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MOX fuel, a mixture of weapon-grade plutonium and natural or depleted uranium, may be used to deplete a portion of the world's surplus of weapon-grade plutonium. A number of reactors currently operate in Europe with one-third MOX cores, and others are scheduled to begin using MOX fuels in both Europe and Japan in the near future.

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Mixed oxide (MOX) fuel provides almost 5% of the new nuclear fuel used today and fuels about 10% of France's fleet. MOX fuel is manufactured from plutonium recovered from used reactor fuel, mixed with depleted uranium. MOX fuel also provides a means of burning weapons-grade plutonium (from military sources) to produce electricity.

MOX, Mixed Oxide Fuel - World Nuclear Association
Mixed Oxide Fuel (Mox) Exploitation and Destruction in Power Reactors: 2: Merz, E.R., Walter, Carl E., Pshakin, Gennady M.: Amazon.com.au: Books

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Mixed oxide fuel, commonly referred to as MOX fuel, is nuclear fuel that contains more than one oxide of fissile material, usually consisting of plutonium blended with natural uranium, reprocessed uranium, or depleted uranium.MOX fuel is an alternative to the low-enriched uranium (LEU) fuel used in the light water reactors that predominate nuclear power generation.

MOX fuel - Wikipedia
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Work started on the MOX Fuel Fabrication Facility (MFFF) in 2007, with a 2016 start-up envisaged. Although based on France's Melox MOX facility, the US project has presented many first-of-a-kind challenges and in 2012 the US Government Accountability Office suggested it would likely not start up before 2019 and cost at least USD7.7 billion, far above original estimate of USD4.9 billion.

US MOX facility contract terminated : Uranium & Fuel ...
MOX fuel, a mixture of weapon-grade plutonium and natural or depleted uranium, may be used to deplete a portion of the world's surplus of weapon-grade plutonium. A number of reactors currently operate in Europe with one-third MOX cores, and others are scheduled to begin using MOX fuels in both Europe and Japan in the near future. While Russia has laboratory-scale MOX fabrication facilities ...

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Mixed oxide fuel (Mox) exploitation and destruction in power reactors. [Erich R Merz; Carl E Walter; Gennady M Pshakin;] -- MOX fuel, a mixture of weapon-grade plutonium and natural or depleted uranium, may be used to deplete a portion of the world's surplus of weapon-grade plutonium.

Mixed oxide fuel (Mox) exploitation and destruction in ...
Uranium-plutonium mixed (MOX) fuel recycling in thermal reactors in Germany dates back to 1966 starting with the insertion of MOX fuel assemblies into a small prototype reactor at Kahl (VAK). In the following years different types of MOX fuel elements including island types were developed and successfully tested in the VAK-reactor and the MZFR-reactor at Karlsruhe.

Use of Mixed Oxide Fuel in Existing Light Water Reactors ...
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Antipov S. et al. (1995) Manufacturing Experience on Pelletized Mixed Oxide (MOX) Fuel for Fast Reactors. In: Merz E.R., Walter C.E., Pshakin G.M. (eds) Mixed Oxide Fuel (Mox) Exploitation and Destruction in Power Reactors. NATO ASI Series (Series I: Disarmament Technologies), vol 2. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-2288-9_21

MOX fuel, a mixture of weapon-grade plutonium and natural or depleted uranium, may be used to deplete a portion of the world's surplus of weapon-grade plutonium. A number of reactors currently operate in Europe with one-third MOX cores, and others are scheduled to begin using MOX fuels in both Europe and Japan in the near future. While Russia has laboratory-scale MOX fabrication facilities, the technology remains under study. No fuels containing plutonium are used in the U.S. The 25 presentations in this book give an impressive overview of MOX technology. The following issues are covered: an up to date report on the disposition of ex-weapons Pu in Russia; an analysis of safety features of MOX fuel configurations of different reactor concepts and their operating and control measures; an exchange of information on the status of MOX utilisation in existing power plants, the fabrication technology of various MOX fuels and their behaviour in practice; a discussion of the typical national approaches by Russia and the western countries to the utilisation of Pu as MOX fuel; an introduction to new ideas, enhancing the disposition option of MOX fuel exploitation and destruction in existing and future advanced reactor systems; and the identification of common research areas where defined tasks can be initiated in cooperative partnership.

Within the next decade, many thousands of U.S. and Russian nuclear weapons are slated to be retired as a result of nuclear arms reduction treaties and unilateral pledges. Hundreds of tons of plutonium and highly enriched uranium will no longer be needed for weapons purposes and will pose urgent challenges to international security. This is the supporting volume to a study by the Committee on International Security and Arms Control which dealt with all phases of the management and disposition of these materials. This technical study concentrates on the option for the disposition of plutonium, looking in detail at the different types of reactors in which weapons plutonium could be burned and at the vitrification of plutonium, and comparing them using economic, security and environmental criteria.

A survey of recent developments in the field of plutonium disposal by the application of advanced nuclear systems, both critical and subcritical. Current national R&D plans are summarized. The actinide-fuelled critical reactors are associated with control problems, since they tend to have a small delayed neutron fraction coupled with a small Doppler effect and a positive void coefficient. Current thinking is turning to accelerator-driven subcritical systems for the transmutation of actinides. The book's conclusion is that the various systems proposed are technically feasible, even though not yet technically mature. The book presents a unique summary and evaluation of all relevant possibilities for burning surplus plutonium, presented by experts from a variety of different disciplines and interests, including the defence establishment. The obvious issue - the non-proliferation of nuclear weapons - is vital, but the matter represents a complex technological challenge that also requires an assessment in economic terms.

This NATO Advanced Research Workshop on Disposal of Weapons Plutonium is a follow-up event to two preceding workshops, each dealing with a special subject within the overall disarmament issue: "Disposition of Weapon Plutonium", sponsored by the NATO Science Committee. The first workshop of this series was held at the Royal Institute of International Affairs in London on 24-25 January 1994, entitled "Managing the Plutonium Surplus, Applications, and Options". Its over all goal was to clarify the current situation with respect to pluto nium characteristics and availability, the technical options for use or disposal, and their main technical, environmental, and economic constraints. In the immediate term, plutonium recovered from dismantled nuclear warheads will have to be stored securely, and under international safeguards if possible. In the intermediate term, the principal alter natives for disposition of this plutonium are: irradiation in mixed oxide (MOX) fuel assemblies in existing commercial light-water reac tors or in specially adapted light-water reactors capable of operation with full cores of MOX fuel .and irradiation in future fast reactors. Another option is to blend plutonium with high-level waste as it is vitrified for final disposal in a geologic repository. In both cases, the high radioactivity of the resulting products provides "self shielding" and prevents separation of plutonium without already developed and available sophisticated technology. The so-called "spent fuel standard" as an effective protection barrier is - quired in either case.

The "VOLGA" conferences, hosted in odd-numbered years by the Department of Theoretical and Experimental Reactor Physics of the Moscow Engineering Physics Institute (MEPhI), are some of the most prestigious technical meetings held in Russia. Traditionally, these conferences present the opportunity for reactor physicists from around the world to gather at MEPhI's holiday camp on the banks of the Volga river (near Tver) to exchange ideas and explore innovative concepts related to nuclear power development. In 1997, NATO became involved in the "VOLGA" meetings for the first time by co-sponsoring "VOLGA97" as an advanced research workshop. This workshop broke with tradition a bit in that the venue was moved from MEPhI's holiday camp to a location nearer Moscow. The workshop program was effectively organized in order to cover a broad range of topics relating to the theme of the meeting. Generally, the papers concerned safety related questions associated with utilizing both weapons-grade and reactor-grade plutonium in the nuclear fuel cycle, including facility requirements, licensing issues, proliferation risks, and a variety of advanced concepts for alternative fuel cycles. The program contained a total of ninety-nine papers presented in five days of sessions.

The history of mankind is a story of ascent to unprecedented levels of comfort, productivity and consumption, enabled by the increased mastery of the basic reserves and flows of energy. This miraculous trajectory is confronted by the consensus that anthropogenic emissions are harmful and must decrease, requiring de-carbonization of the energy system. The mature field of indicator-based sustainability assessment provides a rigorous systematic framework to balance the pros and cons of the various existing energy technologies using lifecycle assessments and weighting criteria covering the environment, economy, and society, as the three pillars of sustainability. In such a framework, nuclear power is ranked favorably, but since emphasis is often placed on radioactive wastes and risk aversion, renewables are usually ranked top. However, quantifying the severity of the consequences of nuclear accidents on a rough integral cost basis and balancing severity with low core-damage accident probabilities indicates that the average external cost of such accidents is similar to that of modern renewables, and far less than carbon-based energy. This book formulates the overall goal and associated unprecedented demanding criteria of taming nuclear risks by excluding mechanisms that lead to serious accidents and avoiding extremely long stewardship times as far as possible, by design. It reviews the key design features of nuclear power generation, paving the way for the exploration of radically new combinations of technologies to come up with “ revolutionary ” or even “ exotic ” system designs. The book also provides scores for the selected designs and discusses the high potential for far-reaching improvements, with small modular lines of the best versions as being most attractive. Given the ambition and challenges, the authors call for an urgent increase in funding of at least two orders of magnitude for a broad international civilian “ super-Apollo ” program on nuclear energy systems. Experience indicates that such investments in fundamental technologies enable otherwise unattainable revolutionary innovations with massive beneficial spillovers to the private sector and the public for the next generations.

This book is a compilation of major reprint articles on one of the most intriguing phenomena in modern physics: the quantum Hall effect. Together with a detailed introduction by the editor, this volume serves as a stimulating and valuable reference for students and research workers in condensed matter physics and for those with a particle physics background. The papers have been chosen with the intention of emphasizing the topological aspects of the quantum Hall effect and its connections with other branches of theoretical physics, such as topological quantum field theories and string theory. The contents include sections on integer effect, fractional effect, effect of global topology, effective theories, edge states and non-Abelian statistics.

A world list of books in the English language.

Following recent disarmament agreements, the Russian Federation and the USA have declared part of their stockpiles of weapons-grade plutonium as a surplus to their national defense needs. This material needs to be disposed of, and one of the suggested means of doing so is burning it in existing reactors and transforming the material into spent fuel. The experience in these two countries with mixed oxide fuel (MOX) is either dated or scarce. Several European countries and Japan, however, have acquired much experience in using MOX fuel in reactors which was shared at this important workshop. This publication presents the workshop results which reviewed existing technical information from the civil nuclear power programmes that are beneficial to weapons-grade plutonium disposition. It also proposes concrete actions that could help expedite this process in the near future.

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