1 侖目=10^{-2}（焦耳）（公斤）$^{-1}$	4.5.7 Dose equivalent The product of absorbed dose, quality factor, distribution factor, and other modifying factors necessary to obtain an evaluation of the effects of irradiation received by exposed persons, so that the different characteristics of the exposure are taken into account. It is commonly expressed in rems. 1 rem = 10^{-2}JKG^{-1}
4.5.8 最大許可等效劑量（MPDE）　按法規委員會的規定，假設對人體及遺傳不致發生可察覺的傷害機率之條件下，在一定時間內許可接受的最大等效劑量。在一地人口內，不同人群可有不同水準的最大許可等效劑量。此名詞亦可稱為最大許可劑量。（MPD）	4.5.8 Maximum permissible dose equivalent (MPDE) The largest dose equivalent received within a specified period which is permitted by a regulatory committee on the assumption that there is no appreciable probability of somatic or genetic injury. Different levels of MPDE may be set for different groups within a population. Also called Maximum permissible dose (MPD).

4.5.9 人為或天然及人為兩者俱有的游離輻射，對個人、群體或全人口的入射。目前尚無一簡單名詞可確定此一觀念，但可參閱 4.5.5「曝露」一詞的第（2）項意義。	4.5.9 The incidence of man-made or of both natural and man-made ionizing radation on persons, groups of the population or the whole population. No single English term or phrase defines this concept exactly, but see term 4.5.5(2) above.
4.5.10 個人劑量　個人在某一指定期間內其身體或某一特定的重要器官接受到的劑量（曝露、吸收劑量或等效劑量）。	4.5.10 Individual dose The dose (exposure, absorbed dose or dose equivalent) to the body or to a given critical organ received by any individual during a given period of time.
4.5.11 群體或部分人口集合劑量　人口劑量（請參閱 5.5.8）中有關於某一指定「部分人口」的分量。「部分人口」可為某一國家或某一地區的人口，視其目的而異。	4.5.11 Group/sub-population collective dose A component of the population dose (see 5.5.8) related to a given sub-population, which , for some purposes, may be the population of a country or region. The group/sub-population collective dose is measured in rems.
4.5.12 放射性落塵　由於核子裝置爆炸或其事故的釋放，而引起放射性物質在地球表面上的沉積。	4.5.12 Radioactive fall-out The deposition upon the surface of the earth of radioactive substances from the explosion of a nuclear device or from their accidental release.
4.5.13 放射毒性　物體因含有放射性核種與其子核放出的游離輻射而導致的毒性，放射毒性不止起因於放射性核種具有的放射特性，同時亦有因其化學與物理狀態及此元素在人體或器官內新陳代謝而引起的。（註）放射性核種，按照其相對的毒性，可分為四類：高毒性；中毒性（次群 A）；中毒性（次群 B）；與低毒性。	4.5.13 Radiotoxicity The toxicity attributable to ionizing radiation emitted by an incorporated radionuclide and its daughters; radiotoxicity is related not only to the radioactive characteristics of this radionuclide but also to its chemical and physical state and to metabolism of this element in the body or in the organ. Note. According to their relative radiotoxiciyt, radionuclides are classified into four categories: high toxicity; medium toxicity (sub-group A); medium toxicity (sub-group B); and low toxicity.
4.5.14 管制區　人員的個別輻射曝露受到管制的地區，且此地區係在具備適當輻射防護法規知識及負有執行法規責任的專業人	4.5.14 Controlled area An area in which individual exposure of personnel to radiation is controlled and which is under

員監督之下。	the supervision of a person who has knowledge of the appropriate radiation protection regulations and responsibility for applying them.
4.5.15 劑量測定術　吸收劑量、曝露、等效劑量、或其他輻射量的量度或評估。	4.5.15 Dosimetry The measurement or evaluation of the absorbed dose, exposure, dose equivalent or similar radiation quantity.
4.5.16 攝入　由外界環境進入人體的活性量。	4.5.16 Intake The quantity of activity entering the body from the external environment.
4.5.17 游離輻射　由直接或間接游離粒子或兩者的混合組成之任何輻射。 （註）在法規與輻射防護範圍內，可見光及紫外線通常不包括在內。	4.5.17 Ionising radiation Any radiation consisting of directly or indirectly ionising particles or a mixture of both. Note. In the fields of regulation and radiation protection, visible and ultraviolet light are usually excluded.
4.5.18 放射性污染　在某一材料或地區內，含有其厭惡的放射性物質。	4.5.18 Radioactive contamination A radioactive sub-stance in a material or place where it is undesirable.
4.5.19 除污　按化學或物理程序，對放射性污染的去除或減低。	4.5.19 Decontamination Removal or reduction of radioactive contamination, by chemical or physical processes.
4.5.20 最大許可濃度　某一核種在空氣、水或食物中的活性濃度水準，經法規訂定不至對人類健康造成不正當危險度的最大值。	4.5.20 Maximum permissible concentration The level of activity concentration of a nuclide present in air, water or foodstuffs which by legal regulation is established as the maximum that would not create undue risk to human health.
4.5.21 放射性物質的排放　核子設施運轉時在控制條件下放射性物質排放於空氣中或水中。	4.5.21 Discharge of radioactive materials The controlled emission of radioactive materials into the atmosphere or into waters in the operation of nuclear installations.
4.6 放射性廢料處理	4.6 Treatment of Radioactive Wastes
4.6.1 放射性廢料　放射性物質經加工、處理、或使用之後遺留不要的廢料。	4.6.1 Radioactive waste Unwanted radioactive materials obtained in the processing or handing or radioactive materials, or after their utilisation.
4.6.2 放射性廢料管理　以在控制下終極處置為目標之放射性廢料管理，例如包括濃	4.6.2 Radioactive waste management The management of radioactive wastes with a

縮、固化、桶裝密封、在過渡場所的存放。	view to their controlled ultimate disposal, including for example, concentration, solidification, sealing in containers, storage at an intermediate site.
4.6.3 濃縮程序　將大宗放射性廢料體積減少之程序，例如蒸發、沉澱、焚化。	4.6.3 Concentration processes Processes for reducing the bulk of radioactive wastes, e.g. evaporation, precipitation, incineration.
4.6.4 過渡放場所　放射性廢料運往終極處置場所之前，在控制條件下存放的場所。	4.6.4 Intermediate storage site A where radioactive wastes are stored under controlled conditions prior to their transport to a site for ultimate disposal.
4.6.5 固化程序　將放射性廢料結合在緊密固體（例如混凝土、瀝青或玻璃）之內的程序。	4.6.5 Solidification processes Processes for embodying radioactive wastes in compact solid bodies, e.g. concrete, bitumen or glass.
4.6.6 放射性廢料終極置所　放射性廢料在控制條件下不須再作進一步處理的存放場所。	4.6.6 Ultimate radioactive waste disposal site A site at which radioactive wastes are stored under controlled conditions, such that no further handing is required.
4.7 增訂名詞	4.7 Additional Terms
4.7.1 半衰期（放射性的）　在一放射性物質中，原子分裂數達到半數時，以致其活性衰變至原有數值之一半所需的時間。 半衰期（有效的）　在一系統中，特定的放射性同位素，因放射性衰變及其他諸如因生物的消失和燃耗作用，使得放射性同位素之量減半所需的時間。	4.7.1 Half-life (radioactive) The time taken for half of the atoms present in a radioactive substance to disintegrate and hence for its activity to decay to half its original value. Note Depending on the isotope and element concerned half-lives range from less than a millionth of a second to more than a million years. Half-life (effective) The time taken for the amount of a particular radioactive isotope in a system to be reduced to half its value as a consequence of both radioactive decay and other processes such as biological elimination and burn-up.
4.7.2 分離功單位（SWU）　在鈾分離過程中將鈾分為兩股流柱，一為濃縮的，另一為耗乏的，分離功即此過程作功之計算單位。	4.7.2 Separative work unit (SWU) A measure of the effort expended in separating uranium into two streams, the one enriched and the other depleted.

（註）此分離功單位與所用的分離序無關。分離功的單位為公斤。濃縮費用和能量消耗均按每公斤分離功作單位計算之，單位時間所做的分離功數，稱為「分離功率」。	Note The separative work unit is independent of the separation process applied. The unit of separative work is the kilogram and enrichment charges and energy consumption are reckoned per kilogram of separative work performed. Separative work performed per unit time is termed separative power.
4.7.3 重水　氧化氘D_2O。水中之氫原子為同位素氘取代；其在正常水中之存在量約為六千分之一。高純度的重水於某型式核反應器中可用作緩和劑。	4.7.3 Heavy water Deuterium oxide, D_2O. Water in which the hydrogen atoms are represented by the hydrogen isotope deuterium; it is present in ordinary water to the extent of about one part per 6000. In the substantially pure state it is used as a moderator in certain types of nuclear reactors.