MOX SHIPMENTS, NEW ZEALAND, AND NUCLEAR ARMS CONTROL

CSS
STRATEGIC BRIEFING PAPERS
Volume 2: Part 4: February 2000.

In September 1999, two ships carried cargoes of Mixed Oxide (MOX) nuclear fuel through the Tasman Sea on their way to Japan. In the complete reprocessing process, plutonium is first recovered in Britain or France from spent Japanese reactor fuel. In oxide form the plutonium is then mixed with uranium oxide (hence the name Mixed Oxide) and made into fuel pellets. The reprocessing is carried out by British Nuclear Fuels Plc (BNFL) and the French company, COGEMA. The shipments can follow any one of three possible routes from Europe to Japan, and have in the past included pure plutonium oxide and high-level nuclear waste.

Only minor modifications are required to load a commercial power-generating nuclear reactor with MOX fuel instead of uranium fuel. Japan started reprocessing as part of its desire to ensure its energy security and promote nuclear fuel recycling, instead of 'once through' fuel use, for effective energy utilisation. Nuclear power now accounts for 36% of Japan's electricity generation. Some critics argue that MOX fuel will increase the chances of critical accidents. Europe has, however, used MOX fuel successfully for thirty years. Japan also has plans for breeder reactors that will give it an independent closed fuel cycle. The breeder programme has experienced accidents and delays.

The extra cost of MOX fuel is a matter of substantial contention, with various studies producing different results, and including debate over the value of energy security and waste disposal issues. Reviews of contracts in Germany, Belgium, Spain, Sweden and Switzerland will put the reprocessing industries in France and Britain under pressure. Japan's future plans, in light of its recent nuclear accident and the intention of the power company KEPCO to return a shipment of MOX fuel, will be watched with great interest. Commercial imperatives and adverse public/political pressure could conceivably shutdown the reprocessing industry in Britain and France.

Objections to the MOX fuel shipments have focused on three aspects. Firstly, critics have pointed out the dangerous nature of plutonium and the potential of even a small amount released in an accident to cause contamination. However, the MOX fuel pellets are in ceramic form and are sealed inside zirconium fuel rods. The rods are carried inside forged steel containers that comply with standards set by the International Maritime Organization. The containers can withstand water pressure to a depth of over 5000 metres, a drop onto a solid surface from a height of nine metres, and temperatures up to 800 degrees for 30 minutes. So while the chances of an accident producing a leakage are very small, regional states have argued that they have the right to insist on zero risk. The tension between protection of the marine environment and freedom of navigation is a topic of debate in international law.

Secondly, critics such as the Nuclear Control Institute in the US have argued that the security measures for the two freighters, operated by Pacific Nuclear Transport Limited (PNTL), are inadequate. Concern has been expressed that, despite the two ships having 30mm cannon and armed police on board, they might be vulnerable to attack by terrorists. A previous shipment of plutonium in 1992 was accompanied by a Japanese naval ship, and a 1988 US Department of Defense report argued that a dedicated "surface combatant" was required as an escort throughout the voyage. Given US rules of origin of the enriched uranium used by Japan, MOX fuel transport must comply with the 1988 US-Japan agreement on nuclear cooperation. However, the US State Department has approved the current security arrangements for the ships where they will essentially escort each other.

Thirdly, critics of the fuel shipments argue that MOX fuel is a proliferation risk. Plutonium can be used as the fissile material in a nuclear weapon with the necessary quantities varying (starting at around 8 kg). Reactor-grade plutonium is less than ideal but is still a useable fissile material for making a bomb. The International Atomic Energy Agency (IAEA) classifies MOX fuel as "direct use" material that can be used for the manufacture of nuclear weapon components without transmutation or further enrichment. Separation of the plutonium from the MOX fuel requires a chemical process and the IAEA considers that, with

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the necessary equipment and expertise, conversion time would be 1 to 3 weeks. The 1999 MOX shipment reportedly contained 446 kg of plutonium.

There are three ways that MOX shipments could be a proliferation risk. Firstly, the ships could be hijacked, which is probably beyond the capabilities of non-state groups such as terrorists. Secondly, the fuel could be stolen from a storage facility in Japan or Europe, another difficult proposition, but not impossible. Thirdly, a state involved in the reprocessing programme could use the plutonium at some point in the future and breakout of arms control treaty obligations.

The broader debate revolves around the compatibility of plutonium reprocessing with nuclear arms control goals of states such as New Zealand. There is general consensus in the international community that the next building block for nuclear arms control is a treaty that will ban the military production of fissile material, such as plutonium, to limit proliferation. In 1998, the Conference on Disarmament, the multilateral body that has negotiated arms control agreements such as the Chemical Weapons Convention and the Comprehensive Test Ban Treaty, agreed to establish a committee to negotiate a Fissile Materials Cut-Off Treaty (FMCT).

There was no agreement in the Conference on Disarmament in 1999 to re-establish the committee to allow negotiation to proceed. Exploratory talks have indicated that some states want to reduce existing stockpiles of military fissile material and want a FMCT that is not just about cutting off future production. Disagreement also exists over how a FMCT will deal with the civilian nuclear power industry. MOX fuel is not produced for nuclear weapons, making it technically outside the scope of a FMCT which seeks a ban on the production of fissile material for "nuclear weapons or other nuclear explosive devices".

However, there is now, for the first time, more plutonium in the civilian nuclear industry than in military programmes. The continuation of civilian plutonium reprocessing raises the question of whether it is counter to the 'spirit' of a future FMCT. Supporters of nuclear disarmament argue that the goal is to ensure that no more plutonium is produced that might be available for nuclear weapons in the future. Advocates of more moderate nuclear arms control argue that it would be impossible to secure agreement on a comprehensive FMCT that banned civilian reprocessing and that a more pragmatic approach would be to ensure that the necessary safeguards are in place to prevent diversion from civilian to military use. The limitations of nuclear disarmament are acknowledged even by those who advocate it. As the authors of the model Nuclear Weapons Convention point out: "the viability of nuclear disarmament in a world with nuclear energy… [depends] on the degree of surveillance, accounting and control of nuclear facilities that those affected are willing to tolerate".

The IAEA already manages a verification regime under the Treaty for the Non-Proliferation of Nuclear Weapons in which the civilian nuclear power industry is monitored. Although criticised for being imperfect, this regime would likely be the starting point for a FMCT. Supporters of a comprehensive FMCT argue that the Chemical Weapons Convention has reinforced the precedent for arms control agreements to regulate, restrict and inspect civilian industry. However, there is no precedent in arms control for the banning of civilian production. The Chemical Weapons Convention places stringent conditions on the civilian chemical industry but does not totally ban the production of any particular chemicals.

New Zealand would support a treaty that places restrictions on fissile material for both potential nuclear-weapon states and existing nuclear-weapon states and would do so on the basis that there is effective verification to ensure that there is no diversion of civilian stocks for military purposes. New Zealand is concerned about MOX fuel shipments from a non-proliferation perspective but public perceptions of the safety issues are a stronger determinant of current policy.

Reprocessing countries are increasing global stocks of plutonium so dealing with military stocks of plutonium is only part of the issue. Further progress towards nuclear disarmament will need to find a solution that satisfies all countries involved. Countries with military stocks of plutonium (such as China) would not accept restraints if other countries (such as Japan) were permitted to maintain civilian stockpiles. Constraining plutonium reprocessing is problematic, and would probably prevent near-term progress on a FMCT. But, it might be considered as a legitimate goal for nuclear arms control given that plutonium separated from MOX can be used in nuclear weapons.

ISSN 1175-1452