

# Global Threat Reduction Programme

Eighth Annual Report 2010



Progress during 2010 on the UK's global threat reduction programme to address nuclear, radiological, chemical and biological risks

Eighth Annual Report **2010**

## Foreword

We will refocus critical programmes for building security capacity overseas (such as the G8 Global Partnership-led Global Threat Reduction Programme) on the areas that represent the most serious risks to the UK: prioritising the security of nuclear, biological and chemical materials and expertise

*Strategic Defence and Security Review October 2010*

The current threat to the UK from international terrorism is judged to be severe. The UK's National Security Strategy recognises the threat of a chemical, biological, radiological or nuclear attack by international terrorists as one of its highest priorities. The Global Threat Reduction Programme therefore remains a key element in the UK's work to ensure that chemical, biological, radiological and nuclear materials and expertise are out of reach to terrorist groups or hostile states and this report details the progress made on the Global Threat Reduction Programme projects in the past year.

The UK's position is supported by international recognition of the global nature of the threat. At the Muskoka Summit in June 2010 G8 Leaders identified nuclear security, biological security, scientist engagement, and support to UNSCR1540 as key issues for the G8 Global Partnership to address. Leaders welcomed the progress made by the Global Partnership since its launch at the Kananskis Summit in 2002, and reaffirmed their commitment to work cooperatively to secure all vulnerable nuclear material in four years. President Obama has identified nuclear terrorism as the 'most immediate and extreme threat to global security' and in April hosted a Nuclear Security Summit in Washington, DC. In May, the Nuclear Non Proliferation Treaty Review Conference reached agreement to revitalise the treaty, the world's key nuclear agreement.

During 2010 the UK continued to work with partners in programmes addressing the highest priority proliferation risks identified by the Global Partnership. The Government published a new National Security Strategy setting out the objectives for UK security, and the Strategic Defence and Security Review which describes how the strategy will be implemented. The result is a cross-Government approach to meeting our security aims, which concentrates resources where they can be most effective.

The UK will not be able to achieve its security objectives without strong international cooperation. Looking forward, the Global Threat Reduction Programme will complete its current commitments to secure material and expertise and will focus future efforts on nuclear security and biological security, and where the UK's unique skills and expertise add most value.



**Alistair Burt MP**

*Alistair Burt*

Parliamentary Under Secretary of State, Foreign and Commonwealth Office



**Charles Hendry MP**

*Charles Hendry*

Minister of State, Department of Energy and Climate Change



**Nick Harvey MP**

*Nick Harvey*

Minister of State for the Armed Forces, Ministry of Defence

# Executive Summary

Eighth Annual Report 2010

2010 has seen significant progress towards completing UK commitments to the Global Partnership

<b>Foreword</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
<b>1. Background</b>	<b>8</b>
1.1 UK Strategic Context	9
1.2 The International Context	10
1.3 GTRP Management and Oversight	11
<b>2. Progress during 2010</b>	<b>16</b>
2.1 Nuclear Programmes	17
2.2 Chemical Weapons Destruction and Biological Non-Proliferation Programmes	27
<b>3. Annexes</b>	<b>30</b>
A. Funding	31
B. Glossary	35

The Global Threat Reduction Programme is the UK's main programme of overseas assistance to countering the proliferation of Chemical, Biological, Radiological and Nuclear materials. Projects within the Global Threat Reduction Programme are derived from two principal policy drivers:

- Countering the threat to the UK or its interests arising from terrorist or state acquisition of chemical, biological, radiological and nuclear weapons of mass destruction through preventative upstream work;
- Delivering the UK's commitments to the Global Partnership against the Spread of Weapons and Materials of Mass Destruction.

The Global Partnership's original focus and the Global Threat Reduction Programme's successes to date have been primarily within Russia and the Former Soviet Union. Alongside international partners, the UK has made a substantial contribution to: the destruction of chemical weapons; dismantlement of decommissioned nuclear submarines; disposition of fissile materials; and the employment of former weapons scientists.

The spread of weapons and materials of mass destruction is a recognised global challenge, spanning issues from physical protection of materials and scientist reemployment to illicit trafficking, export controls and security of dual use materials (especially biological). With substantial improvements already delivered in Russia and the Former Soviet Union, the geographic reach of UK work continues to widen.

Both the UK's national priorities and the focus of the Global Partnership have evolved since 2002. In late 2010, the UK revised its National Security Strategy and conducted a Strategic Defence and Security Review. These have set the future direction for the Global Threat Reduction Programme as a programme focussed on nuclear security and biological security.

The UK will continue to support G8 partners in seeking to ensure an extension of the Global Partnership beyond its currently scheduled end date of 2012, alongside a refocusing of the programme on the highest global threats.

This report summarises the achievements of the UK Global Threat Reduction Programme in 2010.

These include:

- Successful completion of a major multi-year joint US-UK-Kazakhstan project to transfer spent nuclear fuel from the decommissioned plutonium-producing BN-350 nuclear power plant at Aktau in Kazakhstan to safe and secure storage on the other side of the country at Semipalatinsk.
- Completion of the UK's largest physical protection project to date delivered in collaboration with the International Atomic Energy Agency, providing security improvements to the Armenian nuclear power plant.
- The establishment of tapered sustainability support for previously completed nuclear security infrastructure projects in Russia, and completion of a further such project within the Global Threat Reduction Programme's Nuclear Security Programme.
- Development of the Global Threat Reduction Programme's Nuclear Security Workshop, which has gained the International Atomic Energy Agency's endorsement and for the first time was delivered overseas (in Kazakhstan).
- Moving into the final phase of the Closed Nuclear Cities/Centres Partnership scientist redirection programme, which remains on track to meet all objectives by its planned closure date in 2012.

- Completion of milestones in the shielding of radioactive material and construction of new facilities at the spent nuclear fuel storage facility at Andreeva Bay in North West Russia.
- Continued contributions to improved safety and security by the Global Threat Reduction Programme's biological non-proliferation programme, primarily in Georgia and Tajikistan.

The risk from the proliferation of materials and knowledge relevant to chemical, biological, radiological and nuclear weapons of mass destruction remains severe, and can only be tackled through international collaborations such as the Global Partnership. The UK will continue to work closely with international partners to address those risks of most concern to the UK: the security of nuclear and biological materials and relevant expertise.

Over the next two years the Global Threat Reduction Programme will complete the UK's involvement in major projects within Russia: Andreeva Bay; Closed Nuclear Cities/Centres Partnership; and nuclear security infrastructure projects. The Global

Threat Reduction Programme will also complete commitments at Aktau, Kazakhstan, and remain committed to working on nuclear and radiological security with international partners, including US Threat Reduction Programmes and the International Atomic Energy Agency. The biological non-proliferation programme will continue to be developed in the Former Soviet Union and elsewhere, in close cooperation with key international partners primarily the US, Canada and the EU.

Reflecting the cross-departmental nature of counter-proliferation work, the Global Threat Reduction Programme is managed by a cross-Government team with the Foreign and Commonwealth Office as policy lead, the Department of Energy and Climate Change managing the nuclear and radiological portfolio and the Ministry of Defence managing biological and chemical projects.

Electronic copies of this report can be obtained from the Global Threat Reduction Programme web page at: [http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/nuclear/nonprolif/global\\_threat/annual\\_report/annual\\_report.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/nuclear/nonprolif/global_threat/annual_report/annual_report.aspx)



Fuel from the decommissioned plutonium-producing BN-350 nuclear power plant at Aktau, Kazakhstan, in a safe and secure storage facility at Semipalatinsk.



15 November 2010. The final cask containing spent nuclear fuel from Aktau arrives at Semipalatinsk.

# 1

# Background

Eighth Annual Report 2010

<b>Foreword</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
<b>1. Background</b>	<b>8</b>
1.1 UK Strategic Context	9
1.2 The International Context	10
1.3 GTRP Management and Oversight	11
<b>2. Progress during 2010</b>	<b>16</b>
2.1 Nuclear Programmes	17
2.2 Chemical Weapons Destruction and Biological Non-Proliferation Programmes	27
<b>3. Annexes</b>	<b>30</b>
A. Funding	31
B. Glossary	35

# 1. Background

The UK Government attaches the highest priority to national security. International terrorism and the proliferation of weapons of mass destruction continue to be among the greatest threats faced by the UK

## 1.1 UK Strategic Context

The Government recognises that the security of the nation is the first duty of government. One of its earliest actions, in May 2010, was to establish the National Security Council (NSC) to oversee all aspects of National Security and ensure a strategic and coordinated approach to this most important of issues. In October, the NSC published the UK's new National Security Strategy (NSS) [http://www.direct.gov.uk/prod\\_consum\\_dg/groups/dg\\_digitalassets/@dg/@en/documents/digitalasset/dg\\_191639.pdf](http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191639.pdf), which 'outlines our reappraisal of Britain's role in the world, the risks to our security and their implication for the UK'. It gives top priority to countering the threat from terrorism at home and overseas. The UK Strategic Defence and Security Review (SDSR) [http://www.direct.gov.uk/prod\\_consum\\_dg/groups/dg\\_digitalassets/@dg/@en/documents/digitalasset/dg\\_191634.pdf](http://www.direct.gov.uk/prod_consum_dg/groups/dg_digitalassets/@dg/@en/documents/digitalasset/dg_191634.pdf), published alongside the NSS, sets out the ways and means by which the UK will deliver the objectives set out in the NSS.

The NSS assesses that there are three tiers of national security priority; tier one being that group of risks which the NSC considered 'to be of the highest priority for UK national security'. Top of tier one is 'International terrorism affecting the UK or its interests, including a chemical, biological, radiological or nuclear (CBRN) attack by terrorists'. Top of tier two is 'An attack on the UK or its Overseas Territories by another state or proxy using chemical,

biological, radiological or nuclear (CBRN) weapons'. The NSS thus identifies countering the proliferation of CBRN materials and related knowledge as one of its highest priorities.

The National Security Strategy sets out two clear objectives (i) to ensure "a secure and resilient UK by protecting our people, economy, infrastructure, territory and ways of life from all major risks that can affect us directly"; and (ii) to shape "a stable world, by acting to reduce the likelihood of risks affecting the UK or our interests overseas". "We do this by applying all our instruments of power and influence to shape the global environment and tackle potential risks at source". It also sets out in its National Security Risk Assessment a clear prioritisation of those potential threats we face.

The SDSR sets out the UK's approach to mitigating this risk, which seeks to be proactive in strengthening multilateral initiatives to counter proliferation. It also seeks to make best use of resources through targeted preventative upstream actions building capacity and capability overseas to secure CBRN materials and expertise, including continued support of the Global Threat Reduction Programme (GTRP).

The SDSR established the principle of lead ministers responsible to the NSC for coordination of priority areas of work to deliver national security tasks. Counter-proliferation work is coordinated by the Foreign Secretary.

Although managed as a counter-proliferation programme, the GTRP also contributes to the UK's international Counter-Terrorism Strategy. Known as CONTEST, this sets out a comprehensive strategy for dealing with the terrorist threat and has four elements:

- **Pursue** – to stop terrorist attacks.
- **Prevent** – to stop people becoming terrorists or supporting violent extremism.
- **Protect** – to strengthen our protection against terrorist attack.
- **Prepare** – to mitigate the impact of an attack where it cannot be stopped.

The GTRP makes a significant contribution to overseas Protect work.

## 1.2 The International Context

Proliferation of materials and expertise relevant to CBRN weapons is of concern and recognised in bilateral and multilateral treaties, conventions, resolutions, partnerships and joint working memoranda. United Nations Security Resolution 1540 (UNSCR 1540) requires the adoption and enforcement of controls to prohibit non-state actors from acquiring the ability to deliver a CBRN attack. The nuclear Non-Proliferation Treaty (NPT) limits the proliferation of nuclear weapons whilst supporting the peaceful uses of nuclear technologies. The Biological and Toxin Weapons Convention (BTWC) prohibits the development, production, and stockpiling of biological and toxin weapons. The Chemical Weapons Convention (CWC) outlaws the production, stockpiling and use of chemical weapons.

The GTRP was established to deliver the UK's contribution to the Global Partnership (GP) against the Spread of Weapons and Materials of Mass

Destruction but importantly it also provides assistance that enables countries to meet their international commitments, including to the CWC, BTWC and UNSCR 1540.

## G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction

The GP was launched at the 2002 G8 summit held in Kananaskis, Canada. G8 leaders pledged up to \$20 billion over 10 years to support cooperative programmes addressing non-proliferation, disarmament, counter-terrorism and nuclear safety. Initially focussed on the Soviet legacy of the Cold War, priority concerns were: destruction of chemical weapons, dismantlement of decommissioned nuclear submarines, disposition of fissile materials, and employment of former weapons scientists.

The UK pledged up to \$750 million and by March 2011 will have spent £344 million. One of the achievements of the GP has been its ability to attract support from non-G8 countries. To date some 23 countries have contributed to the GP either through their own programmes or through other GP members' programmes. The UK has coordinated its efforts with a number of GP partners to maximise the effectiveness of the GTRP. For example, the UK has managed funding contributions totalling over £60 million from Belgium, Canada, Czech Republic, EU, Finland, France, Ireland, The Netherlands, New Zealand, Norway, Nuclear Threat Initiative (NTI) and Sweden to support GTRP projects on Chemical Weapons Destruction in Russia. The UK has also managed £1.9 million contributed by Norway for submarine dismantlement and the Arctic Military Environmental Cooperation (AMEC) programme; and £0.357 million from Sweden towards projects at Andreeva Bay, North West (NW) Russia.

Since 2002 the GP has achieved substantial progress in all areas identified as initial priorities. In

accordance with the Kananaskis principles, work has also taken place in other areas, including the physical protection of nuclear and radiological materials, combating illicit trafficking, improving export controls, and biological security.



Temporary Process and Contamination Control Modules to be used during installation of biological shielding over the SNF storage tank DSU 3A at Andreeva Bay, NW Russia.

The current GP mandate of 10 years ends in 2012. The UK supports the extension of the GP beyond 2012 and whilst working to complete commitments, is already expanding its scope geographically. The UK considers that the threat posed by the proliferation of CBRN material and expertise remains high and supports the future focus of the GP to be on nuclear security, biological security, and knowledge proliferation, in line with the UK's own security priorities. The UK also remains fully committed to the importance of a coordinated and multilateral approach and continues to strengthen its cooperation with the International Atomic Energy Agency (IAEA).

The UK has been working with Kazakhstan since 2002 and supports its intention to join the GP.

### Global Partnership in 2010 – Canadian Presidency

The Canadian G8 Presidency included non-proliferation as a priority issue and within that, the GP as an important G8 commitment. A number of high-profile events including the April 2010 Washington Global Nuclear Security Summit and the NPT Review

Conference gave momentum and focus to G8 discussions on non-proliferation.

At the Muskoka Summit in June 2010 G8 Leaders reaffirmed their commitment to the GP, recognised the work undertaken since 2002 and looked to the future of the GP, stating:

*“We recognize the continuing global threats before us, and we all recognize the importance of continuing our joint efforts as partners to address them in the years ahead. Toward that end, we ask our senior experts to evaluate the results of the Global Partnership to date, as a point of departure for developing options for programming and financing beyond 2012, focusing on nuclear and radiological security, bio security, scientist engagement and facilitation of the implementation of UN Security Council Resolution 1540, as well as the potential participation of new countries in the initiative.”*

The Summit reaffirmed commitments to complete priority projects in Russia and Ukraine although did not reach agreement to extend the lifetime of the GP.

### 1.3 GTRP Management and Oversight

In addition to refocusing the GTRP on the UK's top security priorities of nuclear security and biological security, the SDSR introduced strengthened governance and coordination arrangements for UK counter-proliferation activities. These include the establishment of a 'Critical Capabilities Pool' (CCP), overseen by a new committee, chaired by the Cabinet Office and reporting to the National Security Council, from which new GTRP projects can be funded. Funds to complete the existing GTRP commitments over the next two years will continue to be provided by the Department of Energy and Climate Change (DECC), who will continue to manage the GTRP's nuclear and radiological portfolio; the Ministry of

Defence (MOD) will continue to manage biological and chemical projects.

Project management, technical assistance and associated risk management are provided to DECC by companies appointed through competitive tender. In 2010 three new contracts, for the period 1 April 2010-31 March 2014, were awarded to the following companies after an international competitive tender in accordance with EU and Government procurement rules.

the GTRP's Nuclear Security Workshop and nuclear security projects in Russia.

Two previous contracts that ran until 31 March 2010 have been varied to allow completion of previously committed projects, which will close out completely in 2012.

**HTSPE Ltd with AEA plc** are managing to closure the Closed Nuclear Cities/ Centres Partnership (CNCP) in Russia and Former Soviet Union (FSU) countries.



Brokk 90 Robot used for work on Dry Storage Units at Andreeva Bay, NW Russia.

**Nuvia Ltd** provide nuclear non-proliferation project management services for the GTRP work in NW Russia, in particular at Andreeva Bay.

**Crown Agents** provide specialist banking support and nuclear non-proliferation project management services for nuclear security projects including the GTRP's spent radioactive sources project in Ukraine.

**Babcock International (formerly VT Group and VT Nuclear Services Ltd)** provide nuclear non-proliferation project management services including

**Nuvia Ltd** are managing the closure of UK work at Aktau, Kazakhstan.

Most of the MOD's biological non-proliferation projects in the FSU are being implemented as "Partner Projects" through the **International Science and Technology Centre (ISTC)** in Moscow. Technical and scientific input is generally provided by expert UK agencies, including the **Defence Science and Technology Laboratory (Dstl)**, **Health Protection Agency (HPA)** and **Veterinary Laboratories Agency (VLA)**.



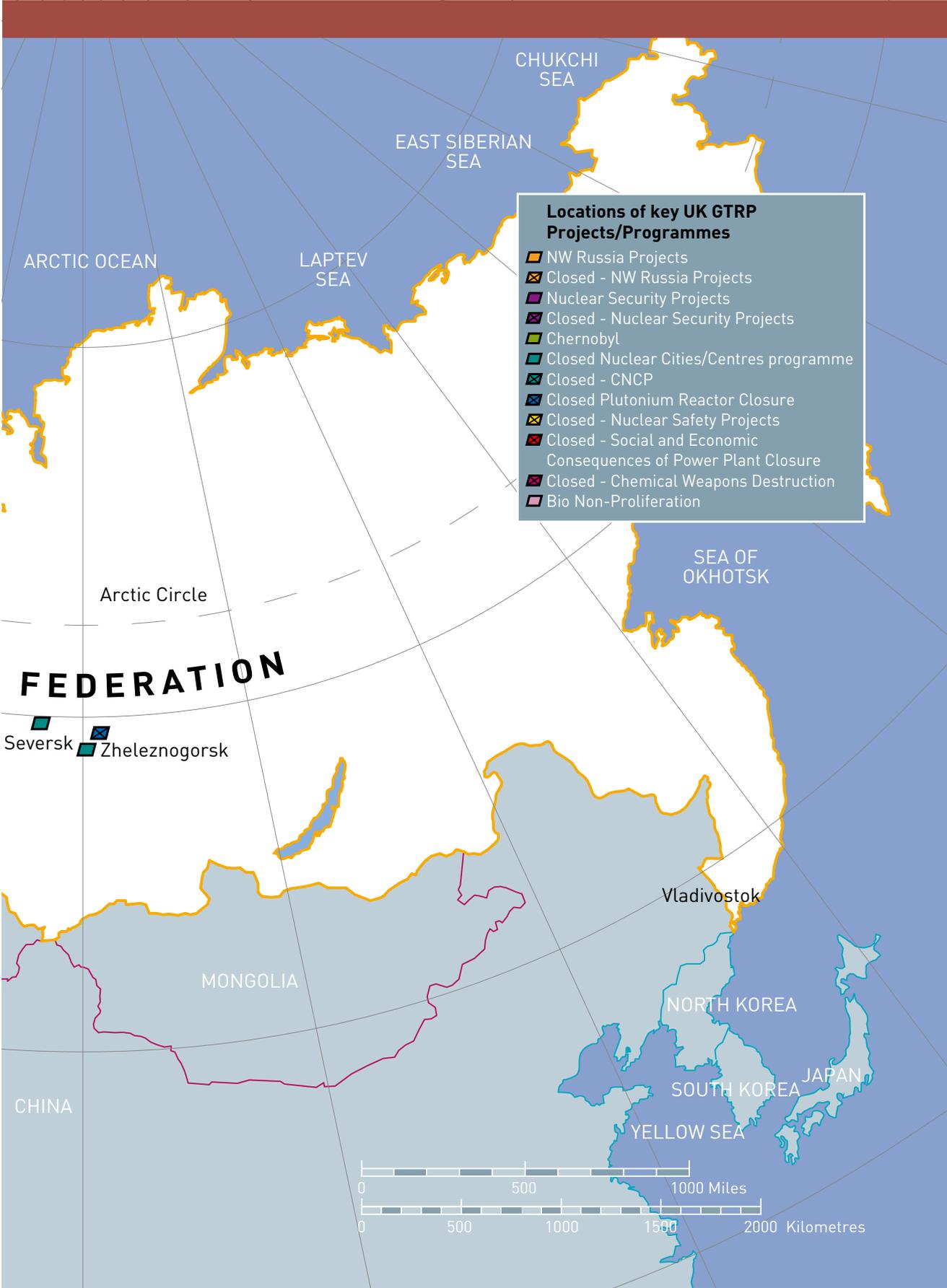
Installation of the biological shielding over SNF in DSU 2A at Andreeva Bay, NW Russia.



Staff at the Institute of Nuclear Physics in Tashkent at work on a CNCP funded project manufacturing  $^{153}\text{Sm}$ -oxabiphor, a preparation used in palliative cancer treatments.

Location of key UK GTRP projects and programmes





Schematic map for illustrative purposes only. Not to precise scale.

# 2

## Progress during 2010

Eighth Annual Report 2010

<b>Foreword</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
<b>1. Background</b>	<b>8</b>
1.1 UK Strategic Context	9
1.2 The International Context	10
1.3 GTRP Management and Oversight	11
<b>2. Progress during 2010</b>	<b>16</b>
2.1 Nuclear Programmes	17
2.2 Chemical Weapons Destruction and Biological Non-Proliferation Programmes	27
<b>3. Annexes</b>	<b>30</b>
A. Funding	31
B. Glossary	35

## 2. Progress during 2010

The UK remains committed to completing existing projects and will continue to support overseas nuclear security and biological security projects

The GTRP's mature portfolio of projects made solid progress in 2010, building on the excellent record of achievement in previous years. Programmes scheduled to complete in 2012, coincident with the end of the current G8 GP ten year programme, entered their final phase and over the next two years the UK will look to ensuring their successful completion to time and to cost.

Following the Government's revised NSS and 2010 Spending Review the GTRP has been refocused and prioritised. In particular, the UK will be closing out its involvement at Andreeva Bay over the financial year 2011/12 once existing commitments have been met. The UK remains committed to GTRP's nuclear security and biological security programmes and the contribution they make to the UK's security.

### 2.1 Nuclear Programmes

Currently, the GTRP's principal nuclear programmes are:

- Closed Nuclear Cities/Centres Partnership (CNCP) – scientist redirection programme creating sustainable jobs for former nuclear weapons workers in the FSU.

The UK has previously completed the dismantlement of four nuclear submarines in NW Russia (one co-funded with Norway) and has been a partner in AMEC (Arctic Military Environmental Cooperation) which has been dormant since 2009. The UK's Nuclear Safety Programme closed out in 2009.

#### Andreeva Bay

The former Soviet naval base at Andreeva Bay in NW Russia is about 40 kilometres from the Norwegian border. The site has around 30 tonnes of highly radioactive Highly Enriched Uranium (HEU) spent nuclear fuel (SNF) in one of the world's largest stockpiles. The SNF is in an advanced state of corrosion and stored in unsuitable and hazardous conditions in three Dry Storage Units (DSUs), originally built as storage tanks for liquid radioactive waste. Getting the site into a fit state to enable safe retrieval of the SNF, repacking and onward transportation for reprocessing at the Russian reprocessing facility at Mayak, has posed, and continues to pose, a huge challenge: the infrastructure necessary for retrieval operations to commence will not be in place until 2014. The UK has been supporting Russia in this task since 2002, in conjunction with other international partners: Norway, Sweden, Italy, the European Bank of Reconstruction and Development (EBRD) and the European Commission. Close coordination between the international donors has been an

- Andreeva Bay – contributing to international efforts to retrieve and secure the fissile material stored there.
- Plutonium-producing reactor at Aktau, Kazakhstan – working in collaboration with US partners to ensure irreversible shut-down and removal of fissile material to safe and secure storage.
- Nuclear Security Programme – UK programme promoting physical security of nuclear and radiological material around the world.

essential part of making progress with work of this complexity.

Since 2002, the UK has funded a number of works to address the most urgent tasks associated with removal of the SNF, including the construction and installation of infrastructure for the protection of workers and the environment from radioactive contamination and a temporary weatherproof cover over the least protected of the DSUs.

In 2010, the UK provided some £8 million to ongoing projects at Andreeva Bay for: the installation of biological shielding over the DSUs to improve the radiological conditions; construction of a decontamination and maintenance facility; and the design and preparatory work for construction of the DSU enclosure, which will be the main SNF retrieval and handling facility.

Following the Government's Spending Review in October 2010, the UK made the decision that it will not be possible to fund new work at Andreeva Bay and that all existing commitments must be closed out by March 2012. The EBRD-managed Nuclear Window of the Northern Dimension Environmental Partnership (NDEP) has agreed to fund the construction of the DSU enclosure and SNF retrieval equipment. The UK made a contribution of £8.67 million to the Nuclear Window of NDEP in March 2010.

Key achievements in 2010:

#### ■ Design and regulatory review of the DSU enclosure

The DSU enclosure will be the main facility for SNF retrieval and handling at Andreeva Bay. Its design was completed in August 2010 and successfully passed State Expert Review by Russian regulatory bodies in December 2010. Preparation of the design documentation was co-financed with Sweden. In addition, concepts for SNF retrieval and handling processes within the DSU enclosure have been

prepared and will now be taken forward under funding from NDEP, along with the detailed design and construction of the DSU enclosure.

#### ■ Installation of biological shielding over the DSUs

The UK has been working for some time to install steel shielding over the three DSUs. This is a critical project since the shielding very significantly reduces the radiation levels that workers are exposed to making future work safer, quicker and cheaper. The shielding over DSUs 2A and 2B was largely completed in 2009.



Andreeva Bay – an SNF canister inside DSU 2A. This shows the advanced state of corrosion, debris over the spent fuel assemblies and no shielded canister lid.

The radiation level in the third and final DSU 3A is significantly higher than in DSU 2A and 2B. In addition, concrete beams suspended over the DSU, sealed with bitumen and asphalt, make the installation of the biological shielding a complex technical challenge requiring the use of remotely-controlled robots and specialist equipment to avoid excessive radiation exposure for workers. Trials have now been completed and work to remove the concrete beams is expected to begin by April 2011 with all 320 tonnes of steel shielding in place by the end of 2011. Once complete, radiation levels above DSU 3A will be reduced by a factor of several thousand.

### ■ Construction of the maintenance and decontamination facility

The UK project to construct and equip the non-radiological areas of this facility is substantially complete. UK-funded design of the ventilation system and equipment for the areas that will be used to decontaminate the SNF retrieval equipment is also well advanced.

### SNF Interim Storage Facility and Site Security Upgrades at Atomflot, NW Russia

The £23 million UK programme to build an interim SNF storage facility for SNF from the icebreaker supply vessel "Lotta" at the Atomflot site near

Murmansk, supply fifty SNF storage casks, and improve the site's physical protection systems was completed in 2008. Since then, Russia has been filling and transferring the casks from the "Lotta" to the store, a process that is due to complete in 2012. By the end of 2010, 26 filled casks had been transferred.

The UK's remaining objectives are to ensure that the store is fully utilised as intended and that the security improvements remain fully operational and are sustained to IAEA standards. In collaboration with the US Department of Energy (DOE), the UK in 2010 began contributing to a modest three year programme to ensure the sustainable operation of UK- and US-funded

### IAEA Contact Expert Group for International Radioactive Waste Management Projects in Russia

The Contact Expert Group (CEG) was established under the auspices of the IAEA in 1996. Its role is to promote cooperation between all countries and international organisations that provide assistance to Russia in handling accumulated SNF and Radioactive Waste (RW) resulting from past activities in production of nuclear weapons, use of nuclear energy for peaceful and military purposes and nuclear arms reduction. Information on CEG activities is available on the CEG web page:  
<http://www.iaea.org/OurWork/ST/NE/NEFW/CEG/index.html>

In order to provide information support to the CEG members, the CEG Secretariat maintains a database of international projects with Russia in CEG-related areas. The database is publicly available at the website:  
<http://cegdb.iaea.org>

During 2010, the CEG held two workshops. The first, held in the Netherlands in February, covered the existing and planned international projects at Andreeva Bay, and also discussed sunken submarines and other objects containing SNF and RW in the Arctic seas.

The second workshop in Vladivostok in May addressed the issues of final elimination of the nuclear legacy in the Far East of Russia.

The CEG held its 24th plenary meeting in October in Ottawa, where it reviewed and discussed members' programmes in Russia. CEG Members also discussed the plans for joint cooperation under the GP and beyond 2012.

CEG members also held an additional technical meeting on reprocessing of SNF from the Gremikha former naval base in NW Russia in Rome last December. Sweden will host the 25th CEG plenary meeting in September 2011 marking the 15th anniversary of CEG.

# 2

security improvements at Atomflot, principally through the provision of maintenance training to Atomflot personnel.

## Plutonium-Producing Reactor at Aktau, Kazakhstan

The BN-350 reactor at Aktau was a Soviet prototype liquid-metal-cooled fast breeder reactor which operated between 1973 and 1999. The reactor was considered a major proliferation risk because of its potential to produce weapons-grade plutonium and the significant quantities of accumulated fissile material on site. The UK has been working at Aktau for some years with the US DOE and Kazakh authorities to address these risks. Irreversible shut-down was achieved at the end of 2009 with the passivation of the primary sodium cooling circuit.

The focus during 2010 has been on completing the passivation of residual sodium to reduce future fire and environmental pollution risks, and on the safe and secure removal from the site of SNF containing plutonium and HEU. Important progress has also been made with UK-funded projects to immobilise the contaminated caesium traps stored at the reactor and to undertake radiation surveys to ensure that all significant quantities of fissile material have been accounted for.

The US DOE has been leading the project to transport the SNF (which the US estimate is sufficient for 775 nuclear bombs) to safe and secure storage at the Semipalatinsk Test Site in North East Kazakhstan in collaboration with Kazakhstan, the UK and IAEA. The UK has been responsible for cask loading, dispatch and receipting operations. Successful completion of this project in November 2010 marked a major non-proliferation milestone. A ceremony held at the test site was attended by David Moran, HM Ambassador to Kazakhstan and Anne Harrington, Deputy Administrator for Defense Nuclear Nonproliferation, US DOE National Nuclear Security Administration (NNSA).



David Moran, HM Ambassador to Kazakhstan (second right), Anne Harrington, Deputy Administrator for Defense Nuclear Nonproliferation (NNSA) to US DOE (sixth from right) and Dr Fiona Harrison, Head of DECC GTRP (second left) at the Semipalatinsk close out ceremony, November 2010.

Throughout 2010, progress has been maintained on all other UK-funded projects at Aktau:

- Completion of design and manufacture of equipment for the **Caesium Trap Disposition and Residual Sodium Treatment** project, aimed at immobilising the highly radioactive caesium traps in a lead matrix for long-term storage.
- The **Radiation Survey of the BN-350 Hot Cell** has been completed.
- The UK continued to provide technical assistance with plans for putting the US DOE funded **Sodium Processing Facility (SPF)** into operation. This facility was built to transform the radioactive sodium coolant into an alkaline solution suitable for eventual solidification in the **Geocement Stone Facility (GSF)**. Earlier UK- and US-funded projects produced the plant design for the GSF. Construction of the GSF remains unfunded at present and, as a result, it is proposed to operate the SPF to produce sodium hydroxide in solid form as a RW suitable for interim storage on site.

The UK programme of work at Aktau will close out in 2011: the key remaining project is that of examining the **Fuel Storage Ponds** now that the SNF has been removed, to confirm the absence of significant amounts of nuclear material needing recovery or special protective measures.

### Shut-down of Soviet Plutonium-Producing Reactors in Siberia

In 2005 the UK contributed £11 million to the US-led Elimination of Weapons Grade Plutonium Production Programme to support the irreversible shut-down of the last operating Soviet plutonium-producing reactor, one of three located in the closed nuclear cities of Zheleznogorsk and Seversk in Siberia. The UK contribution was instrumental in persuading other donors

such as Canada, the Netherlands, New Zealand, Finland and the Republic of Korea to contribute to the programme. Russia announced the shut-down of the final reactor at the Global Nuclear Security Summit in April 2010. All former Soviet plutonium-producing reactors are now closed.

### Nuclear Security Programme

The UK's Nuclear Security Programme is focussed on the UK's highest security priority of improving the security of fissile and other nuclear and radiological material. The programme supports improvements to physical protection at facilities to bring them into line with IAEA standards, and provides training and capability-building support for security personnel, to strengthen security procedures and culture.

### Residual Sodium Treatment and Passivation of Coolant Circuits

After the main BN-350 coolant circuits were drained of liquid sodium, hundreds of kilos of so-called 'residual sodium' remained that could not be drained out. Residual sodium treatment at BN-350 was undertaken over the years 2006 – 2010. By the end of 2009 sufficient sodium had been processed in the primary circuit to confirm irreversible shut-down. Further processing and circuit examinations during 2010 have confirmed the effectiveness of the carbonation process in passivating the internal surfaces of the coolant circuits.

The BN-350 passivation results have been reported at conferences in the UK and the US. The carbonation process used is under consideration for the passivation of the coolant circuits of the UK's fast reactors at Dounreay and data from BN-350 has been made available to the Dounreay operators. This is an example of how GTRP experience can be fed back to assist domestic projects within the donor country.



Removal of an Intermediate Heat Exchanger for examination of the effect of carbonation from passivation of the primary cooling circuit at BN-350.

**Physical Protection Projects in Russia.** 2010 saw the completion of the UK-led physical protection project at the Moscow Institute of Physics and Engineering, funded jointly with other donors.

The UK has now completed all but one of its seven original projects to upgrade the physical protection of civil nuclear sites in the Russian Federation. The focus is now on completing the final project and ensuring the long-term effectiveness and impact of UK-funded improvements. To this end, the UK has developed a package of sustainability support comprising:

- Funding of a two week maintenance course at the Interdepartmental Special Training Centre in Obninsk to equip maintenance staff at the institutes with the skills required to maintain the installed physical protection equipment.
- A three-day 'asset management workshop' designed to help site security managers develop an understanding of the issues associated with implementing an effective maintenance regime at their sites, including ensuring a reliable funding stream.
- Provision of an initial inventory of strategic spares and tapered support over three years to sustain that inventory at an acceptable working level.

These transitional arrangements are intended to help sites take on full responsibility for ongoing maintenance of physical protection improvements provided by the UK, so that the security benefits (and UK objectives) continue to be realised in the long term.

**Physical Protection Projects outside Russia.** The UK is leading a project, to be co-funded by the UK and EU, to design and construct a centralised store for spent radioactive sources in Ukraine, at the Vector

Complex within the Chernobyl Exclusion Zone. Its objective is to reduce the threat of illicit trafficking by providing safe and secure long-term storage for the large quantities of spent radioactive sources currently held at a number of obsolete facilities across Ukraine. The project is being implemented in close coordination with other international donors' initiatives supporting upgrades in radiological source management and transportation in Ukraine. The project has been somewhat delayed due to changes to the Ukrainian regulatory approvals process, but a contract is expected to be signed early in 2011 to enable construction to begin in financial year 2010/11.



Dr Fiona Harrison alongside the General Director Yuri Dragunov opening the "Victor Romashin Memorial" security upgrades at Nikiet in Moscow.

### Collaboration with the IAEA via the Nuclear Security Fund

The IAEA Nuclear Security Fund (NSF) was established in 2002 to support, among other things, the implementation of nuclear security activities that seek to prevent, detect and respond to nuclear terrorism. In 2009, the IAEA approved a new Nuclear Security Plan for the period 2010-2013. The GTRP has been working with the IAEA's Office of Nuclear Security for a number of years

## Nuclear Security Best Practice Workshops

**Security culture plays an essential role in underpinning the effectiveness of physical security systems. The GTRP Workshop is now endorsed by the IAEA and delivered under the banner 'Foundations of the Physical Protection of Facilities Holding Nuclear or Radioactive Material – Best Practice Workshop'.**

The objective of the workshop continues to be raising awareness of the critical importance of a strong security culture in the protection of nuclear materials. The workshop aims to provide a framework that encourages delegates to discuss and share their experiences, and reflect on their local challenges from a different perspective. Drawing on IAEA recommendations and UK best practice the workshop:

- Explains the challenge faced by nuclear facilities in terms of potential risks and security threats.
- Describes and discusses the practical arrangements and cultural issues which need to be addressed in order to ensure good security.
- Demonstrates and explains current UK best practice.
- Discusses relevant international and national regulatory frameworks.
- Provides an opportunity for delegates to consider their own experience with the aim of identifying areas for improvement.

The workshops are supported by the UK Civil Nuclear Constabulary and include a site visit hosted by Dungeness A nuclear power plant, currently undergoing decommissioning by Magnox South Ltd on behalf of the Nuclear Decommissioning Authority.

The workshop had previously always been delivered in the UK but in 2010 one workshop was conducted in Kazakhstan, at the invitation of the Kazakhstan Atomic Energy Committee (KAEC). This event was a success and the UK is exploring making use of overseas delivery to help support the development of in-country training capabilities.

on nuclear security projects funded via UK contributions to the NSF. The UK made a £4 million contribution to the NSF in 2009 which has supported an expansion of the UK collaboration with the IAEA on a number of projects delivering significant improvements to nuclear security worldwide. These funds have also provided support to the IAEA's global nuclear security training activities.

**Armenia.** In March 2010 Tomihiro Taniguchi, IAEA Deputy Director General for Safety and Security and Charles Lonsdale, HM Ambassador to

Armenia attended a ceremony to mark the completion of work funded by the UK through the NSF, which upgraded the perimeter fence at the Armenian Nuclear Power Plant near Yerevan. At a value of €1.58 million, this was the largest physical protection project undertaken to date by the IAEA.

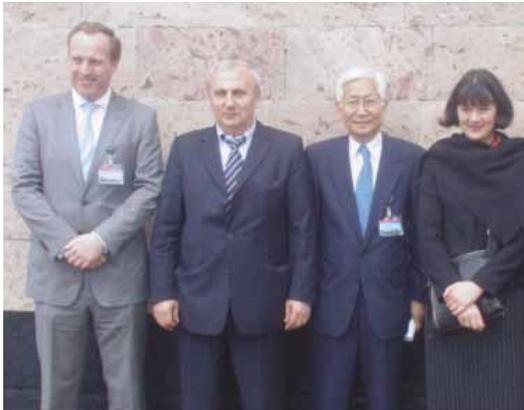
**Tajikistan.** In collaboration with the IAEA, the UK has been supporting major security infrastructure upgrades at the radioactive waste repository near Fayzabad, Tajikistan, located about 100 km east of Dushanbe, and 200 km north of the border with Afghanistan.

# 2

Progress during 2010

The UK is working closely with the IAEA and the Tajik nuclear regulatory authority on the delivery of this project. The first phase of work, installing upgraded physical protection measures has been completed. A second phase of work, comprising construction of a new radioactive source storage building, is due to complete in late spring 2011.

**Moldova.** A small project to upgrade physical protection at the RW disposal facility in Chisinau, Moldova was completed in December 2010. This project focused on repairing the perimeter and equipping it with lighting, CCTV and intrusion detection equipment.



HM Ambassador to Armenia, Charles Lonsdale (Left) and IAEA Deputy Director Tomihiro Taniguchi (second from right) mark the successful completion of physical protection work at Yerevan

## International Work to assist Remediation at Chernobyl

Progress has continued on international decommissioning and safety programmes at Chernobyl. The detailed design and the regulatory reviews have been completed for the SNF storage facility project, being conducted by Holtec International. A decision has been made to proceed with the final construction of the facility and the manufacture of special double walled canisters in which to store the SNF. The facility is scheduled to be completed in 2014, with the final canisters delivered in 2017.

The detailed design for the new steel shelter structure to enclose and seal off the damaged Unit 4, to be built by the Novarka consortium, has been completed and the licensing package submitted for review by Ukrainian regulators. Site clearance work at Chernobyl in preparation for construction of the shelter structure was completed in 2010 and preparation of the steel arch assembly zone has started.

It is anticipated that further funding will be required from the international community for the completion of the works at Chernobyl, and the UK has continued to discuss with G8 nations

## Collaboration with the US Department of Energy's National Nuclear Security Administration (NNSA)

**In March 2009 the UK contributed £4 million to NNSA's Global Threat Reduction Initiative (GTRI) to support specific priority radiological and nuclear security projects including:**

- GTRI's HEU minimization programme, with the UK making contributions to projects in Kazakhstan, Uzbekistan, Belarus and Ukraine to down-convert research reactors running on HEU to run on Low Enriched Uranium (LEU), and remove any remaining HEU fuel.
- GTRI's radiological source security programme, with the UK making contributions to projects to improve the physical protection of highly radioactive sources in hospital oncology units and research establishments in Asia, including Nepal and Sri Lanka where all upgrades are now complete, and Bangladesh where work is due to complete in 2011.

and other major donors the need for future contributions. Ukraine has announced that it will hold events in April 2011 to mark the 25th anniversary of the Chernobyl Accident and it is expected that a pledging event will be held in conjunction with the anniversary activities.

### Closed Nuclear Cities/Centres Partnership (CNCP)

Since the break-up of the Soviet Union in the 1990s, Closed Nuclear Cities (ten centres of nuclear weapons research, production and maintenance) in Russia, and a number of nuclear institutes in FSU states (Ukraine, Kazakhstan, Uzbekistan, Armenia, Georgia and Belarus) have seen large-scale job losses and a lack of investment. The GP's original priorities acknowledged the proliferation risk posed by unemployed former Soviet nuclear weapons scientists, technicians and support personnel. The UK's Closed Nuclear *Cities* Partnership was established in Russia to counter this risk by supporting the creation of alternative job opportunities for such personnel; it was subsequently extended as the Closed Nuclear *Centres* Partnership, to nuclear institutes in other FSU states.

The CNCP programme seeks to generate alternative lasting non-weapons related employment for scientists and technicians with proliferation sensitive skills, access and knowledge. It also aims more broadly to promote sustained social and economic development in the closed nuclear cities/centres to provide an environment where the individuals concerned can see a secure future for themselves and their families. The quantitative objective for CNCP is the creation of 3000 sustainable jobs, at least 55% of which will be for former weapons workers.

CNCP achieves its aims through four instruments: investment grants; focussed training; partnership building with UK companies; and local economic development.

**Investment Grants.** CNCP has provided support to the development of start-up businesses and, crucially, funding to get them started. Awarding of investment grants ceased in April 2010, to allow support to be provided to the beneficiaries over the final two years of the programme. At April 2010, CNCP had awarded grants totalling £20 million to 166 projects, expected to create up to 3,269 jobs, 2,084 of which are for former weapons workers.

**Training.** CNCP has provided language, business skills and focussed technical training. During 2010 CNCP ran specialised seminars on business opportunities in the fields of radiation processing services and in health related technologies. Another training tool has been the operation of study tours to the UK for senior cities/centres personnel. CNCP successfully ran two such tours in 2010, demonstrating business development practices in the UK. This year has also seen the first two smaller study tours to the UK to share best practices between specialists in particular technology fields (in this instance isotope production for medical applications and radiation treatment).

**Partnership Building.** The study tours and other programme contacts also help to create partnerships between closed cities/centres and UK businesses and institutes, such as that established between the Cambridge based TWI Ltd and the Institute of Nuclear Physics in Alatau, Kazakhstan to deliver non-destructive testing services in the Kazakh market.

**Economic Development.** CNCP seeks to build on the structure of business development agencies and commercialisation units, promoting a self-sustaining network that will seek out new sources of funding, attract investment through partners and contacts made, and ultimately support new business opportunities.

In the final two years of CNCP, the focus is on successful completion of the grant projects, and, just as importantly,



"INP 5 hot chamber" at the Institute of Nuclear Physics, Almaty.

### **CNCP in Kazakhstan**

In 2010 CNCP has supported investment projects in Almaty (Alatau) and Kurchatov City, near Semipalatinsk, with funding and technical and project management support. 18 investment projects have been supported in total, and these are expected to create 243 jobs by 2012.

The projects approved in 2010 include:

- Supporting the international accreditation of an analytical laboratory at the Institute of Nuclear Physics (INP), Alatau, to build up their service business in sample analysis for commercial clients
- Calibration services for medical X-ray equipment at the Institute of Radiation Safety and Ecology, Kurchatov
- Production of thermocouples, used for measuring high temperatures, particularly in refining and process industries and in power plants, at the Institute of Atomic Energy, Kurchatov

In addition the programme is providing expert assistance and training, for example, to teams from the Institutes in both cities who are establishing businesses in the growing field of energy efficiency in Kazakhstan.

During 2010, the CNCP team was invited to have a dialogue with the Ministry of Industry and New Technologies, exploring ways to make use of the CNCP approach to science commercialization at a national level. These discussions and activities have led to concrete areas of cooperation, with co-funding from Kazakh public funds.

on the creation of a sustainable infrastructure that will outlive CNCP. The two annual CNCP conferences held in 2010 reinforced this message, with all participants discussing how their particular centres planned to continue the CNCP format of job creation beyond April 2012.

In July 2010, DECC signed a Memorandum of Understanding with the Department of Foreign Affairs and International Trade Canada (DFAIT). This enabled the transfer of C\$1.5 million to the CNCP programme, in a 'piggyback' arrangement that has been widely and successfully used throughout the GP. DFAIT and DECC have agreed a separately identifiable Canadian programme of work that will enable further job creation and help support the establishment of a sustainable infrastructure.

## 2.2 Chemical Weapons Destruction and Biological Non-Proliferation Programmes

### Assistance with Destruction of Chemical Weapons

UK assistance with construction and procurement tasks in support of the Chemical Weapon (CW) destruction facility at Shchuch'ye is now complete. Most of the projects managed by the UK were completed in 2008, using funding provided by the UK, Canada, France and some ten other international donors. The final two items of equipment procured by the UK were delivered in December 2010. Canada is procuring virtually identical equipment to that procured by the UK at Shchuch'ye, for a CW destruction facility at Kizner and the UK is sharing its experience and providing technical support.

The UK leads, with US support, in arranging an annual Chemical Weapons Demilitarisation Conference. The 13th conference took place in Prague, Czech Republic in May 2010 attended by representatives from 17

different countries and international organisations. The next conference will take place in Interlaken, Switzerland in May 2011.

Green Cross was founded in 1993 by former President Mikhail Gorbachev as a mechanism to encourage dialogue on environmental matters across different sectors. The MOD has supported Green Cross for a number of years. Now that the UK assistance programme is complete and Russia has destroyed nearly 50% of its stockpile, MOD funding for Green Cross has ended.

### Biological Non-Proliferation Programme

At the 2010 G8 Summit in Muskoka, Leaders agreed that biological security should be one of the main foci for the GP beyond 2012. Five "pillars" of work to strengthen global biological security were identified which are consistent with the aims of the UK GTRP:

- 1)** Secure and account for materials that represent biological proliferation threats;
- 2)** Develop and maintain appropriate and effective measures to prevent, prepare for and respond to the deliberate misuse of biological agents;
- 3)** Strengthen national and global networks to rapidly identify, confirm and respond to deliberate biological attacks;
- 4)** Reinforce and strengthen biological non-proliferation principles, practices and instruments; and
- 5)** Reduce proliferation risks through the advancement and promotion of safe and responsible conduct in biological sciences.

During 2010, the UK programme has progressed in three main areas: continuing to build on existing work; identifying and taking forward options for contributing in priority areas to the Canadian and US programmes; and developing new mechanisms

# 2

Progress  
during 2010

for working with international organisations. Coordination with key partners has remained a high priority across the programme, in particular with Canada, the US (Departments of State and Defense) and the EU.

The GTRP has maintained a focus on work in the FSU, in particular Tajikistan and Georgia.

Staff from the Institute of Preventative Medicine in **Tajikistan** have travelled to the UK to receive training from the HPA in molecular diagnostic techniques for dangerous pathogens causing haemorrhagic fever. Staff at the Institute of Zoology and Parasitology have received training from the London School of Hygiene and Tropical Medicine in diagnostic techniques used to detect malaria in mosquitoes. A brucellosis project at the Tajik Republican Center for State Sanitary Epidemiological Surveillance has been approved, and the work plan is currently being finalised with assistance from the VLA. A further regional project linking this Tajik laboratory with others in Kyrgyzstan examining trans-border diseases is being co-funded with Canada.

In **Georgia**, the HPA has continued to work with the National Centre for Disease Control as part of a joint disease surveillance project run in collaboration with the US Department of Defense. The UK Food and Environmental Research Agency (FERA) has continued to work closely with the Institute of Phytopathology of Georgia (formerly the Institute of Plant Immunity) towards development of a modern plant disease molecular diagnostics capability, and sustainable integration of the institute into the Georgian agricultural sector.

In **Kyrgyzstan**, Canada plans to build a new human and animal health facility in which the national collection of dangerous pathogens will be housed and where all work on such agents will be carried out. The UK has agreed in principle to contribute some £2 million for key items of equipment.

The UK programme is also developing a portfolio of biosafety training. HPA has provided the first of a series of courses in **Azerbaijan**, and further in-country training events are planned in 2011. A high-containment laboratory managers' course will be piloted in **Ukraine** in 2011.

These projects have continued to use the world class expertise of Dstl, HPA, VLA, FERA, and other UK organisations. They are helping to improve biosafety and biosecurity at FSU institutes, strengthen national and regional health security by building capacity in disease diagnosis, detection and control, and strengthen international scientific networks and cooperation. The projects also provide wider health-related benefits through better understanding of natural disease threats and how to respond to them.

In 2010 MOD signed a Memorandum of Understanding with the **US Department of State**, enabling the UK to contribute to their Biological Engagement Program and thus achieve impact in countries and regions which are a priority for the UK with minimal overhead costs. The GTRP also contributed funding for a number of events in support of the BTWC, including preparations for the five-yearly Review Conference in 2011.

In developing the UK's biological non-proliferation programmes, it has become clear that there are opportunities to work with other international organisations at the "Health/Security Interface", in particular the World Health Organization, World Organisation for Animal Health, and the Food and Agriculture Organisation. Both the UK and Canada held initial meetings with these organisations in 2009, and during 2010 have worked with them to identify specific areas of work in which GP members can contribute through these organisations to fund projects which meet common health and security objectives. The UK plans to sign Memoranda of Understanding with each of these organisations.



Biosafety training delivered by HPA in Republican Veterinary Laboratory in Baku, Azerbaijan

# 3

## Annexes

Eighth Annual Report 2010

<b>Foreword</b>	<b>3</b>
<b>Executive Summary</b>	<b>4</b>
<b>1. Background</b>	<b>8</b>
1.1 UK Strategic Context	9
1.2 The International Context	10
1.3 GTRP Management and Oversight	11
<b>2. Progress during 2010</b>	<b>16</b>
2.1 Nuclear Programmes	17
2.2 Chemical Weapons Destruction and Biological Non-Proliferation Programmes	27
<b>3. Annexes</b>	<b>30</b>
A. Funding	31
B. Glossary	35

## Annex A – Funding

The UK has been providing overseas assistance to counter the proliferation of WMD for well over a decade. During the 1990s, the UK embarked upon a number of nuclear safety and security projects, which in 2000 were brought together into the UK's FSU Nuclear Legacy Programme, managed by the then Department of Trade and Industry (DTI). Following the launch of the GP in 2002, this programme became part of the UK's GP programme, along with MOD's chemical and biological WMD assistance programme. Between 2003/04 and 2007/08 the budget for nuclear and radiological programmes was £32.5 million per annum. From 2001 MOD allocated up to £4 million per annum for its chemical/biological assistance programmes. In 2007 the MOD and DECC funding for GP projects was brought together into a single, ring-fenced budget for the GTRP. This pooled budget was placed under the overall direction of a Ministerial Oversight Board chaired by FCO. Following the Government's 2008 Comprehensive Spending Review GTRP funding was set at £36.5 million per annum for the period 2008/09 to 2010/11.

In 2010, the Government's NSS and SDSR refocused and prioritised programmes within the GTRP, focusing on the security of CBRN materials. New GTRP projects will be funded from a cross-Government Critical Capabilities Pool administered by the Cabinet Office: DECC will continue to manage the nuclear and radiological security programme and MOD the chemical and biological security programmes.

DECC will fund existing GTRP project commitments over the next two years; some £14 million has been made available for new projects in 2011/12 and it is anticipated that similar funds will be available in subsequent years.

Figures for expenditure to date in the major programme areas are presented in figures (i) and (ii) for Nuclear/Radiological and Chemical/Biological programmes respectively. Total GTRP expenditure is presented in figure (iii).

**Note:** The UK Financial Year is 1st April – 31st March.



Staff of the Sukhumi I. Vekua Institute of Physics and Technology, Tbilisi, show the basalt fibre production facility, established with the help of a CNCP grant. Basalt fibre is used in a variety of construction applications.

Figure (i) – Nuclear Programmes – main expenditure

Programme Area – DECC (Figures in £ million) <sup>(1)</sup>	2001-02 Outturn	2002-03 Outturn	2003-04 Outturn	2004-05 Outturn	2005-06 Outturn	2006-07 Outturn	2007-08 Outturn	2008-09 Outturn	2009-10 Outturn	2010-11 Forecast	2001 to 2011 Total Spend <sup>(7)</sup>
<b>Chernobyl Projects</b>	7.88	4.04	14.13	0.16	0.072	0.143	9.793	0.48	0.00	10.00	46.698
<b>Nuclear Safety Programme</b>	1.84	2.59	1.98	5.61	5.86	4.543	0.00	0.86	0.00	0.00	23.283
<b>Nuclear Security Programme</b>	0.29	0.63	0.58	0.64	0.96	3.892	8.169	12.48	7.52	7.65	42.811
<b>Decommissioning in FSU and Central and Eastern Europe<sup>(2)</sup></b>	2.86	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.86
<b>Closed Nuclear Cities/Centres Partnership</b>	0	0.70	1.96	4.10	3.97	5.305	5.995	6.17	6.75	4.75	39.7
<b>North West Russia<sup>(3)</sup></b>	0.08	0.64	16.52	20.1	19.45	13.82	15.378	10.58	17.5	9.25	123.318
<b>KEDO<sup>(4)</sup></b>	2.04	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.44
<b>Reactor Decommissioning, Aktau, Kazakhstan</b>	0.00	0.11	0.47	0.73	1.56	0.568	1.168	1.44	0.82	0.56	7.426
<b>Social and Economic Consequences of Nuclear Power Plant Closure</b>	0.13	0.30	1.11	1.23	0.86	0.539	0.065	0.00	0.00	0.00	4.234
<b>Information Dissemination and Programme Publicity</b>	0.00	0.05	0.05	0.02	0.04	0.05	0.035	0.056	0.18	0.02	0.501
<b>Soviet Plutonium Reactor Closure Project<sup>(5)</sup></b>	0.00	0.00	0.00	2.55	5.89	2.49	0.00	0.00	0.00	0.00	10.93
<b>Total DECC Expenditure<sup>(6)</sup></b>	15.12	11.46	41.80	35.14	38.662	31.35	40.603	32.066	32.77	32.23	311.201

**Footnotes**

- Figures include costs of DECC's project management contractors and costs of locally engaged members of staff in the British Embassy in Moscow but exclude the staff costs and travel and subsistence of the DECC team directing and managing the programme, currently around £500,000 per annum.
- Includes in 2003-04 a contribution of £5 million to the EBRD Nuclear Safety Account for remediation work at Chernobyl.
- Includes in 2003-04 a contribution of £10 million and in 2009-10 a contribution of £8.67 million to the Nuclear Window of the EBRD Northern Dimension Environmental Partnership (NDEP) Fund.
- The UK contribution to the Korean Peninsula Energy Development Organisation (KEDO)-a North Korean non-proliferation project-was funded through the UK contribution to the EU, but considered part of this programme. No further payments are envisaged for KEDO.
- UK contribution to the US-led project to shut down the final Soviet plutonium-producing reactor in Zheleznogorsk. No further contributions are envisaged.
- Unspent funds carried forward from previous years are included in the outturn figures for 2003-04, 2004-05, 2005-06, 2006-07 and 2007-08 financial years.
- Total spend from 2001-11 includes forecast expenditure through to the end of financial year 2010-11.

Figure (ii) – Chemical and Biological Programmes – main expenditure

Programme Area – MOD (Figures in £ million)	2001-02 Outturn	2002-03 Outturn	2003-04 Outturn	2004-05 Outturn	2005-06 Outturn	2006-07 Outturn	2007-08 Outturn	2008-09 Outturn	2009-10 Outturn	2010-11 Forecast	2001 to 2011 Total Spend <sup>(4)</sup>
Chemical Weapon Projects at Shchuch'ye	0.00	2.20	1.70	2.49	2.84	1.80	3.48	2.10	0.49	0.12	17.22
Contractor Project Management and Set-up costs	0.00	0.05	0.45	1.15	0.25	0.29	0.28	0.56	0.00	0.00	3.03
Support to Green Cross Office, and Other Projects <sup>(1)</sup>	0.00	0.07	0.05	0.05	0.09	0.09	0.13	0.11	0.13	0.09	0.81
Redirection Projects	0.00	0.02	0.20	0.24	0.45	0.47	0.21	0.40	1.18	2.59	5.76
CWD Project Management and Support <sup>(2)</sup>	0.11	0.31	0.47	0.57	0.68	0.40	0.45	0.45	0.21	0.04	3.69
Biological Project Management and Support <sup>(3)</sup>	0.00	0.05	0.05	0.11	0.15	0.20	0.40	0.46	0.62	1.16	3.2
<b>Total MOD Expenditure</b>	<b>0.11</b>	<b>2.70</b>	<b>2.92</b>	<b>4.61</b>	<b>4.46</b>	<b>3.25</b>	<b>4.95</b>	<b>4.08</b>	<b>2.63</b>	<b>4.00</b>	<b>33.71</b>

**Footnotes**

- 1 This includes support to the Green Cross and MOD contributions towards the Annual Chemical Weapons Demilitarisation Conference. Expenditure on the CWD Conference was not reflected in UK Annual Reports prior to that for 2006.
- 2 MOD project management and support charges include costs for a small programme/project management team, and their travel and subsistence, translation requirements, etc.
- 3 These figures also include some costs arising from project delivery.
- 4 Total spend from 2001-11 includes forecast expenditure for financial year 2010-11.

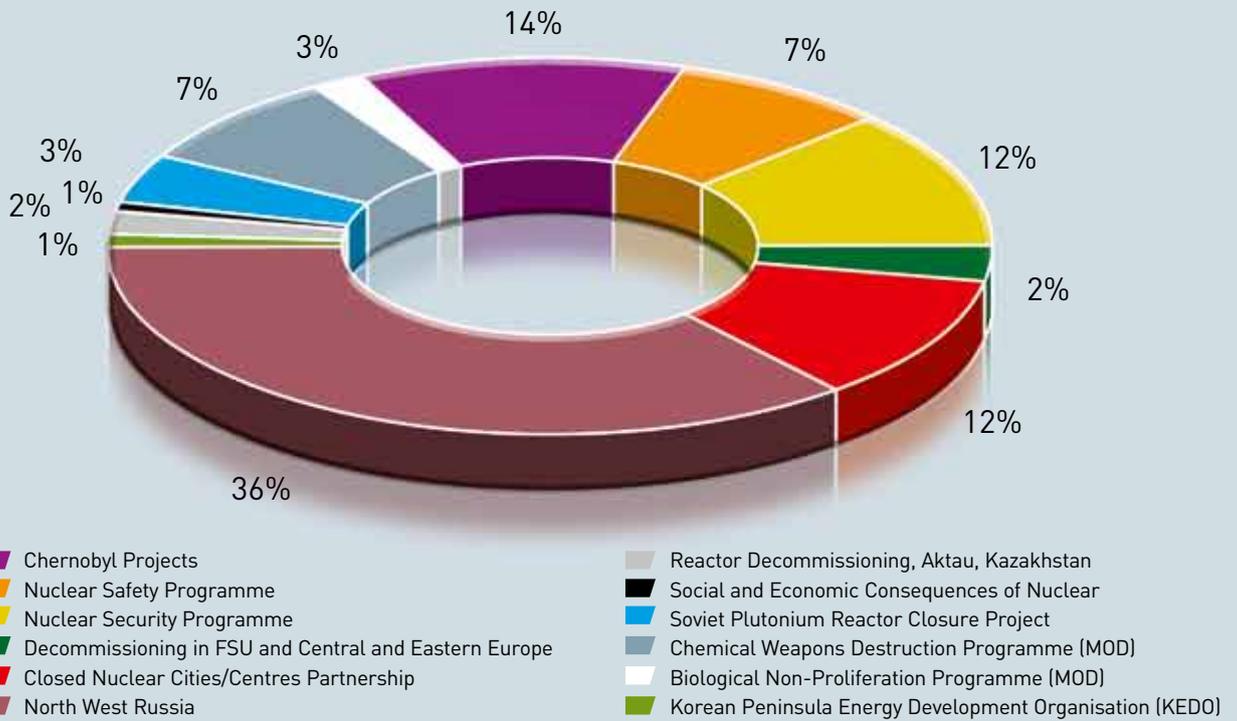
Figure (iii) – Global Threat Reduction Programme – total expenditure

Programme Area – DECC (Figures in £ million)	2001-02 Outturn	2002-03 Outturn	2003-04 Outturn	2004-05 Outturn	2005-06 Outturn	2006-07 Outturn	2007-08 Outturn	2008-09 Outturn	2009-10 Outturn	2010-11 Forecast	2001 to 2011 Total Spend <sup>(1)</sup>
Total DECC Expenditure Nuclear	15.12	11.46	41.8	35.14	38.662	31.35	40.603	32.066	32.77	32.23	311.201
Total MOD Expenditure Chemical and Biological	0.11	2.70	2.92	4.61	4.46	3.25	4.95	4.08	2.63	4.00	33.71
<b>Grand Total of Programme Expenditure</b>	<b>15.23</b>	<b>14.16</b>	<b>44.72</b>	<b>39.75</b>	<b>43.122</b>	<b>34.60</b>	<b>45.553</b>	<b>36.146</b>	<b>35.4</b>	<b>36.23</b>	<b>344.911</b>

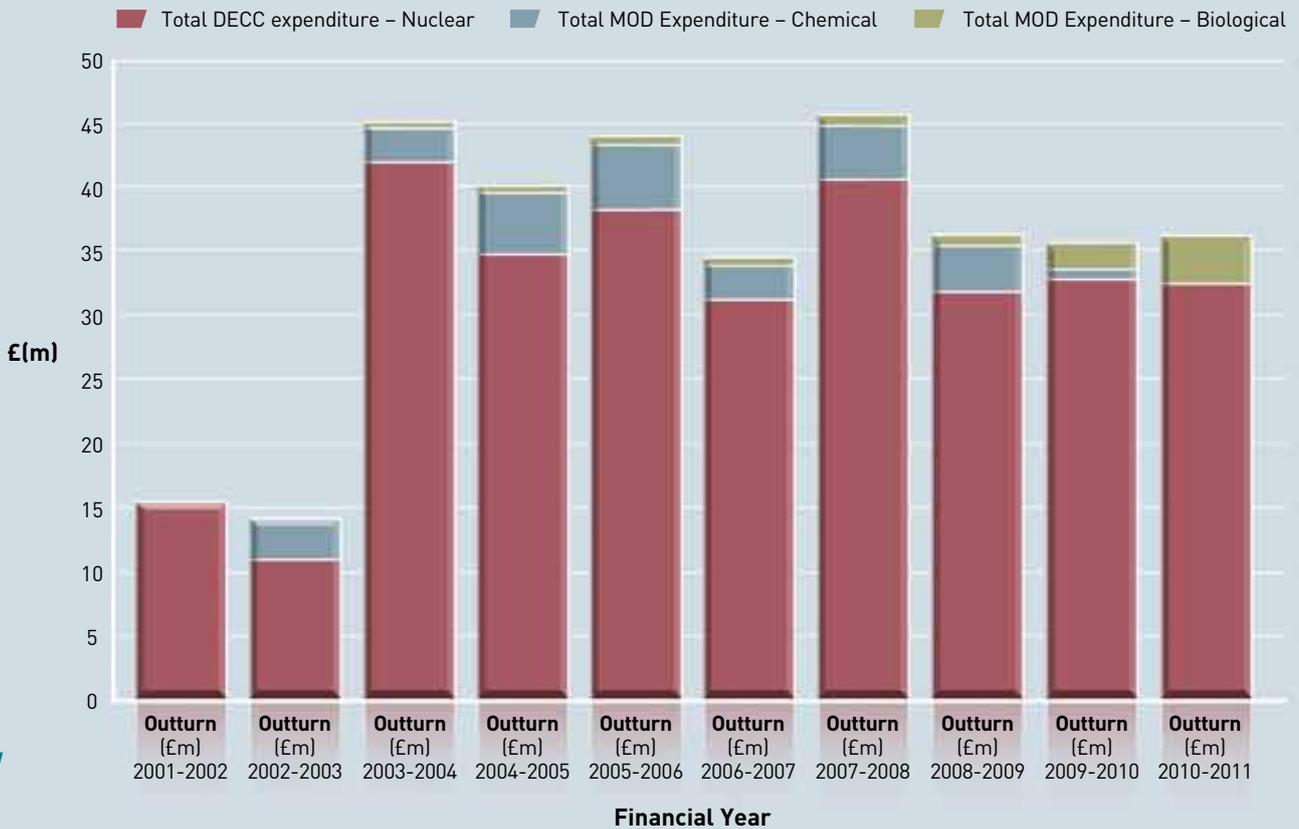
**Footnote**

- 1 Total spend from 2001-2011 includes forecast expenditure through to the end of financial year 2010-11.

**Figure (iv) – Global Threat Reduction Programme**  
– expenditure by main programme 2001-02 to 2010-11



**Figure (v) – Global Threat Reduction Programme**  
– total expenditure 2001-02 to 2010-11



## Annex B – Glossary

### **Biosafety**

The levels and type of containment, equipment and practices required for working safely with biological material.

### **Biosecurity**

The appropriate levels of security required for working with potentially dangerous biological material.

### **Chernobyl Shelter Fund (CSF)**

The CSF was set up in 1997 at the European Bank for Reconstruction and Development (EBRD) to manage international assistance to Ukraine in transforming the existing shelter over Chernobyl Unit 4 to a stable and environmentally safe state.

### **Closed Nuclear City**

One of ten closed administrative areas/cities created in the Russian Federation in Soviet times to carry out various stages of the design, manufacture and maintenance of nuclear weapons. Also known by the Russian acronym 'ZATO'.

### **Closed Nuclear Cities/Centres Partnership (CNCP) programme**

The UK's programme of financial and technical assistance to counter the proliferation risk posed by unemployed and under-employed former Soviet nuclear weapons experts by creating alternative sustainable employment opportunities.

### **Dry Storage Unit (DSU)**

Three unused liquid radioactive waste storage tanks (Tank 2A, Tank 2B and Tank 3A) at Andreeva Bay were converted in the 1980s for use as temporary storage units for Spent Nuclear Fuel (SNF) in theoretically dry conditions as an emergency measure after the failure of the onsite fuel (wet) storage pond facility. Each DSU has approximately 1,000 storage cells for fuel canisters, each containing up to 7 spent fuel assemblies.

### **European Bank for Reconstruction and Development (EBRD)**

EBRD was established in 1991 to provide support to help build market economies and democracies in countries from Central Europe to Central Asia. EBRD manages six international nuclear safety funds: the Chernobyl Shelter Fund (CSF); the Nuclear Safety Account (NSA); the Nuclear Window of the Northern Dimension Environmental Partnership (NDEP); and three International Decommissioning Support Funds – for Bulgaria, Lithuania and the Slovak Republic.

### **Highly Enriched Uranium (HEU)**

Uranium in which the percentage of the fissile isotope Uranium-235 has been increased (enriched) to more than 20%. Although uranium used in nuclear weapons is usually enriched to 85% or above, 20% enrichment is taken as the minimum sufficient for use in a crude nuclear device.

### **Hot Cell**

A shielded containment area or box in which 'hot' radioactive material can be remotely controlled or manipulated by an operator who is protected from the damaging effects of the radiation by the shielding.

### **International Atomic Energy Agency (IAEA)**

The IAEA is the independent intergovernmental organisation in the United Nations family that serves as the global focal point for nuclear cooperation.

### **International Science and Technology Centre (ISTC)**

The ISTC, based in Moscow, and the Science and Technology Centre, Ukraine (STCU), based in Kiev, are international non-proliferation organisations dedicated to the prevention of the proliferation of expertise related to Weapons of Mass Destruction (WMD).

# 3

## Annex B Glossary

Assistance is provided to former weapons experts in the transition to self-supporting, sustainable, peaceful activities.

### **Northern Dimension Environmental Partnership (NDEP)**

The Northern Dimension Environmental Partnership (NDEP) is an international fund managed by the European Bank for Reconstruction and Development (EBRD). Its origins lie in the EU's Northern Dimension initiative which promotes co-operation between the countries of the Baltic and Arctic Sea regions. NDEP's 'Nuclear Window' programme seeks to address the legacy of the operation of nuclear-powered ships and submarines in North West Russia. The UK contributed £10 million to the NDEP Nuclear Window in 2003/04 and £8.67 million in March 2010.

### **Nuclear Safety Account (NSA)**

The NSA was the first multilateral fund set up at the European Bank for Reconstruction and Development (EBRD) in 1993, to finance nuclear safety projects in Central and Eastern Europe. Its principal current programme of work is at Chernobyl.

### **Plutonium (Pu)**

Plutonium is a heavy radioactive element, denoted by the chemical symbol Pu, that has a number of isotopes, the most important of which is the fissile isotope Pu-239 used in nuclear weapons.

### **Spent Nuclear Fuel (SNF)**

Fuel that has been removed from a reactor after use (and is thus irradiated). Over a period of some three to four years, the fuel rods in a nuclear reactor burn up, decrease in efficiency and require replacement with fresh (unirradiated) fuel. The irradiated SNF remains highly radioactive and requires removal and permanent storage or disposal.

### **Uranium (U)**

Naturally occurring uranium is almost wholly composed of the non-fissile isotope Uranium-238 and contains <0.70% of the fissile isotope Uranium-235. This percentage can be enriched, usually by a gaseous diffusion process involving uranium hexafluoride, to yield Low Enriched Uranium (LEU) (up to 20% U-235) or High Enriched Uranium (HEU) (more than 20% U-235). Uranium has a second fissile isotope, U-233, which can be produced from Thorium.

### **Weapons-Grade Plutonium**

The fissile isotope Pu-239, at sufficient purity (in particular with low enough concentrations of the isotope Pu-240) to produce a nuclear explosion when weaponised.

### **Weapons of Mass Destruction (WMD)**

Generally understood to include biological, chemical and nuclear weapons.



CNCP Russia study tour, 1-5 November 2010.





## Eighth Annual Report 2010

Photographs courtesy of:

HTSPE Ltd

International Atomic Energy Agency

National Nuclear Center of the Republic of Kazakhstan

SevRAO/Federal Centre for Nuclear Radiation (FCNRS)

US Department of Energy

## Eighth Annual Report 2010

Department of Energy and Climate Change  
**[www.decc.gov.uk](http://www.decc.gov.uk)**  
First published March 2011.  
© Crown Copyright.  
URN 11/373

Printed copies of this report can be obtained by:

Email: [deccteam@decc.ecgroup.net](mailto:deccteam@decc.ecgroup.net)  
Orderline: 0845 5049188  
Fax: 01375 484556

Reports also available on the DECC website:  
**[www.decc.gov.uk/gtrp](http://www.decc.gov.uk/gtrp)**