SKI Report 00:3

Report on Combating of Illicit Trafficking

The Illicit Trafficking Combat Project Group

January 2000

ISSN 1104-1374
ISRN SKI-R--00/3--SE

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January 2000

Ministry of Environmental Protection and
Regional Development of the Republic of Latvia

Statens strålevern

Norwegian Radiation Protection Authority

SKI

Swedish Nuclear Power Inspectorate

PREFACE

To: The Latvian Ministry of Environmental Protection and Regional Development (VARAM),
The Norwegian Radiation Protection Authority (NRPA), and
The Swedish Nuclear Power Inspectorate (SKI).

In December 1998, the above named organisations agreed to carry out a project study of means and measures aimed at the combating of illicit trafficking. A Working Group was established, and a Reference Group with the task to give advice to the Working Group.

Mr. Paul Ek, Director SKI, was assigned Project Leader and Chairman of the Reference Group, and Mr. Göran Steen, former Chief Judge of the Svea Court of Appeal, was assigned Chairman of the Working Group.

As members of the Working Group were assigned Mr. Sverre Hornkjöl, Research Scientist NRPA, and Mr. Andrejs Salmins, Senior Official, VARAM.

As Project Secretary was assigned Mr. Torkel Bennerstedt, Consultant to SSI. From 14 May 1999, he was succeeded by Mr. Lars Wredberg, former Section Head IAEA, and Consultant to SKI.

The Reference Group has had the following members:

Torgrim Moseby	in October 1999 replaced by
Kai Hopperstad	Norwegian Police Security Service Headquarters (POT);
Johnny Strand	Norwegian Directorate of Customs Excise (TAD);
Anne-Marit Östereng	in October 1999 replaced by
Inger Hege Lågstad	Norwegian Defence Command Headquarters;
Jaakko Tikkinen	Finnish Centre for Radiation and Nuclear Safety (STUK);
Stig Isaksson	SKI;
Birgitta Svahn	SSI;
Sten Grapengiesser	SSI/SIUS;
Lars Göran Strömberg	Swedish Defence Research Establishment (FOA);
Peter Kröjs	Swedish Customs;
Björn Hamilton	Swedish Army Forces Headquarters (FM:HKV);
Roland Weinfors	in September 1999 replaced by
Bengt Pettersson	Swedish Security Police Headquarters (SÄPO).

Meetings have been held as follows:
In Riga 25, 26 January 1999; in Helsinki 4, 5 March 1999; in Oslo 9 April 1999; in Stockholm 15 September, 5 October, 19 November, 3 and 21 December 1999, and 13 January 2000.

The Project has arranged:

- a Seminar in Sigulda, Latvia, on 26, 27 April 1999, and
- a Work Shop at Randsvangen, Norway on 1-3 June 1999.

At the Seminar in Sigulda participated representatives of the following Latvian authorities:

- Environmental State Inspectorate;
- Security Police;
- The Custom Board;
- The Custom Institute;
- Border Guards;
- The Border Guards Training Centre.

Project representatives visited nuclear and law enforcement authorities in some countries during 1999 as follows:

- STUK Helsinki, on 17 June;
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Bonn, on 29 July;
- National Atomic Energy Agency, Warsaw, on 8 September;
- State Office for Nuclear Safety, Prague, on 29 September;
- Nuclear Regulatory Administration, Kiev, on 7 October;
- Board of Trade, London, on 12 November;
- Department of State, Washington DC, on 7 December;
- Gosatomnadzor (GAN), Moscow, on 17 December.

Discussions were also held with representatives of the Transuranium Institute (EU-JRC), Karlsruhe on 8 June 1999. The International Atomic Energy Agency (IAEA), Vienna, was visited on 11 January 2000.

With the Project completed, this Report on Illicit Trafficking Combat is herewith presented.

Stockholm 13 January 2000.

For the Project:

Paul Ek

Sverre Hornkjöl Göran Steen Andrejs Salmins

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SUMMARY

During recent years, the problem of illicit trafficking, including smuggling of nuclear material and equipment and unauthorised transfer of know-how has been dealt with by different international organisations. So far, however, there are no signs of obvious results of practical implementation of measures for preventing proliferation of nuclear weapons and their constituents. In the meantime, both India and Pakistan have detonated nuclear explosives and become nuclear weapons States. There is a potential threat that terrorist organisations would come into possession of such weapons. Illicit trafficking has continued to occur in different parts of the world and open source information suggests that most of the reported cases of illicit trafficking of nuclear material and radiation sources originate from countries of the former Soviet Union.

The objective of this study is to propose improvements of different means and methods for the prevention of illicit trafficking and the proliferation of nuclear weapons. Such improvements are referred both to the national and international level.

Improvements on the National Level

As a first step, the requirements of the Treaty on the Non-proliferation of Nuclear Weapons (NPT) and related recommendations developed by the International Atomic Energy Agency (IAEA) must be incorporated into basic nuclear laws of each State.

An essential requirement imposed on authorities and operators through basic nuclear legislation is the establishment and implementation of:

a) nuclear material accountancy and control;
b) physical protection of nuclear material and facilities; and
c) export/import control of nuclear material and, so called, dual-use items.

The legislation would make it possible for the State nuclear authority to be informed continuously about the location and quantity of nuclear material in the country, and to monitor that it is under satisfactory protection and guard in accordance with the requirements. This would constitute an important component in the national system for preventing illicit trafficking.

The introduction of requirements on licensing of practices and activities involving dual-use items, and other products used for nuclear weapons manufacturing, would also give the authority the possibility to prevent unauthorised transfers of such products.

The nuclear legislation must clearly stipulate the distribution of responsibilities between nuclear authority, operator and employees. This would give a solid basis for attaining high safety culture, including positive motivation and active commitment among executives and other employees. It would also ensure that nuclear material would not be lost through negligence or internal criminal activities.

The operator's thorough examination of the trustworthiness and competence of his staff, as well as every effort to establish a positive working climate, would also contribute to the general safety and quality improvement.

A further step of improvements on the national level, would be the urgent and firm introduction of modern Quality Assurance and Internal Control Systems into all forms of nuclear activities. Well developed and implemented quality and control systems would affect the efficiency of the supervision activities in a positive way, which is the responsibility of the State nuclear authorities. In modern, safety related quality control systems, the operator alone is responsible for all activities and operations, and he must establish an internal control that will ensure that the authority’s rules and requirements are thoroughly implemented and adhered to. The operator’s organisation, including competence and procedures, must be approved by the State authority. By means of spot-checks, the authority can then convince itself that the operator is fulfilling the requirements.

The legislation should also impose heavy sanctions and penalties for all criminal activities related to illicit trafficking. In the most serious cases involving nuclear weapons or weapons materials, which are to be considered as crime against humanity, the penalty should be lifetime imprisonment.

As a direct measure to combat illicit trafficking on the national level, the State supervisory and law enforcement authorities should establish co-operation between themselves and with authorities in other countries and international organisations. Special national committees for combating illicit trafficking should be set up and should use intelligence and open sources information. Region of States should investigate and implement joint task forces for combating illicit trafficking.

Improvements on the International Level

By the IAEA:

The IAEA should assist States in the practical implementation of measures and means for combating illicit trafficking and for the evaluation of threat scenarios. This would include that the IAEA should give States access to relevant information accumulated in the IAEA databases. To improve that process in an efficient way, the IAEA should apply the principle of public access to information on its operations to a greater extent.

Among other measures for promoting the development of more efficient tools and systems for combating illicit trafficking, the IAEA should:

- in assisting States, establish rules about duties and responsibilities for operators, authorities and individuals in the NPT area , through appropriate documentation;

- promote assistance programmes to States in consultation with NPT States, as need may be, of technical equipment and competent staff for the combating of illicit trafficking;

- provide experts and establish standards and procedures, across borders, for the investigation of serious cases of illicit trafficking, in consultation with national and international nuclear and law enforcement authorities and organisations;

- incorporate a more modern safeguards inspection technique of the national systems for accountancy and control, in accordance with standards and procedures that were intended to be established on the basis of the Additional Protocol. This would allow the IAEA to allocate more resources for combating illicit trafficking.

By a New International Regime:

Concerning the basic requirements on combating illicit trafficking, it is observed that appropriate nuclear legislation has not been introduced in several countries. This is in spite of the existence of IAEA's recommendations on non-proliferation issues, applicable also for combating illicit trafficking, for about ten years. Some countries have the necessary legislation, but with a poor implementation and supervision of its adherence.

With the purpose to effectively change this unsatisfactory situation, this study suggests, that a new international regime should be established by the Untied Nations and be assigned the task to:

- define the set of requirements and recommendations to be implemented in States for the effective combating of illicit trafficking, and to promote and pursue the implementation of and adherence to them;

- develop and establish a follow-up and audit system, with the purpose to review the implementation of those requirements and recommendations;

- carry out audits;

- when necessary, initiate the development of improved requirements, based on follow-up findings.

Such a new Regime would not be intended to alter the current obligations of the IAEA as defined by its Statute and mandate. The role of the new organisation would be to supplement the obligations of the IAEA, as necessary, for the combating of illicit trafficking.

Access to information

It is important that the public and the media are getting full insight in the manner States are fulfilling their non-proliferation commitments. Such insight is, no doubt, a pressure on the States to establish and maintain effective systems for safeguards, physical protection and export/import control.

This study proposes that the principle of public access to information should apply regarding events related to illicit trafficking. This principle should apply to facility operators and authorities, as well as to the IAEA and the proposed, new International Regime.

A. INTRODUCTION

OBJECTIVE

The objective of this Project Study is outlined in the Project Directives (English version dated 1999-05-19) as follows:

"With focus on the Latvian and NIS[1] situation, but with reference also to the European region, the Project study shall investigate the different means and procedures, on the national and international level, that are essential for detecting and combating Illicit Trafficking. This includes, in the nuclear area, legislation, SSAC[2], physical protection, export/import control, radiation protection, as well as border and customs control and security police activities.

With a reference to the Scandinavian practice, the Project study shall identify actions within the various implementation areas that should be subject to improvement, and suggest how the network of involved State authorities and institutions can be developed to facilitate combating Illicit Trafficking.

Based on a survey and analysis of the current situation, the Project study shall make suggestions that would assist an assessments of what support activities, from the side of the Scandinavian countries, that could be implemented in the NIS and the Baltic States, with the purpose to improve the combating of Illicit Trafficking".

The Directives furthermore stipulate the following about the reporting of the Study:

"The result of the Project study shall be presented in a Report, that in its general perspective should give a comprehensive description of all application areas that are essential for the combating of illicit trafficking. In particular, the Report should suggest measures and procedures for the improvement of relevant infrastructures, including legislation, instructions for authorities and co-operation agreements between concerned parties, nationally and internationally, in the combating of Illicit trafficking.

The recommendations to be presented in the Project Report should contribute to a more efficient prioritisation of resources assigned by Scandinavian support programmes in the NIS and the Baltic States for the combating of Illicit trafficking. They should, therefore, be generally applicable, and, as far as possible, be used as a basis for the development of an overall and comprehensive policy for combating Illicit Trafficking.

In addition, it should be considered whether the conclusions and recommendations of the Project study and the proposals therein could be

[1] NIS=Newly Independent States
[2] SSAC=State System of Accounting for and Control of Nuclear Material

applied also for the combating of Illicit Trafficking of mass destruction weapons other than nuclear".

The complete directives are reproduced in Annex 1.

LIMITATION OF THE OBJECTIVE

The need for an important restriction of the Objective became apparent very early in the project work. This restriction is introduced below, under the heading "Definition of Illicit trafficking". The definition is limited to "*intentional* activities".

The restriction leaves some illicit activities with radioactive materials outside the definition and thus outside the objective of the Report, namely:

a) Incidents where someone takes possession of objects which contain radioactive material without knowing this fact. The transfer (or theft) of the object itself is intentional but the trafficking with radioactive material is not;

b) Legal or illegal transport of material, for instance scrap metal that contains an unknown radioactive source or is contaminated with radioactive substances. Also here the handling of the material is intentional, but the dealer is not aware of the radioactive substances included.

The common denominator for these activities is that the perpetrator is in lack of knowledge and ignorant of radiological risks. They will hardly lead to proliferation of nuclear weapons, and consequences like terrorist activities or extortion are extremely unlikely. Unintentional trafficking is, however, often included in the definition of Illicit Trafficking; for instance in a draft IAEA Safety Guide on illicit trafficking.

Although the threat is on a much lower level, these types of incidents are, however, relatively frequent when it comes to trafficking with radioactive materials. They have resulted in a number of fatalities and serious deterministic radiation injuries and the costs for decontamination have some times been considerable.

For these reasons, the unintentional illicit trafficking has been considered to some extent in this Report, although the analysis is by far not exhaustive in this respect. It is recommended, that a further analysis is done, when it comes to including these types of incidents in the counter-measures proposed in Chapter E and F.

REPORT OUTLINE

Chapter B of this report, gives a review of the current situation with respect to the threat and the market of illicit trafficking, as well as of occurred incidents and events involving illicit trafficking. Measures and means for the prevention of

illicit trafficking are discussed in Chapter C, while detection and investigation of illicit trafficking are dealt with in Chapter D.

The measures and means for prevention, detection and investigation, create the systems, national and international, for responding to illicit trafficking, with the purpose to deter, reduce or eliminate such criminal activities. Methods and strategies for such response are analysed and discussed in Chapter E, and proposals for improvements are presented in Chapter F.

DEFINITION OF ILLICIT TRAFFICKING

Unauthorised or criminal trafficking in radioactive material, including nuclear material, is, in accordance with internationally accepted terminology, referred to as “Illicit Trafficking” of such material.

Measures and means for *prevention* and *detection* of, and *response* to, illicit trafficking are, with a common term, referred to as “Combating Illicit Trafficking”.

For the purpose of this study, Illicit Trafficking is defined as:

> **Unauthorised, intentional activities, with or without crossing international borders, in the form of receipt, provision, possession, use, transfer or disposal of:**
>
> **a) radioactive material, including nuclear material; or**
>
> **b) nuclear items, including so called dual-use items, in the form of devices, components or equipment that can be used for the manufacturing of nuclear weapons; or**
>
> **c) technology and know-how relevant to the manufacturing of nuclear weapons.**

Nuclear Material, Nuclear Items and Dual-Use Items are defined in Annex 2.

As this definition includes "possession" of weapons grade nuclear material, and "use" of such material, which could mean manufacturing of nuclear weapons, the illicit trafficking, in its most serious forms, must be seen as a form of proliferation of nuclear weapons. The ways and means that are discussed and analysed in the following chapters C, D and E of this report, to prevent illicit trafficking on both the national and international level, and to reduce the risk of the most devastating consequences of illicit trafficking, are to be considered as components of the non-proliferation regime.

PROLIFERATION OF NUCLEAR WEAPONS

Ever since the public knew the consequences of the atomic bombs over Japan at the end of the Second World War, the anxiety for proliferation of nuclear

weapons became a fact of life within the world community. This led to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which was soon acceded to by most States; four States still remain outside NPT: India, Pakistan, Israel and Cuba. After the end of the Cold War, the anxiety for further proliferation has risen anew, in particular in consequence of the current, unstable political and economical situation in the Russian Federation, and the events in Iraq, North Korea, India and Pakistan.

The inspections under an NPT safeguards agreement that the International Atomic Energy Agency (IAEA) carried out in Iraq before the Gulf war, could not detect any production of Weapons of Mass Destruction (WMD), or production facilities for such weapons. That such facilities existed, however, was revealed after the war. This experience has demonstrated that also a State that is party to the NPT and subject to IAEA safeguards is able to, clandestinely, get in possession of nuclear material and equipment for the manufacturing of nuclear weapons.

In North Korea, the IAEA safeguards inspectors have not been allowed access to certain locations for carrying out measurements and sampling, needed for the determination of nuclear material and activities. This has led to that a conclusive verification by the IAEA of the country's nuclear activities has not been possible.

The nuclear weapons programmes of India and Pakistan, which have resulted in test explosions, as well as the officially not recognised status of Israel with respect to the possession of nuclear weapons, are other factors, which have increased the concern over uncontrolled nuclear proliferation in the World.

The current situation in the Russian Federation is characterised by destabilised social order: the former severe communistic control, on both central and regional level, of civil and military activities has been relaxed and has not been fully replaced by an effective regime in the area of nuclear material control. Furthermore, the dismantling of major portions of the nuclear weapons programme has led to the lay-off of highly competent nuclear weapons scientists and technicians, which are potential recruits to illegal nuclear weapons manufacturing abroad. Corruption within official organisations and State institutions is also a factor of concern, when it comes to protection against criminal activities, such as theft from nuclear facilities of nuclear materials or nuclear items..

There is an overall worrying aspect of potential terrorist activities, using nuclear weapons, that might be directed from one State against another, and also of terrorism within a country, aimed at the own State and its enterprises, organisations or individuals. Such terrorism might use illegally obtained nuclear weapons or nuclear material for the manufacturing of such weapons. Also so called "dirty bombs" (i.e. nuclear fission products or highly radioactive materials spread by the detonation of a conventional explosive) might be used by terrorists. The risk for terrorist acts using nuclear weapons is, however, judged to be relatively low in comparison with the risk that terrorists might use biological and chemical weapons.

It is well known, that Pakistan could develop and manufacture nuclear weapons by using both own natural uranium resources, and nuclear material obtained from other countries, and by purchasing equipment needed for uranium enrichment centrifuges from countries in Western Europe. Also foreign nuclear experts and consultants were used.

It is, however, necessary to point out that the development of a complete and independent nuclear weapons programme by a State is a complicated process that takes long time, involves high technical competence and organisational resources, and that costs much money. Iraq's programme lasted more than 10 years at an estimated cost of about 10 billion US dollars, without resulting in a completely finished product.

The major technical difficulties attached to a State's nuclear weapons programme are referred to the production of nuclear weapons grade fissile material, i.e. high-enriched uranium or plutonium. If uranium is used, it must be enriched in the isotope U 235 to levels above those used in nuclear power reactor fuel, using a technically advanced and expensive process. In case of a plutonium bomb, the plutonium used should contain more than 90 % Pu 239, and would have to be obtained from irradiated nuclear reactor fuel through reprocessing. This is a technically advanced and expensive process, in which plutonium is separated from other nuclear material and fission products.

The situation is different when it concerns the illegal and criminal manufacturing of nuclear explosives, aimed for the use by terrorist organisations. Here technically simpler devices with lower precision might be accepted, which means that the requirement on high technical know-how and competence can be relaxed, as well as the need for comprehensive testing. This changes the reference scale, both for time and cost.

In case of either a State's nuclear weapons programme or a terrorist activity to manufacture a nuclear explosive, the overall challenge for the subject culprit is to get access to:

a) nuclear material;
b) equipment and components, i.e. nuclear items including dual-use items; and
c) qualified experts and know-how.

To counter such efforts, the international community is creating systems of prevention and deterrent, in both the nuclear field and in adjacent areas of technology and know-how. Efficient national systems of protection and control must be developed and established in close co-operation between authorities and operators and links of information and communication must be created across borders. The overall aim should be to prevent nuclear material, equipment, technology and know-how, relevant to nuclear weapons manufacturing, from getting into wrong hands.

PROLIFERATION OF OTHER RADIOACTIVE MATERIAL

Since the radiation safety community learned about the consequences of several major radiological accidents, some international organisations and regulators agreed upon the need to strengthen the security and safety systems for radiation sources.

Radioactive material, other than nuclear material, include:

a) short-lived radioisotopes used in nuclear medicine;

b) longer-lived high activity sealed radiation sources used in industrial radiography, medical radiation therapy and for sterilisation; and

c) sealed or unsealed radiation sources of various activities and half-lives used in industry and research. To this group of material is also referred scrap metal contaminated with radioactive substance, and radioactive waste, which contains, or is contaminated with, nuclides at concentrations and activities above exemption levels.

Like nuclear material, this other radioactive material could pose a significant public safety threat more or less similar to that from nuclear material, if they are lost out of control of the national systems for protection against ionising radiation. Although the destructive capacity is much less, the possession of strong radioactive sources could be used efficiently by a terrorist group. A threat to distribute the content of such sources over a densely populated area, for instance by means of conventional explosives or through water supplies, is simple to effectuate and very serious.

The psychological effects on the general public of such a threat must be considered. Its efficiency might not even require that the terrorists have sufficient amounts of radioactive material at disposal. A firm “marketing” of the threat, together with a drastically presented “sample”, would have a strong effect on the opinion of the general public and thus constitute an efficient basis for extortion, even if the “sample” is the only radioactive material available.

Radiation sources might also be used in criminal acts aiming at hurting or killing, or threatening to cause harm, but this study has found no proven evidence of such cases.

The reasons and motives for deliberate actions leading to loss of control of radioactive material could be:

a) a poor legal infrastructure in the field of radiation protection. Without relevant requirements on registration of sources or management of radioactive waste, etc. and without proper supervision of the implementation of such requirements, the doors are open for illicit initiatives;

b) negligence of safety standards prescribed by radiation safety authorities, and of measures for physical security (protection);

c) disposing or diversion of radioactive material, such as radiation sources or waste, for the purpose of avoiding costs and fees for the disposal;

d) theft of radioactive material, followed by smuggling and purchase for the pure purpose of profit, or for the use as a threat or act of terrorism.

There are, therefore, plausible reasons to establish national control and safety systems that prevent or deter intentional irregular or criminal trafficking with radioactive material in parallel with those dealing with nuclear materials. For the safe handling and use of radioactive material, the IAEA, in co-operation with other international organisations, has developed main safety standards, namely the "International Basic Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources" (BSS), IAEA Safety Series No. 115.

Although with little bearing on problems with proliferation of a nuclear weapons threat and thus outside the scope of this Report, it should be noted that the number of incidents of unintentional trafficking with radioactive materials out of national authorities' control have increased considerably during the last decade. Examples are shipments of scrap metal containing radioactive sources or contaminated with radioactive substances of undefined origin, thefts from intermediate storages of radioactive waste with insufficient security arrangements and looting of abandoned medical facilities where radioactive sources have been used.

Such incidents are threatening to human life and health and impose considerable cost in recovery and cleaning-up. Cases have occurred, in which loss of control of radiation sources has caused serious, and even fatal, injuries to individuals who have been either unaware of the presence of the material, or ignorant about the radiological hazard.

As a summary it should be noted that *intentional* illicit trafficking with nuclear material, other radioactive material, nuclear items and dual use items imposes a serious threat to the international community and must be combated, using all available means that are considered cost-efficient. Some of these means might be suitable also for the combat against *unintentional* trafficking with radioactive material, but other more direct mitigations are probably available. A future study of the cases of unintentional trafficking is likely to indicate useful tools in the combat like:

- clear national requirements on management, registration, transport and disposal of radioactive sources;

- information and education of staff involved (police, border police, customs officers, etc.);

- information to the general public on marking of dangerous goods.

It is very likely that bi-lateral co-operation over the borders will play a larger role in this type of combating than what multilateral efforts do.

WEAPONS OF MASS DESTRUCTION

The world community's anxiety with respect to proliferation is not limited to nuclear weapons, but includes also biological and chemical weapons. With a common term, these types of weapons are referred to as Weapons of Mass Destruction (WMD), or NBC-weapons (Nuclear-Biological-Chemical).

The preparedness against the threat of proliferation of WMD on the national level engages the same law enforcement authorities, be it for protection against proliferation of nuclear or biological or chemical weapons and related material, equipment and technology. The on-going "watch-out" and analysis of the threat situation, preferably in co-operation between national authorities for law enforcement, security, intelligence and defence, is covering all types of WMD. The situation to-day concerning WMD, seen from a Scandinavian perspective, is illustrated by the following quotations from a recent (November 1999) report by the Swedish Security Service (SÄPO):

> *"At the beginning of the 1990th, the world community's attention with respect to proliferation of weapons of mass destruction was, to a great extent, focused on nuclear weapons and the risk of proliferation of nuclear weapons and nuclear weapons technology from the former Soviet Union. That risk was exaggerated. It is, however, still questionable to what extent Russia is able to maintain an effective protection against proliferation of weapons of mass destruction or their components. The most acute problems concerning proliferation involving Russia seems to be sales or smuggling of "dual-use" material and the risk that Russian experts choose to sell their services abroad. Another problem is, that many people to day can work for foreign interests in Russia, in particular with the help of modern information techniques.*
>
> *To day, increased resources are invested in watching the development in the area of biological and chemical weapons, and of carriers of weapons of mass destruction, in particular missiles. The relative focusing on Russia has more and more been supplemented with attention directed towards States that are engaged in development in the area in question, i.e. such States as Iran, Iraq, Pakistan and North Korea .*
>
> *Biological and Chemical weapons are by many experts seen as the nuclear weapons of the poor. Since such weapons are relatively cheap and simple to manufacture, it is probable that proliferation of them will continue. For many States it might by sufficient to give a show to the world around that they are in possession of Biological or Chemical weapons capacity, and thereby use this image as a threat or deterrent. This form of bluff can also be used by non-State actors".*

B. THE THREAT SITUATION

B.1 Proliferation of Weapons of Mass Destruction

The Swedish Security Service, SÄPO, has (1999) made the following summary categorisation of future potential threats of proliferation of Weapons of Mass Destruction (WMD), including nuclear weapons, as seen in a national (Swedish) perspective:

a) *WMD and, in particular tactical nuclear weapons, with missiles as the main carrier will become more and more prioritised. This is valid for neighbour States which are potential enemies and which have to seek protection outside a bi-polar world order. In such a situation, the WMD might serve as "weapons of last resort", but can, under certain circumstances become "weapons of choice". Another important reason for this threat scenario is that certain States will try to obtain WMD to protect themselves from pressure from other States.*

b) *In a fragmentised and unstable world order, more and more States will seek to protect themselves against WMD and missile systems. This may, in the first place, lead to an arms race, where the existence of offensive weapons causes the development of defensive systems, which in turn would lead to new offensive experiments. No State to-day has any efficient defence against missile attack. Secondly, this can destroy the confidence in the international regulatory system.*

c) *The technological development of missile systems will lead to that the boundary between strategical and tactical weapons will be faded out. This means that international agreements and treaties will be subject to tensions, but also that States that have such weapons systems will increase their power projection capabilities. States with limited conventional weapon systems might look for WMDs as an attractive alternative in order to maintain or change the balance of power.*

d) *There will be more Non-State players with ambitions and possibilities in the area of WMD, because of the increased proliferation of WMD technology. The civil technology development in the area of "dual-use" nature, e.g. in biotech, is spread globally very fast. This means that the basic know-how and technology for the manufacturing of WMD will become publicly accessible. A trading system has been developed to day between several States within the WMD area, where a great volume of know-how is moving between different countries. This means that knowledge about these weapons will become an almost commonplace thing in the future.*

e) *The threshold for the use of WMD will be lowered. This is because the availability of these weapons increases the possibilities of using them, and also that the separation of regional conflicts out of the global balance increases the probability of their use.*

When considering measures and means to improve existing systems, national and international, for non-proliferation, the threat situation should be studied and judged also against the background of the viability of the current non-proliferation regimes, under the influence of events in the international arena during the recent few years. In analysing systems and strategies for improvements, and when formulating proposals for such improvements (in chapter E and F below), this study has had in mind, among others, observations and comments presented in a recent report (November 1999) by the Centre for Non-proliferation Studies (CNS) at the Monterey Institute of International Studies, USA.

In July 1999, the CNS launched a new initiative: formation of the Monterey Nonproliferation Strategy Group. This international body of seasoned policy practitioners and renowned non-proliferation analysts aims to generate innovative but practical non-proliferation policy recommendations for global adoption and implementation. The report "Nonproliferation Regimes at Risk" (CNS Occasional Paper No.3) compiles works prepared for and based on the first meeting of the Strategy Group, held July 5-7, 1999. Together, these papers comprise a concise yet comprehensive examination of the many new and ongoing proliferation challenges. Some quotations from that report, which have particular bearings on this study and its deliberations, are reproduced in Annex 3.

B.2 The Illicit Trafficking Situation

The overall picture of the unauthorised or criminal trafficking in radioactive material is, in the first place, based on knowledge and information about real incidents and events of such trafficking that have been reported within the international community. The IAEA maintains a database of illicit trafficking of nuclear material and other radioactive sources dating from 1993. Presently, 61Member States participate in this Illicit Trafficking Database Programme. As of 31 December 1998, the database contained information on 304 incidents, of which 237 have been confirmed by States; most of the incidents involve unintentional trafficking and are outside the scope of this study (reference: the IAEA Annual Report 1998). While extensive, the Illicit Trafficking Database is necessarily limited to known, reported incidents and is only one indicator of the extent of the illicit trafficking problem. A majority of the reported incidents have involved radioactive sources and natural and low-enriched uranium. Most of the incidents involving radioactive sources must be labelled as unintentional trafficking. Only a few cases have involved high-enriched uranium or plutonium.

The picture of the illicit trafficking complex would, however, be very incomplete without supplementing the knowledge of real events during recent years with the "contemplated reality" behind the officially confirmed scene of nuclear crimes. That the real extent of illicit trafficking, including those acts that have already taken place but have so far been concealed, is much larger than the reported cases indicate, is considered as a fact by most concerned parties in the international community. Insufficient data are available to determine any

trend in the frequency of these occurrences. Any apparent reduction may be due in part to opportunists finding that there is little genuine market for the materials involved in past incident. However, as long as these materials remain a potential for theft due to difficult or non-existent security conditions in some countries, there is a strong possibility that clandestine groups may seek these materials for illicit purposes. Lingering security weaknesses combined with continuing activities of terrorists and rogue States make the illicit trafficking in nuclear substances a possibility that the international community must continue to be prepared to deal with it.

Some of the reasons for not neglecting the risk of illegal proliferation of nuclear weapons are:

a) the demand pressure from threshold countries;
b) an over-optimistic faith in the possibilities to make financial profit by trading in nuclear and other radioactive material and related products;
c) the connection to organised economic crime in the former Soviet Union; and
d) the unstable political, economical and administrative situation in that geographical.

On the market, there are interested buyers of nuclear material and items that may not even be officially recorded, and there are also providers and middlemen that willingly offer their services. One cannot be sure that smuggling of nuclear and other radioactive material has not already taken place to some threshold country, or to some terrorist group. Nor can one exclude the possibility of such smuggling in the future.

Knowledge and information that support this opinion is frequently exchanged between the engaged experts from nuclear authorities, police, customs and foreign offices at meetings and seminars. For this report, information about illicit trafficking cases has been collected during visits to nine countries, namely the Czech Republic, Finland, Germany, Latvia, Norway, Poland, the Russian Federation, Sweden and Ukraine. Meetings were held with representatives for nuclear and radiation protection authorities, police and customs.

Information has also been obtained through a study of open sources. One such source of information is the CNS. In order to illustrate the situation, four illicit trafficking cases during 1999, involving nuclear material, are described in Annex 4 (reproduced from CNS). Since the information is from open sources, the cases might not (yet) be formally confirmed by the countries concerned. One other case reported in Annex 4 is of particular interest, because it concerns a transport route between Russia and Iran, through Azerbaijan.

Incidents with radiation sources are frequently reported world-wide, but a majority should be labelled as unintentional trafficking with radioactive material. At the Conference on “Safety of Radiation Sources and Security of Radioactive Materials” in Dijon, France, 14-18 September 1998, the United States Nuclear Regulatory Commission (USNRC) informed that approximately 200 reports of lost, stolen or abandoned radioactive sources and devices are received each year (in the USA). Since 1983, the US metal recycling industry accidentally

melted radioactive sources on 30 occasions, with average financial consequences of 8-10 millions US$ per event. Similar incidents (31 cases) were at the Conference reported to have occurred in 18 other countries.

Regarding major accidents with radiation sources that have occurred around the world, the United Kingdom National Radiological Protection Board (UKNRPB) reported at the Dijon conference, about 15 fatal non-nuclear radiation accidents (1961-1996), which led to the death of 7 workers and 24 death of individuals of the public. Two serious cases of this type are reproduced in Annex 4.

Another illustration of illicit trafficking scenarios is the well-known development of the Pakistan nuclear weapons programme. It is of particular interest, because it shows the difficulties of maintaining an export control regime for nuclear items including dual-use items; or, the other way around, how export control (in industrial Western countries) can be circumvented. The West German Broadcasting Corporation (WDR) broadcast the following information in a film produced by Egmont R. Koch in 1998. Several individuals are interviewed in the film, among them the Director of the Pakistan Nuclear Weapons Programme, and the former Head of the Pakistan Atomic Energy Commission (PAEC):

> The Nuclear Weapons Program was initiated in 1976. The Director worked in 1974 as a scientist at the URENCO uranium enrichment plant at Almelo in Holland. He was engaged in centrifuge technology and had access to centrifuge designs, and to names and addresses of sub-contractors in several European countries. According to a Dutch criminal investigation report in 1979, he delivered documents concerning centrifuge technology to Pakistan. In the TV interview, however, he denies that he was a spy and claims that he was a normal employee who obtained centrifuge know-how in connection with his work at the project in Holland.
>
> The Director further tells, during the interview, that when he, as the leader of the Pakistan nuclear weapons programme, wanted to purchase nuclear equipment, he was visited in Pakistan by several European contractor firms, who offered to sell to him equipment to be used in the centrifuge process. He used a Dutch friend as a purchaser of equipment from European firms. The trade central was the Pakistani Embassy in Bonn. He said that, when you want to buy something, you place an order, and normally you get it. If not, you ask "Tom" (middleman) who will get it for you, but you may have to pay him a 15 % fee.
>
> Also the Head of the PAEC clarified during the interview, that the companies were quite aware of what Pakistan was doing (i.e. building a centrifuge plant for enrichment for nuclear weapon purposes). He argued that it was not the responsibility of Pakistan to meet with the West European export regulations. He also said, that of course the companies made good profit, because when there are export restrictions the "exporters go underground and the prices go up". He also stressed with emphasis: "Sanctions don’t work".

There is also a recent case about smuggling of a thyratron from Sweden to Iran. The Swedish Customs discovered during a post export control late 1998 that one thyratron designated “Grounded Grid Thyratron F-205” had been exported from Sweden to Iran. The thyratron was declared to customs as “1 pcs of instrument” and was of U.S. origin. An individual was stated as exporter and as consignee appeared the University of Amir Kabir, Teheran. Open source information showed that the University of Amir Kabir has a 5 MW research reactor and hot cells for radioactive materials. The university is also known as Nuclear Research Centre at Teheran University.

Further investigations by customs, including an audit at the exporter premises, showed that Grounded Grid Thyratron F-205 according to its technical specification is covered by item 3A228 (Nuclear Suppliers Group) in the EU-list of dual-use goods. It therefore requires an export permit when exported from Sweden. Thyratrons was used earlier in the U.S. nuclear weapons programme in the electronic circuit that gives a simultaneous ignition of the large amount of detonators that achieves the detonation of the nuclear device.

On 8 September 1999, Customs could seize a Grounded Grid Thyratron F-205 thyratron at Stockholm-Arlanda airport from the same exporter. The consignee was University of Elm-o-Sanat, Iran. The Customs criminal investigation division in Gothenburg carried out a preliminary criminal investigation, which included search warrants and interrogations with involved individuals. On 25 November 1999 the district court in Halmstad sentenced the exporter, a Swedish citizen, 21-year-old Iranian born, to 4 months in prison for the smuggling of one thyratron and the attempt to smuggle a second thyratron. He was also sentenced for forgery of documents relating to the issuing of end user statements. Both prosecutor and defender have appealed. The seized thyratron was forfeited to the Swedish government (Customs).

B.3 Market Components

The Market of illicit trafficking offers a broad spectrum of players, governed by different motives or reasons, and different chains of activities for obtaining, moving, supplying or using the "product". The Market can be illustrated through the following components:

- materials and items subject to illicit trafficking;
- the demand side; and
- the supply side.

Materials and Items subject to Illicit trafficking

In the following are described the different categories of radioactive materials which are potentially subject to illicit trafficking; where it can be obtained, and also, in brief form, the techniques used by a proliferator for transferring the nuclear material to weapons-usable material.

a) Nuclear Materials and Nuclear Items

- Nuclear weapons and Weapons-grade Uranium, above 90 % U-235, and Plutonium-239, available at military storage sites and at weapons manufacturing facilities;

- Fresh research or military reactor fuel elements in metallic, alloy form, containing Highly Enriched Uranium (HEU) with 20 or more % U235 or U-233; Fresh commercial nuclear power reactor fuel in the form of fuel rods or assemblies, containing around 4 % U-235; and Mixed-Oxide (MOX) fuel with uranium and plutonium.

  The fresh nuclear fuel can be used by a proliferator, who has access to technical resources for enrichment of the fuel to weapons-grade uranium. The enrichment techniques that could be used by a state are:

  (i) gas centrifuge, commercial development in Europe by the partners of URENCO, i.e. UK, Netherlands and Germany. Gas centrifuge separation is the method used by Pakistan and was part (not finished) of the Iraqi efforts to produce weapons material;
  (ii) gaseous diffusion, which was one of the early developed techniques for uranium enrichment. In use mainly in the USA and France. In Russia replaced by gas centrifuge plants;
  (iii) nozzle technique, which emerged in the 1970s and 80s as a major innovation pioneered in Germany and developed independently in South Africa;
  (iv) laser separation, for which research and development started in the late 1970's, but so far has had no commercial applications. It permits isotopes to be "stripped" from certain materials containing uranium-235 or plutonium-239, and could possibly be operated on a small scale to produce enough material for a few weapons;
  (v) using calutrons; this is an outdated but simple and commonly known technology, which is attractive to potential proliferators who want only a small number of weapons rather than a large arsenal. It was part of the Iraqi programme.

- Spent (irradiated) nuclear power reactor fuel assemblies, preferably with low burn-up, containing Pu-239 that has been produced from U-238 through capture of neutrons in the reactor. The proliferator would have to separate the plutonium from the other elements in the fuel (uranium and fission products). The chemical separation of plutonium in small amounts does not require technical resources that generally can be provided only by a State. Larger quantities and efficient operation of the separation process, however, will clearly require such advanced technology. Separation of plutonium from commercial high-burn-up reactor fuel will result in a weapon that is of less use from a military point of view, but that still can be an operable weapon, however unpredictable, of interest to terrorist organisations, and which could also function as a radiological weapon.

- Nuclear items, i.e. mechanical or electronic components, equipment and devices that can be used, or that are necessary, for the manufacturing of nuclear weapons or nuclear explosives. Some of these items are also dual-use items. They are available at factories in many countries, in particular in developed countries in the Western World; (for definition of Nuclear Items, see Annex 2).

b) Radioactive Material other than Nuclear Material

Large amounts of radioactive material comprising many isotopes are used legally in medicine, research and industry but have no connection with the production of nuclear weapons. Strong radioactive sources can, however, have very harmful and even lethal effects and in the hands of criminals, psychopaths or terrorists they can be used as weapons for threats and extortion for personal, financial or political reasons. Even a weak source could be used for this purpose. A villain that claims to have large amounts and is able to provide a sample of radioactive material has a strong point in his extortion demands.

Very strong radioactive sources are used mainly for two purposes, for cancer therapy in hospitals and for industrial sterilisation and curing of materials. The sources are enclosed in containers with heavy protective screens and placed in special bunkers with thick concrete walls. A theft is not so easily arranged, especially as an unprotected source is very harmful also for the thieve. There are, however, examples of illicit trafficking with radioactive sources causing serious consequences.

<u>The Demand Side</u>
The (illegal) users of material and items that are offered or available on the illegal and criminal market of illicit trafficking activities can be categorised as follows:

a) States (other than the NPT recognised nuclear-weapon States) that already have a nuclear weapons programme, or have the ambition to obtain nuclear weapons, i.e. so called Threshold States. Examples are: Iraq, Iran, Pakistan, India, Israel, and North Korea. The States may, or may not, intend to use the nuclear weapons to execute nuclear war fare (in defence or offence), or to exercise state terrorism towards another state, or to use a nuclear weapons arsenal as a threat or deterrent;

b) Terrorist organisations of two types:
"mafia gangs" that are trading with nuclear material in the same way as with narcotics or valuable antiques and art, and "terrorists", including sub-national groups, that want to use nuclear or radioactive material as a threat or a weapon in political or ideological terror acts, or as a means of murder.

c) Groups or individuals that might use nuclear weapons or radioactive material as a threat, with criminal intentions, such as extortion, with a financial or political/ideological motive;

d) Individuals (brokers) that will buy, smuggle and sell to final users nuclear weapons, weapons-grade uranium and plutonium, nuclear items, or radioactive material which can expose workers or members of the public to the danger of ionising radiation. The motive is presumably in the first place financial profit, but can of course also be political/ideological.

e) Members of the public who come across radioactive material without knowledge about the content and the risks involved. The purpose might be to sell the container and its content as scrap or just simple curiosity.

The Supply Side

The players on the supply side of the illicit trafficking market are individuals or groups that are:

- acquiring the material or items in illegal (criminal) actions, such as theft or terrorist attacks; and

- bringing the material to the demand side user, or a broker, by means of concealed transport within a state or over borders, i.e. smuggling.

Their motives for committing those crimes may be political (terrorists) or personal financial profit. The theft of the material at a nuclear facility or storage of nuclear material (military or civil) can be "protracted theft", i.e. concealed, drawn out over time, and involving planning and organisation, with the help of insiders, or it can be "abrupt theft", i.e. executed quickly or involving terrorist action.

An important distinction should be made with respect to the methods used for illegally obtaining "nuclear items" including dual-use items, in comparison with "nuclear material". The illegal acquisition of nuclear items is presumably not done by theft, but by procurement, directly or via a front company, on the open industrial market. This is made possible because of poor export/import control systems, but also with the help of bribes and corruption. This method was used in the well-known, and openly admitted, case of Pakistan's nuclear weapons programme. The difficulty in establishing and maintaining feasible and efficient export/import control systems for nuclear items, including dual-use items, is an admitted concern among representatives of State nuclear authorities, in particular in industrial countries with a large, advanced and complex industrial structure. Some authority representatives even go so far that they claim that an effective export control of nuclear items is next to impossible, but has to be considered mainly as a measure of deterrent.

C. PREVENTION

When contemplating systems and measures for the prevention, detection and response to illicit trafficking in a State, within its territory or across its borders, one has to take into consideration its specific and unique characteristics and features in overall terms, such as geographic location, borders and coastlines, political situation, economic conditions, industry, financial systems, governmental structure. For the purpose of this study, however, the components of a State's infrastructure that are considered of prime relevance for illicit trafficking combating are concentrated on the following:

- National legislation;
- Systems of State supervision/control of nuclear and radiation operations and practices;
- Organisation of operator activities (responsibilities, internal control, safety culture);
- Physical Protection of nuclear material, other radioactive material and nuclear facilities;
- Export/Import Control of nuclear material and nuclear items;
- Law enforcement functions (police, security, customs, investigation, prosecution, penalties and sanctions);
- Procedures for co-ordination and co-operation between State authorities and agencies.

In this chapter are discussed those components, which are of major importance for Prevention of illicit trafficking: Legislation, State Control System, Operator Activities, Physical Protection and Export/Import Control.

Law enforcement functions and procedures for co-ordination and co-operation between State authorities are discussed in Chapter D, as being major components for illicit trafficking Detection and Investigation.

Nine reference countries were adopted for the study, namely: the Czech Republic, Finland, Germany, Latvia, Norway, Poland, the Russian Federation, Sweden and Ukraine. All these countries are parties to the NPT; eight of them as non-nuclear weapons states, and the Russian Federation as a nuclear weapons state. As background information, a review has been made of these countries with respect to laws and regulations with relevance to the combating of illicit trafficking through prevention, detection and response. The review is based mainly on information obtained at visits to these countries and at meetings with supervision and law enforcement authorities. The review is presented, country by country, in Annex 5.

C.1 Legislation

INTERNATIONAL LEGAL INSTRUMENTS

General
The fundamental international legal instruments for ensuring secure nuclear activities involving nuclear material are:

- the Treaty on the Non-Proliferation of Nuclear Weapons (NPT*)*, and

- Safeguards Agreements with the International Atomic Energy Agency, IAEA, (based on IAEA document INFCIRC/153 corrected), including the Additional Protocol to the Agreement for the Application of Safeguards (INFCIRC/540 corrected).

A safeguards agreement commits a party State to establish a State System of Accounting for and Control of Nuclear Materials (SSAC). For the fulfilment of the agreement obligations, the State must also establish and implement procedures and measures for the Physical Protection of nuclear material and nuclear facilities (against theft and terrorist attacks), and for Export/Import Control of such material.

The legal requirements on physical protection should be based on:

- the Convention on Physical Protection of Nuclear Material (IAEA INFCIRC/274/Rev. 1) and the recommendations of IAEA INFCIRC/225/Rev. 4, which also includes nuclear facilities.

The national legal requirements on export/import control should be based on:

- the Guidelines of the Nuclear Suppliers' Group (NSG*)*, listed and circulated through IAEA circular INFCIRC/254 Part 1 and Part 2, as amended.

For the safe handling and use of ionising radiation sources, similar legislation should be established, preferably based on the IAEA document:

- International Basic Safety Standards for Protection against Ionising Radiation and for the Safety of Radiation Sources, referred to as the BSS (IAEA Safety Series No. 115).

Treaty on the Non-Proliferation of Nuclear Weapons (NPT)
The Treaty came into force in 1970, and the Review and Extension Conference indefinitely extended it in 1995. There are 182 non-nuclear weapon States and 5 nuclear-weapon States party to the Treaty. Of significant interest is to note, that the following four States are not parties to the NPT, three of them have nuclear weapons or capabilities to build such weapons: India, Pakistan, Israel and Cuba.

For this study relevant parts of the NPT are quoted in Annex 6.

IAEA Safeguards Agreements according to INFCIRC/153 Corrected

Safeguards are technical means of verifying compliance with legal obligations relevant to the peaceful uses of nuclear energy. Their objectives are political, that is, to assure the international community of the peaceful nature of safeguarded nuclear activity and to deter the diversion or misuse of safeguarded materials or facilities through the risk of early detection.

The application of the IAEA's safeguards is primarily based on information provided by the State of the nuclear material or equipment that should be subject to safeguards. The IAEA has a right to undertake special inspections to ensure that all nuclear material that is subject to safeguards are in fact safeguarded and for that purpose to obtain and have access to additional information and locations to guard against possible undeclared activities.

Safeguards cannot by themselves prevent a violation by a State of its obligations not to divert nuclear material from peaceful purposes, and cannot assess the future intentions of States. The system is designed as an early warning mechanism to initiate the necessary procedures for remedial action in case of violation. Under the IAEA Statute, non-compliance with safeguards obligations is to be reported to the United Nations for appropriate action.

Safeguards agreements set out the parties' basic rights and obligations, relevant to the application of safeguards. Detailed implementation procedures are found in a technical set of subsidiary arrangements to the agreements, which are tailored to the specific requirements of safeguarded facilities. Subsidiary arrangements are considered confidential, and are accessible only to the IAEA Secretariat and the State Party.

A fundamental requirement in an NPT/INFCIRC/153 safeguards agreement with the IAEA is the establishment of State System of Accounting and Control (SSAC) . A strong SSAC is the primary deterrent to theft and illicit trafficking of nuclear material. Material accounting and control is designed to assure that the location and amount of all nuclear material in a State is known and confirmed through periodic inventory taking.

In Article 1 of an INFCIRC/153 agreement between a non-nuclear-weapon State and the IAEA, the State undertakes to accept safeguards on all source and special fissionable material in all peaceful nuclear activities within its territory, under its jurisdiction or carried out under its control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices.

Article 2 of an INFCIRC/153 safeguards agreement provides for IAEA's right and obligation to ensure that safeguards will be applied.

More, for this study relevant, information about IAEA's safeguards system is reproduced in Annex 6.

IAEA INFCIRC/540 ("The Additional Protocol")

In May 1997, the IAEA Board of Governors adopted a model protocol to comprehensive safeguards agreements that grants IAEA broader rights of access to sites and information. States accepting the Protocol will provide additional information on nuclear and related activities. Moreover, the IAEA will have greater access to activities and locations to detect clandestine nuclear programmes.

The Protocol is the direct outcome of a two-part process for achieving a strengthened and more cost-effective safeguards system. Part-1, approved by the IAEA Board in 1995, includes:

- Environmental sampling at locations to which the IAEA has access for design information verification or inspections. It is considered a powerful tool for detecting the presence of undeclared activities at or near declared nuclear sites;

- "No-notice" inspections at the strategic points of all nuclear facilities;

- IAEA's right of access to records of activities carried out before a safeguards agreement enters into force, to help ensure that all material has been declared;

- Use of advanced technologies that can operate unattended to transmit information to IAEA headquarters.

Part-2 measures incorporated in the Protocol include:

- An "expanded declaration" to provide information on activities related to the nuclear fuel cycle. This will help give the IAEA a better understanding of a State's nuclear programme, its future directions, and the kinds of nuclear activities the programme's infrastructure could support;

- Access to any place on a nuclear facility site, to any decommissioned facility, and to any other location where nuclear material is present; to nuclear-related manufacturing and other locations identified by the State in its expanded declaration; and to other locations identified by the IAEA;

- The use of environmental sampling and other measures at these locations.

European Union (EU)/Euratom Safeguards Agreements

Is not reported here, since the study is focused on the NIS and Russia. However, the Euratom safeguards, as carried out in EU Member States, is based on the Treaty on Atomic Energy, including Regulation No. 3276.

Requirements for Radiation Sources

With regard to legislation relating to radiation sources, other than nuclear material, there are no internationally binding legal instruments through which

States can commit themselves to ensure the control and security of radiation sources and, in particular, to report the loss or theft of such sources to the IAEA and/or international organisations.

The scientific basis for radiation protection standards is found in recommendations made, and periodically reviewed, by the International Commission on Radiological Protection (ICRP), which take account of studies by the United Nations Committee on the Effects of Atomic Radiation (UNSCEAR). The work underlies the "International Basic Safety Standards (BSS) for Protection Against Ionising Radiation and for the Safety of Radiation Sources" by which the International Labour Office (ILO), the World Health Organisation (WHO), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA), and the IAEA have provided a world-wide basis for harmonised and up-to-date standards. The BSS have been reviewed and revised by those four organisations, together with the Food and Agriculture Organisation (FAO) of the United Nations, and the Pan-American Health Organisation (PAHO). The IAEA Board of Governors approved the revised standards in September 1994. The BSS is regarded as an important instrument for all national legislation in the area of radiation safety and protection.

The BSS are complemented by other standards dealing with particular aspects of radiation protection: occupational protection; protection of the public and the environment; and intervention in case of a nuclear accident or radiological emergency. Many States tailor their national regulatory systems to the general guidance provided by the BSS.

Adoption of the BSS by member States and international organisations establishes a general obligation that activities utilising radioactive material, including nuclear material, are carried out in accordance with the BSS. The BSS reflects that the transport of radiation sources should be performed in accordance with the requirements of the IAEA recommendations for the Safe Transport of Radioactive Material (IAEA Safety Series No.6), which may be made mandatory through applicable international conventions and national legislation.

Requirements of the BSS that are relevant to illicit trafficking are those of notification and authorisation by registration or licensing, as well as those related to the security of radiation sources. The requirement on security establishes that sources shall be kept secure by registrants and licensees so as to prevent theft or damage and to prevent any unauthorised use of such sources. Independent verification by an established national Regulatory Authority is an essential condition of compliance with the BSS requirements. Thus, although the BSS are intended to place requirements on registrants and licensees, who have the primary responsibility for applying them, Governments have the responsibility for their enforcement, generally through a national infrastructure that includes the necessary Regulatory Authority.

NATIONAL LEGISLATION

Fundamental Principles

Most States are signatories or parties of international treaties, conventions and agreements that aim at ensuring that all radioactive material, possessed and used for peaceful purposes (i.e. nuclear material, ionising radiation sources, radioactive waste, and other material with induced radioactivity), are being used, stored, handled and transported in a manner that will not cause impermissible and harmful exposure of ionising radiation to man and the environment. In this context, special attention is given to such nuclear material that can be used for the manufacturing of nuclear weapons.

The treaty/agreement requirements and obligations concerning the safe and secure possession, use, transport and handling of radioactive materials must be imposed on the users of such material in national legislation.

Through the NPT, States that are parties to the Treaty accept the obligations to protect their nuclear material from unauthorised use, theft and sabotage. This is in addition to their safety-related obligations to prevent the release of radioactive material from nuclear facilities that could have an harmful impact on humans and the environment. The dual requirement of security and safety for the use and handling of nuclear material leads to an overall requirement of physical protection of such material.

The national nuclear laws and regulations should cover both non-proliferation and nuclear/radiation safety. The laws should be clear, transparent and understandable, so that the application of stipulated rules and requirements is facilitated both for the users/operators and the State authorities, as well as for the public.

Since 1994, the International Group of Legal Experts (ILG) has, with Swedish sponsorship, assisted several Newly Independent States (NIS) in establishing new or improved nuclear legislation. The approach to systematically implement the requirements of international treaties, agreements and conventions into the national legislation that is recommended by the ILG is:

> *"first to establish a Basic Nuclear Law, and then to develop additional requirements and regulations in the form of ordinances, based on the Basic Law. The basic, or core, nuclear law would be a joint responsibility of Parliament and Government, while the ordinances would be the delegated responsibility of the Government alone. Detailed requirements and regulations of a more practical and technical nature should be established by a State authority (Nuclear Regulatory Body), i.e. instructions, recommendations, guidelines and manuals aimed at promoting harmonised procedures and standards for the different types of nuclear activities".*

The national legislative system should be based upon certain fundamental principles, which should be reflected as provisions in laws and become ”corner stones” of the legislative structure. The most important of these principles are:

- a system of obligatory "Licensing" of nuclear activities by a State Regulatory Body;

- "Sanctions and penalties" for activities that are carried out without a license, intentionally or unintentionally;

- an independent State Regulatory Body in the centre of a "State Control System";

- "Operator's responsibilities" for both non-proliferation and safety, reflected in an approved Operator's System with identified personal and individual responsibilities.

Licensing

The Law should state that licensing by the State Regulatory Body is a requirement for all nuclear activities and practices including radiation sources within a practice. It should also stipulate the consequences of non-adherence to the licensing requirements in the form of sanctions and penalties. Any nuclear activity without a license should be declared illegal. The license should prescribe the conditions that are necessary for the fulfilment of regulatory requirements and standards.

The establishment of a licensing system is essential, because licensing is the most useful and effective tool available to the State Regulatory Body to control that the nuclear activities and practices including radiation sources within a practice are implemented in accordance with laws and regulations. It is the responsibility of the facility operator, and not of the state authority, to establish, implement and maintain a system for the safe operation of the facility, and also a system aimed at preventing the unauthorised use of nuclear material and equipment. In a modern licensing system, the operator must demonstrate and prove to the State Regulatory Body that he has sufficient technical and operational competence, as well as financial and other resources, to build and operate a nuclear facility or installation, and to manage and handle radioactive material in a way that ensures safety, safeguards and non-proliferation.

Sanctions and penalties

Below is given an overview comparison of the minimum and maximum rates of penalty for smuggling and other crimes with connection to nuclear material in OECD States with significant nuclear power programmes. See also Annex 7.

Abbreviations used: Imp = imprisonment; Fi = fines; th = thousand; y = years.

State	Smuggling	Other violations of licensing regulations	Severe crimes i.e. aiming at nuclear weapon devices
Canada	Fi max 20 th $ or Imp 5 y or both	Fi or Imp max 2 y	Imp max 10 y

France	Imp 2-10 y or Fi	Fi max 250 th F	Imp 2-10 y
Germany	Imp max 3 y or Fi	max 100 th DM	Imp 5 y – lifetime
Japan	Imp max 1 y and Fi max 300 th yen	Imp max 3 y and Fi max 500 th yen	Imp max 10 y
UK	Imp max 5 y or Fi or both	The same	Imp max 14 y
USA	Fi max 10 th $ or Imp max 10 y or both	Fi max 5 th $ or Imp max 2 y or both	Imp up to lifetime
Belgium	Imp max 5 y and Fi max 1 million FB	Fi max 1 million FB or Imp max 2 y or both	Imp 10-20 y (in case of causing death; otherwise 10-15 y)
Czech Republic	Fi max 100 million CZK	The same	-
Hungary	Fi according to license regulations	The same	Imp max 5 y
Spain	“Minimum term of Imprisonment”	The same	“Maximum term of penal servitude”
Finland	Fi or Imp max 2 y	The same	Imp min 4 y (crime with nuclear explosives)
Sweden	Nothing specific about nuclear material (nor about weapons; only for narcotic drugs)	Fi or Imp max 4 y	Crimes dangerous to the public: Imp max 8 y. (Nothing specific about nuclear devices)

Reference is also made to Annex 5 concerning Norway, Latvia, Poland and Russia.

C.2 State Control System

There should be a responsible and competent State authority, and the structure, power and independence of that authority should be stated in the Law, in particular with respect to the authority’s function as a State Regulatory Body. The independence should be both vis-à-vis operators and other State

authorities and also State organisations or bodies that are facility operators. There could be more than one authority, as long as the respective responsibilities are clearly delineated.

The State Regulatory Body should have the right to issue instructions and guidelines for inspections and other control functions. These instructions should include the mandate and area of responsibility, including the right to exercise the mandate and the means of enforcement, such as right of entry, right of halting operations, and right to call upon relevant authorities for arrest, search or seizure.

A major objective of the State nuclear control system must be an efficient and appropriate control and supervision of both installations and individuals, aiming at a strict and complete implementation of State laws and regulations and of other requirements that are stipulated as licensing conditions. To meet that objective in an effective way, modern control procedures and routines should be used. This would include the establishment of a kind of teamwork-interaction between, on one side, the State Regulatory Body's inspectors and, on the other side, the operator staff responsible for quality control and quality assurance.

Two control stages could be identified:

- control during the pre-operational stage, i.e. the so called System Entry Control, and

- control during the implementation and operational stage, i.e. the so called Continuous Surveillance Control.

The System Entry Control comprises the licensing process, and the way in which it is carried out will lay the ground for the future implementation of control and surveillance measures. The emphasise of the control through Continuous Surveillance should be put on the successive fulfilment of the licensing conditions in all its parts and details. The Continuous Surveillance Control should include the study and analysis of the applicability and suitability of standards, procedures and routines, and how and to what extent they are used in the processes and in the handling of radioactive material. It should also be observed how experience from quality assurance and internal quality control is accumulated and used, and how the management's responsibility is exercised.

With respect to the non-proliferation measures, the emphasis of the Continuous Surveillance Control should be put on a thorough auditing of the procedures for handling and accountancy of the nuclear material at the installations, and of the physical protection of nuclear material, both at the installations and in transit. In addition to the continuously implemented control routines, the concept of random spot-check inspections should be used.

As a general principle, the supervising authority should not be encouraged to prescribe in detail to the operators how the different safety and non-proliferation measures should be implemented and carried out. That should be left to the

operators themselves. The control authority should advise, clarify and approve of measures that are worked out and presented by the operators.

C.3 Operator Responsibilities

A fundamental licensing condition should be that the operator establishes, in addition to the nuclear and radiation safety systems, a safeguards and physical protection system aimed at preventing proliferation or unauthorised use of radioactive material and equipment. He should also establish a system of Quality Assurance and Internal Control.

In line with Western nuclear legislation principles, and in harmony with legislation in other high technology and safety areas, a modern nuclear legislation system requires a clear indication of personnel and individual responsibility and accountability. The duty of the State Regulatory Body is to ensure that the adequate legislation and regulation is applied and implemented, and also to carry out control through inspections

State regulatory bodies are normally not in a position to control in detail all nuclear activities, nor do they normally have the personnel resources to do so. The principle of individual responsibility in an internal control system is, therefore, essential for ensuring an adequate technical and operational standard. The operator must have in place an organisation, including procedures, instructions and documentation, that is appropriate to the safe and secure operation of the installation. The operating staff must have the required competence and skill, and an education and training program must be established to ensure that technical competence as well as safety awareness are maintained.

Prompt and effective procedures for dealing with abnormal operational events, as well as preventive measures, are prerequisites for a well-functioning quality assurance and internal control system. Procedures for reporting and carrying out analysis, including documentation and information, are other necessary elements of the system.

Another essential aspect of internal control concerns various methods for developing and maintaining proper safety attitudes and motivation among staff towards the safe operation of a nuclear installation. These methods are directly related to the requirements on a high safety culture that is recommended by the IAEA in its Safety Series No. 75.

The facility operators' Internal Control has more and more become of topical interest in industrial areas characterised by high safety requirement. The introduction of Internal Control has given a new tool to the State authorities in their effort to monitor the fulfilment of legal (safety and security) requirements, which should lead to an improved safety and security standard. The reason for this is that the Operators would have to demonstrate to the Authorities their safety measures and procedures in a more systematic way and with the help of organised documentation.

For an efficient implementation of Internal Control, competent staff would have to be engaged, both by the Authority and by the Operators. A successful result can be obtained only if responsible and competent personnel on both sides are co-operating.

In a safety and security structure of State supervision in combination with operator internal control systems, the operator's entire staff must be fully engaged in the organisation and systematisation of the operation activities with the aim of avoiding accidents, damages, injuries and incidents. The Operator shall take the initiatives for the organisation and systematisation of the operational activities for meeting laws and regulations. The Authority has to be active and engaged and, in dialogue with the Operator, learn about the Operator's means and ways of meeting the safety requirements.

In an efficient system of Internal Control, it is the Operator management that "voluntarily" initiates measures for fulfilling the requirements of laws and regulations and implements them in a systematic and organised way. But the Authority has always the power to take decisions on means and measures. The management must also follow-up on its own decisions and monitor and control the implementation process. The management's control system must be clearly defined and prescribed in an Internal Control Manual, that is binding vis-à-vis the Authority.

For each nuclear facility and for facilities using radioactive material or radiation sources, a programme for Internal Control shall be planned and implemented in accordance with the guidelines given above. The programme shall cover the whole organisation and it shall be documented. It shall establish and clarify the organisational structure, functions, responsibilities, and contacts with authorities. It shall also identify the operational activities that are relevant to safety and quality, including physical protection and accountancy of nuclear material and radiation sources, and shall be specified for the operator's line organisation.

C.4 Physical Protection

Physical protection against the theft or unauthorised diversion of nuclear material and against sabotage of nuclear facilities by individuals or groups is a matter of both national and international concern. Two instruments on physical protection, which have relevance to the problem of illicit trafficking, have been established:

- the Convention on the Physical Protection of Nuclear Material (INFCIRC/274/Rev. 3); and

- the IAEA "Recommendations on the Physical Protection of Nuclear Material and Nuclear Facilities" (INFCIRC/225/Rev. 4), which were prepared by a panel of experts convened by the IAEA Director General and first published in 1972.

The Convention, which entered into force in 1987, defines levels of physical protection to be applied to nuclear material used for peaceful purposes while in international transport. States that are parties to the Convention are obliged to:

- make certain acts (e.g. theft of nuclear material, or threat to use nuclear material to cause harm) punishable offences under national law;
- extradite or prosecute persons alleged to have committed such acts; and
- provide assistance to other parties to the Convention in the event of an incident.

However, there is no obligation on the parties to the Convention to ensure the protection of nuclear material used for peaceful purposes while in domestic use, storage and transport. Furthermore, the Convention does not apply to:

a) nuclear material used for military purposes; or
b) other radioactive sources.

INFCIRC/225/Rev. 4 provides guidance and recommendations for the physical protection of nuclear material in use, storage and transport, whether domestic or international and whether peaceful or military, and contains provisions related to the sabotage of facilities. Most industrial and developing countries are guided by these recommendations in the establishment and operation of their physical protection systems.

In order to assure that adequate physical protection is provided, State systems must establish conditions which would:

a) minimise the possibilities of unauthorised removal of nuclear material or of sabotage;

b) provide rapid and comprehensive measures to locate and recover missing nuclear material; and

c) minimise the effects of sabotage.

C.5 Export/Import Control

NPT Requirements

The basis for all international regimes for nuclear export control is the NPT. In accordance with Article III.2 of the NPT:

> *"Each State party to the Treaty undertakes not to provide:*
> *(a) source or special fissionable material, or*
> *(b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material,*
> *to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this article".*

The Treaty requirement on safeguards refers only to the fissile material directly provided or involved in the utilisation of such equipment or material supplied that has the "especially designed or prepared for" (EDP) characteristics. This means that so called full scope safeguards are not inherent in the Treaty. Consequently, the safeguards agreements concluded on the basis of NPT with the IAEA (INFCIRC/153 agreements) are not required to include all source and special fissionable material in its peaceful nuclear activities.

The Zangger Committee

The NPT does not elaborate on the meaning of EDP. For this reason, fifteen States formed a group, in 1971, called the NPT Exporters Committee for the purpose of interpreting the meaning, or intention, of Article III.2.b, i.e. to clarify what should be considered as "equipment or material especially designed etc.". This group later became known as the "Zangger Committee" (ZC), named after its first chairman.

The ZC members agree on Memoranda and a Trigger List of items that are considered as Article III.2.b items. The list is called Trigger List, because the export of such items "triggers" the safeguards requirement. It is made public through the IAEA as document INFCIRC/209, as amended. Other than this publishing support, there is no IAEA involvement in the functions of the ZC. The Committee member States are exporters, or potential exporters, of nuclear materials or products. They are under the obligation to observe and follow the Memoranda agreed by the Committee, including the Trigger List. The obligations are, however, not legally binding.

The Nuclear Suppliers Group

Following India's nuclear test explosion in 1974, the need for control supplementary to that provided by the Zangger Committee Trigger List was experienced. In 1975, seven States met in London to exchange views on how the nuclear export control system could be strengthened. This initiative was first known under the name "the London Group", but became later the "Nuclear Suppliers Group" (NSG). In parallel with the ZC, an NSG Trigger List was established. The List is very similar to the ZC Trigger List and both parties strive for the harmonisation of the two Lists, to the extent possible, in view of the different mandates.

NSG development activities made a pause until the disclosure of Iraq's nuclear weapons programme. In 1992, the NSG introduced "Dual-Use Items" and established a Dual-Use Items List, accompanied by Separate Guidelines.

The NSG has two set of Guidelines:

- Part 1 Guidelines (including the Trigger List) for so called "Dedicated Use Items", i.e. source and special fissionable material and items especially designed or prepared for the processing, use or production of special fissionable material (so called EDP items); and

- Part 2 Guidelines for Dual-Use Items, which are items or products that are not EDP, but that can be used for both nuclear and non-nuclear purposes.

Part 1 Guidelines require the recipient State to provide evidence that the material will not be used for the development of nuclear devices. The requirement applies also to the transfer of technology. Furthermore, the recipient State must conclude a full-scope safeguards agreement with the IAEA. In common with ZC practice, the NSG member States notify the IAEA Director General about their intention to abide by the Guidelines.

The NSG Guidelines and Trigger List are published by the IAEA in document INFCIRC/254, as amended. As with the Zangger Committee, the IAEA has no other involvement in the NSG.

The Additional Protocol

Following the disclosure of Iraq's clandestine nuclear weapons programme, it became evident that IAEA's safeguards system under NPT/INFCIRC/153 had serious limitations in providing reasonable assurance to the world community about the peaceful nature of the nuclear activities carried out by a State, party to the NPT and under IAEA's safeguards. In the aftermath of this experience, the so called Strengthened Safeguards System was developed. The result is now known under the jargon name of "the Additional Protocol". It is referred to above in C.1.

The Additional Protocol has significant relevance in terms of export/import control of nuclear items. Article 2.a (ix) stipulates that the State Party shall provide the IAEA with a declaration containing:

> *"the following information regarding specified equipment and non-nuclear material listed in Annex II:*
> *(a) for each export out of [the State] of such equipment and material: the identity, quantity, location of intended use in the receiving State and date or, as appropriate, expected date, of export;*
> *(b) upon specific request by the Agency, confirmation by [the State], as importing State, of information provided to the Agency by another State concerning the export of such equipment and material to [the State]".*

The Annex II referred to in the Protocol represents the presently existing, amended NSG Trigger List, with very few exceptions. Because of the treaty character of the Protocol, States that export Trigger List Items are under the obligation to have effective export control in place, so that reports to the IAEA can be issued. Similarly, importing States must operate a system capable of tracking any import of such items, in order to be able to provide, on request, the confirmation to the IAEA of the import.

D. DETECTION AND INVESTIGATION

D.1 National System

STRUCTURE

When referring to a "national system for combating illicit trafficking", it is meant the combined functions and operations of several State authorities which, in one way or the other, have a role to play in the State's efforts to prevent, detect and respond to illicit trafficking. The number of those authorities and their assigned responsibilities vary from country to country.

The key components of a national system for combating illicit trafficking are:

- nuclear and radiation safety authorities, and
- law enforcement authorities,e.g. police, customs, criminal investigation.

As an example, in Sweden there are 16 different authorities that are engaged in a co-operation reference group on non-proliferation, which includes the combating of illicit trafficking.

Because several authorities and agencies are involved, and considering the need to integrate every institution whose competence, experience or resources might be needed in the national system for combating illicit trafficking, it is necessary to establish certain principles that have to be applied in order to achieve effective and timely reactions of that system. As an example of such principles formulated for a national system, reference is made to the German system, for which the following principles have been established:

1) responsibilities and tasks assigned to each authority or agency must be clearly specified;

2) rapid reporting of illicit trafficking events, and distribution of all relevant information to the concerned authorities and agencies must be ensured;

3) law enforcement and nuclear/radiation safety authorities and their experts must be available around the clock, if necessary;

4) law enforcement and nuclear/radiation safety authorities must have radiation detection and analysis equipment at their disposal in conformity with their tasks;

5) inter-authority/agency co-ordinating bodies and their assessment teams should be formed for severe cases;

6) training and sharing of experience from actual cases must be provided for.

RESPONSIBILITIES

The tasks and responsibilities of the various State authorities should be stipulated in national legislation (laws, decrees, regulations). In the following, an example of such task assignments is given, based on the German system.

Duties assigned to the nuclear/radiation safety authorities comprise:

- expert advice and support to the law enforcement authorities from the beginning of an illicit trafficking case, concerning radiological or criticality risk assessment, detection, radiation protection, analysis or safe handling;

- assessment of the technical feasibility of threats involving radioactive materials, and of possible radiological consequences;

- search of radioactive materials with technical means;

- radiation measurements on the scene (local radiation fields, contamination of people and vehicles, isotope analysis);

- radiation protection measures, including measurements and decontamination, specification of isolation or access control areas, and of permissible radiation exposure limits for personnel;

- decisions concerning emergency measures;

- safe handling, packing, transport and storage (intermediate and final) of confiscated radioactive materials to secured storage places;

- laboratory analysis of physical, chemical and nuclear characteristics of seized materials, including isotopic composition, enrichment, impurities, etc., and nuclear forensic measures.

Tasks assigned to law enforcement authorities are:

- collection of indications, information or evidence of illicit trafficking cases, and informing concerned other authorities;

- assessment of threat credibility and feasibility

- criminal investigation and assessments, search activities;

- radioactive measurements and radiation protection measures before the arrival on the scene of authority experts;

- radioactivity border control at crossing points (road, rail, airports. seaports);

- confiscation of material, arrest of perpetrators, collection of evidence, forensic measures, etc.

CO-ORDINATION AND CO-OPERATION

In order to guarantee preparedness for rapid action in acute situations, it is essential that procedures are established and agreed in the national system for co-ordination of those activities that have to be initiated, once a real or suspected case of illicit trafficking has been detected. A communication network between all concerned authorities and agencies should be organised, with contact persons and identified communication links (telephone, fax, e-mail).

In Sweden, a reference group was established, in early 1992, with the purpose to handle questions of illegal proliferation of nuclear weapons and other weapons of mass destruction (WMD). The Group consists of ministries, agencies and organisations which, in their daily work, may come into contact with issues relating to the area of non-proliferation. Co-operation between the group members includes sharing of information, assisting with know-how and training, and direct collaboration on specific cases. The Swedish Security Service (SÄPO) functions as co-ordinator and secretariat, and convenes meetings, at least twice a year. Between the meetings, there are on-going personal contacts between the group members concerning various issues.

One of the important tasks of the Reference Group is to serve as a "knowledge bank". The reason is the following: There exists (in Sweden and other countries as well) a significant knowledge about the threats to society that uncontrollable proliferation of nuclear weapons and other WMD imply. The problem is, however, that the highly specialised knowledge are found at some of the State authorities, such as the nuclear and radiation safety authorities, and the defence and military research institutions, while the law enforcement authorities, in general, lack such competence.

The knowledge bank function is also useful in another context: Experience shows that rumours easily come into circulation about nuclear weapons and substances that can be used for the production of WMD, and are given a lot of space in mass media. To collect such information, examine its accuracy, and as soon as possible either verify or refute it, constitutes another of the tasks of the Reference Group. It is considered as an essential task to see to it that recipients outside the Group, who are in need of such information, also should be provided with it.

Finally, the knowledge represented by the authorities and organisations that form part of the Reference Group should be utilised in the formulation of a threat assessment of proliferation acts that can be the basis for preventive measures. It should be evident from the threat assessment what kind of threat there is; how probable its realisation is, and the seriousness of the consequences of the threat.

DETECTION EQUIPMENT

In spite of the fact that the area of detection of ionising radiation is a, since long, established field of research, and that a large number of techniques have been

developed for a number of applications, no single technique or standard has been adopted internationally in the area of border control of radioactive material. One reason is that this problem has been recognised internationally only for a few years. Today there are however a number of ongoing international efforts in this area.

The concept of detection of a smuggling attempt of radioactive material includes more than only the registration of a signal above the background level in a radiation detector. Different experts have defined it in different ways. One definition mentions three phases in the process: 1) measurement, 2) evaluation of the result (is it a false alarm or not), and 3) identification of the radioactive material.

In a broader context there are several more tasks that should be performed in the case of a smuggling attempt of a piece of nuclear material or other radioactive material. A complete forensic analysis, as presented by the Nuclear Smuggling International Technical Working Group (ITWG), consists of *detection, hazard evaluation*, *preservation of evidence*, *categorisation*, and *identification* of the material. All tasks, but the last one, could or should be performed at the border itself. Identification of the material, i.e. deduction of intended use, origin, smuggling route and last legal owner, involves more complicated analysis techniques, and can only be performed in specialised laboratories.

Equipment for radiation detection, used by law enforcement authorities (customs, police, border guards) are mainly:

- mobile detector systems, i.e. gamma and neutron detectors and dosimeters for self-protection purposes;

- fixed detector systems, so called portal monitors, used for surveillance of moving vehicles (road and rail) at border crossings.

The equipment available to law enforcement authorities is normally not capable of determining the kind of radioisotopes, the isotopic composition, and whether it is nuclear material or not.

More sophisticated radiation detection and analysis equipment should be available at the nuclear and radiation safety authorities, i.e. contamination detectors, neutron detectors, mobile gamma spectrometers. Such equipment can be used by search teams during mobile search actions in road vehicles or helicopters. There are mobile analysis equipment applying different physical principles (e.g. high sensitivity sodium iodide crystals, Ge detectors or neutron detectors) that enables analysis of containers with unknown radioactive content, or mobile search of neutron sources.

Detailed analysis of confiscated nuclear material and radioactive substances would have to be done at authority laboratories or at universities.

A more detailed review of the detection techniques is given in Annex 8 to this Report.

TRAINING

In a well established national system for combating illicit trafficking, training of law enforcement personnel is an essential component for establishing and maintaining a high level of competence and performance. The basic training should be focused on making police, border guards and customs officers familiar with basic radiation protection matters, as well as radiation detection and use of relevant equipment. But also on subjects related to illicit trafficking of dual-use items, which would include modus operandi procedures (senders, receivers, mode of transport, transport routes, payment procedures, etc.).

Training courses would have to be organised on a regular basis. Experience from actual illicit trafficking cases should be fed into the courses, in particular, regarding type of seized radioactive material, type of packages and containers, and other characteristic features. Joint seminars and exercises would also have to be organised for law enforcement officers and radiation protection experts. Such seminars and workshops serve also the purpose to get the involved staff from the different authorities to know each other and, thereby, reduce the "competition tensions" that, of historic or other reasons, impede a good and effective co-operation.

D.2 International Systems and Co-operation

General

International information exchange on nuclear proliferation matters takes place bi-laterally between concerned national security and intelligence authorities. Each national authority establishes its own database for information, relevant to the own country. The information is considered as secret and is treated as such. Most European countries are co-operating, bi-laterally, in a common information exchange network.

Disregarding a State's own efforts at and within its boundaries to combat illicit trafficking, it is obvious that participation in bi-lateral and multilateral co-operation agreements and organisations in the area of non-proliferation would be beneficial for increasing the knowledge, and for being able to more effectively monitor and respond to smuggling and other illegal handling and dealings with radioactive material. At present, there is, however, no established international system or structure for a co-ordinated search for and investigation of illicit trafficking of radioactive material, or of other criminal activities characterised by border crossing, organised crime and money laundering, involving narcotics, conventional weapons or biological and chemical weapons.

The major difficulties hampering any efforts to set up international "search and investigation" teams or forces are:

- the law enforcement agencies of one country is not allowed into another country's territory for carrying out investigation of a crime that originates in the first country, and

- the laws and regulations supervising law enforcement activities, including arrest and prosecution, are different in different countries; they are not harmonised even between the fifteen States of the European Community.

This problem was addressed at a summit meeting on combating international crime in October 1999 in Moscow between the foreign ministers of the Group of 8. A recommendation was agreed upon to promote across border co-operation between law enforcement agencies by adjusting legislation, as appropriate, and take other measures, as needed. It is reason to assume,however, that this will be a very slow improvement process. Also within the European Community, new approaches for coping with international crime are being considered, related to the procedures for prosecution and pronouncing sentences on perpetrators of such crimes.

The assistance offered by international organisations to the national law enforcement agencies, i.e. Police and Customs, is focused on information exchange. These international organisations are Interpol and the World Customs Organisation (WCO) respectively, and Europol for European Union States. Furthermore, the nuclear and radiation safety authorities in IAEA member States have access to the services of the IAEA, which includes both information and measurement and analysis services.

Interpol and Europol

At its 63rd session in Rome 1994, the Interpol General Assembly adopted a resolution on environmental crime which asked the National Interpol Offices (NIO) to use the reporting system *Eco Message* , when reporting cases of international environmental crime to the Interpol General Secretariat (IGS). The aim of the Eco Message is to improve the sharing of information on environmental crime and the collection, storage, analysis and circulation of that information with the help of the IGS.

The IGS devised the Eco Message on the basis of the proposals made by the participants at meetings of the Working Party on Environmental Crime and of the observations made by the NIOs. The *Eco Message* is to be used in the following cases only:

a) Illegal trans-border movements and illegal dumping of waste;

b) Illegal trans-border activities involving radioactive or supposedly radioactive substances;

c) Illegal traffic in species of wild flora and fauna.

It is the NIOs that manage and transmit the Eco Messages. The aim is to report all of the above mentioned offences to the IGS in order for the information to be shared among the NIOs. The Eco Message should be prepared as soon as information about such offences is received and an investigation has been completed. It is to contain all relevant specified information related to the case in question.

Information received by the IGS is checked against the entries in the Criminal Intelligence database, and if any items (persons, companies, numbers) are previously known, the informing NIO will be informed and asked to contact the relevant Interpol office for details. Information received via the Eco Message system is stored in the database according to registration and deletion rules. Interpol is presently using the X400 telecommunication system as a secure way of communication with all Interpol offices.

To establish a point of contact in relation to cases of illegal traffic of nuclear and other radioactive material, Interpol suggests that the relevant national authorities link up with the NIO in their countries. The implementation of this information system is moving slowly, in so far exchange and analysis of information related to radioactive and nuclear material concerns. The reason is the political dimension of the illegal activities in question. It should be noted that both Iraq and Iran are members of Interpol.

Within Europol, its narcotics unit has been assigned the responsibility for dealing with radioactive and nuclear material illegal activities. Also there the implementation moves slowly. The potential for the development of an information exchange system in the nuclear area, is however judged to be better than in the case of Interpol, considering the smaller number of States involved in a European system, in comparison with a world-wide system.

The WCO

The World Customs Organisation (WCO) is the working name of the Customs Co-operation Council (CCC). It is an intergovernmental organisation with 146 members. The CCC was created in 1950 and adopted its working name WCO in June 1994. Its Central Information Service (CIS) is situated in Brussels and it has 10 Regional Intelligence Liaison Offices (RILOS) located in different parts of the world.

In May 1998, the WCO signed a Memorandum of Understanding with the IAEA on co-operation, according to which:

> *"The Parties shall co-ordinate their efforts to achieve the best use of available information including seizure data and legislative information relevant to measures against illicit trafficking in nuclear and other radioactive material and to ensure the most effective utilisation of their resources in the collection, analysis, publication and diffusion of such information.*

WCO has a database "Nuclear and Hazardous Fraud", which in November 1998 had 296 recorded cases.

As was stated by WCO in Dijon 1998:

> *The WCO enforced programme on action to combat illicit trafficking in nuclear material dates back to 1992. The main goal of our programme has been to assist our members to detect and respond to such smuggling attempts.*
>
> *We have made significant progress in the development of awareness programmes with the exchange of information and with collaboration between the WCO and international organizations such as the IAEA, ICPO-Interpol and the EU.*

The WCO Enforcement priority has been identified as “Implementation of a comprehensive programme to help members combat commercial fraud”, which includes the WCO Enforcement Programme on Actions to Combat Nuclear and Other Radioactive Materials Smuggling, launched in 1993.

The WCO Secretariat recommends that its members co-operate closely with their national nuclear regulatory bodies when it is necessary to conduct a physical examination or if there is suspicion or detection of illicit trafficking in nuclear and radioactive materials.

The WCO awareness raising activities can be summarised as follows: two dedicated seminars, followed by working group activities on the Identification of Nuclear Materials and Dangerous Goods; WCO Recommendations concerning Actions Against Illicit Cross Border Movement of Nuclear and Hazardous Material (adopted by several States in 1998); and IAEA/WCO several Technical Committee meetings.

The WCO has developed a comprehensive Enforcement Training Module on the smuggling of nuclear and other radioactive material, which was used to develop national training programmes.

<u>The IAEA</u>

The most important precondition for preventing illicit trafficking is the existence of effective national systems for control of nuclear material and radiation sources. The IAEA programme is focused on assisting States to establish and/or strengthen national control systems and to implement measures that would prevent or deter unauthorised use or handling of such material and sources. In this context, the IAEA has imposed that national control systems must include measures on the State level for preventing, detecting and deterring unauthorised activities. Nuclear materials require systems and procedures for physical protection, accountability, and export/import control, whereas relevant measures for control and security of radiation sources must include, in addition to export/import control, an infrastructure for a) notification, registration, licensing and inspection of radiation sources, and b) prevention of

theft or any other third-party interference that may jeopardise the control of the sources.

National authorities or the media are the first to detect and investigate trafficking incidents. Under its safeguards system, the IAEA receives information from States about the quantity and location of nuclear material under the State's jurisdiction or within its territory. Disappearance of nuclear material in particular, e.g. through a theft, in a State with comprehensive safeguards must be reported to the IAEA. The State in which the material has been confiscated may wish to analyse the confiscated material; upon request, the IAEA can assist States to perform this analysis.

Considerable progress has been made by the IAEA, in co-operation with the World Customs Organisation (WCO), as mentioned above, in developing guidance for national authorities, and specifically for border officers, on the procedures to be used in the detection of illicit movements of radioactive materials and the appropriate response to such detection.

In case of illicit trafficking in nuclear material or radiation sources, or in case of suspicion of such a trafficking incident, the IAEA may provide the State, upon its request, the service of performing analyses on the confiscated material. These analyses may then be used by the State a) to identify or confirm the nuclear nature and properties of confiscated materials; b) to evaluate the radiological hazards that may have resulted from their illicit handling; and c) possibly to provide clues about the origin of the confiscated material.

The IAEA laboratories in Seibersdorf, Austria, have capabilities and a long practice in the analysis of materials encountered throughout the nuclear fuel cycle. It is also possible to determine the chemical nature of the major components, the nature and content of minor constituents, and the nature and content of chemical and radiological trace components. These latter measurements can provide generic information about the mode and time of production of the confiscated materials. Such information may be useful for the State's investigations regarding the origin of the material.

IAEA analysis assistance to States can also be provided by performing qualitative and quantitative assays directly in the field, using available portable or transportable measuring instruments such as gamma ray spectrometers, neutron counters or X-ray fluorescence analysers.

With the increase in the number of reported trafficking incidents, the IAEA has been requested by its member States to expand its existing database in order to provide a reliable global overview of the illicit trafficking situation. In August 1995, the IAEA informed member States that it had upgraded its "Summary of Incidents" data base to create the "Illicit Trafficking Data Base", that it was prepared to accept information on illicit trafficking, and that it would begin issuing periodic summary reports. At that time, the IAEA invited each Government to indicate its interest in participating in this program and to identify its point of contact for the data base. The IAEA's current Illicit Trafficking

DataBase is an incident-oriented accumulation of news from media sources and information from State authorities.

Its primary function is to provide a reliable and accurate source of information in a timely manner on all trafficking incidents at three levels of use: the State's, the IAEA's and the public's. It facilitates an individual State's determination of which facts about specific illicit trafficking incidents are pertinent to its own interests. Also, it allows the IAEA to maintain details of trafficking incidents with a view to determining common themes and trends to be used to support member States' programs to combat illicit trafficking. Finally, it contributes to the public welfare by providing reliable and timely information about illicit trafficking incidents to the media.

Since 1993, 304 events involving the illicit trafficking of nuclear materials and other radioactive sources - including unintentional trafficking - reported by States or published in the media have been included in the IAEA data base (reference: IAEA Annual Report 1998).

D.3 Open Source Information

In the "Information Age", the structure and volume of information has changed dramatically. The information revolution goes beyond the wide scale use of personal computers to encompass a growing use of wide-area, large scale computer networks that provide the infrastructure for information access and sharing on an international scale. This global information infrastructure is providing new frameworks and approaches for obtaining information.

According to a study published in the April 3, 1998 issue of Science, the World Wide Web is estimated to contain over 320 million pages of information. The Web continues to grow at an exponential rate: doubling in size every four months, according to some estimates. This estimate is about two times larger than previous estimates, and may itself be a significant underestimate of the total actual pages available. The study also found that individual Internet search engines cover only small portions of this total - from 34% to 3% - with little total overlap in coverage. The authors, Steve Lawrence and Lee Giles of the NEC Research Institute of Princeton, New Jersey, also found that combined searches using multiple engines increased the likelihood of finding desired information by 3.5 times. According to the authors, the search engine *HotBot* covers 34 percent of these, *Alta Vista* 28 percent, *Northern Light* 20 percent, *Excite* 14 percent, *Infoseek* 10 percent and *Lycos* 3 percent.

Law enforcement authorities need the best information they can get, in a timely and usable fashion. Sources of information have therefore always played a significant role, both for prevention measures and for detection and investigation of criminal activities. Limited resources, demands for more simplified customs procedures when importing and exporting goods, and ever tightening budgets are causing most state agencies in the World to rethink strategies in law enforcement and authority supervision to ensure the most efficient use of the available resources. Traditionally, law enforcement has

many sources that are restricted and jealously protected, but there are also many open sources that provide important information.

The official definition of open-source, as provided by the U.S. Intelligence Community, is:

> "*By Open-source we refer to publicly available information appearing in print or electronic form. Open-source information may be transmitted through radio, television, and newspapers, or it may be distributed by commercial databases, electronic mail networks, or portable electronic media such as CD-ROM's. It may be disseminated to a broad public, as are the mass media, or to a more select audience, such as gray literature, which includes conference proceedings, company shareholder reports, and local telephone directories. Whatever form it takes, Open-source involves no information that is: classified at its origin; subject to proprietary constraints (other than copyright); the product of sensitive contacts with U.S. or foreign persons; or acquired through clandestine or covert means".*

Not only in the area of national and international law enforcement intelligence, but also in other intelligence areas, such as economic and financial, as well as defence and military intelligence, has open source information become of ever increasing importance to decision and policy makers.

Concerning illicit trafficking, Open Sources can be used in the following ways:

- Offline/online search of local newspapers, news agencies, etc. keywords are e.g. theft, burglary, border incidents;

- Search of different types of discussion lists, to be used for identification of individuals, sale/purchase links, groups of interest, etc.;

- Search of web-sides of identified groups, which might lead to the detection of concealed messages;

- Search of commercial databases, which might give important basic facts, such as basis for historic research, mapping of companies and individuals or distribution firms and shipping agencies, tracking of packages, etc.

The risk-taking for transmission of open source information increases with the extent of human-to-human contacts. The cell groups that traditionally are found among individuals engaged in criminal/terrorism activities are, in the first place, using "safe virtual channels" for information distribution. Therefore, channels like Internet, e-mail and discussion lists will increase in importance for these groups. The development of commercial coding systems facilitates the operation, provided that the seller and the buyer have established contacts. The weak link of the search will in that case be to detect "the advertisement of the existence of the product".

Open sources are one of the inputs to IAEA's safeguards information system, which comprises:

- information declared and reported by States, in accordance with safeguards agreements, including the Additional Protocol, i.e. design information, accounting reports, export of specified equipment and non-nuclear material, nuclear research programmes;

- Information collected by IAEA, i.e. inspection reports including sample analysis and measurements, environmental sampling, inspector observations;

- IAEA databases, i.e. non-safeguards databases, illicit trafficking database, country files;

- Open sources.

The systematic and increased use of Open Source Information could improve the effectiveness of IAEA's safeguards system, including the combating of illicit trafficking. The improvements would be focused on the following:

- To help assess the accuracy and completeness of State declarations, submitted in accordance with the Additional Protocol;

- To establish more complete Country Profiles;

- To use Commercial Satellite high-resolution Imagery, to detect undeclared activities related to manufacturing of nuclear weapons programmes. To be used in combination with other information sources;

- Increased and improved information exchange with Interpol, WCO, etc. and with countries, via electronic communication.
-

In a paper posted to Jane's Intelligence Review on 28 October 1999, Dr. Wyn Bowen of War Studies at King's College, London, gives an excellent review of the issue of open sources and national security, in particular concerning the use of open sources for monitoring proliferation threats. Some quotations from that paper are reproduced in Annex 9. Dr. Bowen makes the following conclusion:

> *"An abundance of open sources is available, which can provide important insight in the field of national security. Open sources will rarely provide the complete answer and are best suited to providing context for classified information. It is imperative in any collection effort that open sources are critically assessed for inaccuracy, bias, irrelevance and disinformation. If this is done on an ongoing and systematic basis, good sources will be quickly identified and exploited and poor sources eliminated.*

The expansion of the Internet as a veritable mine of open-source material has significantly exacerbated the problem of information overload. It is worth re-emphasising that although much invaluable material is available on the Internet, there is also an abundance of worthless and regurgitated data. Overload threatens to swamp the end-user with worthless and repetitive information, wastes valuable time and raises costs. This highlights the importance of incorporating subject experts into any systematic open-source collection process".

E. ANALYSIS

GENERAL

The increase in inter-state relations and continuing globalisation of the world society during the twentieth century have, in an overall sense, promoted States' willingness and interest in acceding to conventions and agreements, with the purpose to attain a harmonisation of legislation and internationally applied systems of regulations. Earlier requirements of States for complete sovereignty have, more or less, had to yield to the necessity of establishing international regulations.

This development has been especially prominent in the transportation field, where several conventions have been concluded in order to facilitate international transports and to establish uniform safety regulations. Standards, rules and norms have been developed for the design and construction of transport vehicles and systems, as well as for licensing requirements. With the purpose to support and promote the harmonisation of international transports, two technical co-operation organisations have been established within the framework of the United Nations, namely the International Maritime Organisation (IMO) for shipping and navigation, and the International Civil Aviation Organisation (ICAO) for aviation.

In the nuclear field, the development of international regulations and requirements has, for several reasons, been of essential importance. First of all, proliferation of nuclear weapons programmes to other States than the five nuclear-weapon States (as defined by NPT) is creating a serious threat of war and devastation to all mankind. Secondly, the Chernobyl disaster in 1986 demonstrated the vast consequences across borders of a nuclear accident. Under those circumstances, it is evident that protection against the proliferation threat and the risks of nuclear accidents would have to be established through an international regime.

In this context should also be recalled the recent development of nuclear weapons in India and Pakistan. In the latter country, as was shown in a TV film referred to in chapter B, nuclear material and equipment for weapons manufacturing could easily be obtained on an international “illegal market”. That market would also, most probably, provide highly qualified expertise. Furthermore is recollected, the recent case in Sweden of smuggling to Iran of a dual-use device (thyratron) for a nuclear weapons mechanism. These events, together with the threat analysis in chapter B, make the situation worrying.

Open source information suggests that most of the reported cases of illicit trafficking of nuclear material and radiation sources originate from countries of the former Soviet Union.

The question is, whether the existing regime for non-proliferation and the peaceful use of nuclear energy must be strengthened, as a consequence of the increased concern over the on-going illicit trafficking of radioactive material, including nuclear material, and nuclear equipment, that can be used for the

illegal fabrication of nuclear weapons. Because of the extreme seriousness of the matter, States' right of sovereignty may have to yield to a strengthened international regulation.

LEGAL INSTRUMENTS

When the NPT was established, the International Atomic Energy Agency (IAEA) was given a key-role in the non-proliferation regime, since it was already in place as a United Nations organisation for the promotion of the peaceful use of nuclear energy. The IAEA had already concluded safeguards agreements (in accordance with INFCIRC/66) with some States, but these agreements were limited to specific activities or facilities. They are still in force with States that have not become parties to the NPT.

It is satisfactory to note that the NPT has been joined by almost all States. There are now 182 non-nuclear weapon States and 5 nuclear-weapon States party to the NPT. Non-NPT parties are India, Pakistan, Israel and Cuba. The previous Soviet republics, i.e. the eleven so called Newly Independent States (NIS), and the three Baltic States, have all joined the NPT, and have concluded safeguards agreements with the IAEA. If the NPT requirements are implemented into national legislation, the foundation is also laid for State basic laws on nuclear activities.

Four of the NIS, namely Azerbaijan, Kyrghyzstan, Tajikistan and Turkmenistan, are, however, not IAEA member States. These States are situated in a politically sensitive region. It is therefore important that the IAEA is urging them to become members, so that they can qualify for receiving the technical assistance they may need for establishing a modern infrastructure in the area of radiation safety. Such assistance is needed, among others, in Azerbaijan, as was demonstrated at a visit to the country by representatives of this study. Azerbaijan has through-traffic from Russia to Iran, both by rail and road, but is lacking equipment for the effective control at the borders. At the visit, it was also claimed that the State authorities are not in a position to control nuclear fuel waste that is supposed to be stored somewhere on its territory, to which they have no access.

With the NPT concluded, the IAEA had to negotiate safeguards agreements with all States party to the Treaty, and in particular with those having a nuclear industry, or activities involving nuclear material. A State party to the NPT is obliged to establish a State System of Accounting for and Control of Nuclear Material (SSAC). The main purpose of the system is to provide the State with a correct picture of the inventory, and changes therein, of nuclear material within the State's territory.

A well developed and functioning SSAC must be considered as one of the cornerstones in a State system for the combating of illicit trafficking. To what extent an SSAC is fulfilling its objectives and is functioning in practice, cannot be judged by an outside observer, because IAEA's information on the matter is confidential. It is evident, however, that the IAEA, through its safeguards

inspection programme, would have the possibility to follow up on the States' fulfilment of the NPT obligations. There is a need to improve the IAEA's programme of auditing the SSACs, as well as of the safeguards regime as a whole. This is supposed to be done, inter alia, by implementing the Additional Protocol to the Safeguards Agreement.

Nuclear material must be efficiently protected against theft and sabotage. The Convention on the Physical Protection of Nuclear Material constitutes an important framework for international co-operation in the physical protection of nuclear material used for peaceful purposes, while in international transport. The IAEA has developed recommendations for how the physical protection of nuclear material and facilities should be established. They are published in the series of INFCIRC-documents; the applicable IAEA document (INFCIRC/225/Rev. 4) is well suited for being the basis for national legislation. It should be emphasised that physical protection is an important part of a comprehensive system for preventing proliferation of nuclear weapons.

Other measures must be added and be diversified for obtaining the desired protection. Such measures include IAEA recommendations issued in the INFCIRC-series concerning export/import control of such nuclear items that have been listed in Trigger Lists by the Nuclear Suppliers Group (NSG) and the Zangger Committee. The NSG List includes also so called dual-use items, i.e. equipment that can be used both in non-nuclear activities and for the manufacturing of nuclear weapons.

In the aftermath of the Gulf War, a strengthening of the IAEA Safeguards System was developed in two steps. First, the IAEA Board of Governors' decisions regarding early notification of design information and the use of unannounced and special inspections to verify that a State fulfils the NPT requirements. A second step was the introduction of the Additional Protocol to safeguards agreements. According to this, the IAEA will get additional information from the States about nuclear activities, and have additional access, including access for taking samples from soil, water and air within a State's territory, with the purpose to determine clandestine nuclear weapons activities.

Under the Additional Protocol, the State will report to the IAEA about export of nuclear material and nuclear items, including dual-use items. It remains to be seen to what extent the expectations attached to the Additional Protocol will be fulfilled in the practical implementation, in particular with respect to the reporting by the States of export of nuclear items. Of interest is also how the IAEA will handle and use this additional information for improving safeguards and thereby reducing the risk of proliferation and, at the same time, eliminate or reduce other safeguards measures. So far, only few States have ratified the Additional Protocol and the implementation experience is limited.

Summing up, one can say that the recommendations and guidelines developed under the IAEA umbrella are, in theory, whole-covering with respect to the fulfilment of the NPT requirements on nuclear material, by means of safeguards, physical protection and export/import control. In addition, the IAEA has, in co-operation with other international organisations, established the Basic

Safety Standards for Ionising Radiation (BSS), which, when applied in national legislation and when implemented, will be the basis for developing a national system for the combating of illicit trafficking of radiation sources.

The question is only: Is this sufficient for establishing an overall system for prevention of illicit trafficking that meets reasonable and practicable requirements on effectiveness and completeness?

AREAS OF IMPROVEMENT

Improvements of the existing national and international systems for combating illicit trafficking should be sought in the following areas:

- Legislation
- Follow up activities
- Safety Culture, Quality Assurance and Internal Control
- Supervision
- Principle of Public Access to Information
- Co-operation and Exchange of Information
- Preparedness
- Investigation
- Sanctions
- National Authority or Regulatory Body
- The role of an International Regime

Legislation

As has been established above, the NPT requirements should be the foundation for a Basic Law on Nuclear Activities. The IAEA INFCIRC recommendations related to non-proliferation issues are, on the whole, covering the necessary supplement to the NPT requirements. They are, therefore, well suited for being incorporated in national legislation.

An important sector is, however, missing in the IAEA's recommendations, namely concerning the distribution of responsibilities in safety and non-proliferation matters between operator and supervising authority. Basic requirements concerning these responsibilities must be stipulated in national nuclear laws.

Against this could be argued that specific requirements concerning responsibilities would not be necessary, because the law would contain sanctions, directed towards operators, authorities or individuals who violate the requirements. Experience from modern safety work in different areas shows, however, that clear and precise rules are needed concerning the duties and responsibilities of the involved parties. If an accident occurs, and a professional investigation is carried out, the investigating authorities or the court shall not have to explain to the "defendant" what his duties were at the time of the accident. This should have been known before the accident, from law requirements or instructions. It is a demand for justice, that duties and

responsibilities are clearly expressed in the law, not only in general law terms, such as "sufficient carefulness", "good practice" or "observing standards".

In this context should also be observed that the legislation in the former Soviet Union, which to a certain extent is still applied in Russia and the NIS, did in general not contain requirements about responsibilities of individuals, or about the distribution of responsibilities between operator and authority. There was no need for such requirements, because operator and authority had the same principal, namely the State or the Communist Party.

As was said above, the existing package of rules and recommendations in areas related to combating illicit trafficking is, as a whole, complete. This is, however, not the case with respect to "responsibilities". Taking into consideration the need to harmonise the nuclear legislation in the different States, it would be reasonable to assign to an International Regime an active role in the development of State requirements on duties and responsibilities. The Regime should therefore develop rules on duties and responsibilities for the different parties in the area of nuclear activities.

PROPOSAL

- *States should establish national legislation on the requirements stipulated in the NPT, in the Convention on Physical Protection of Nuclear Material, in the Nuclear Suppliers Group s Guidelines, and also on the requirements recommended by the IAEA, in related parts;*

- *The International Regime should, in assisting States, through appropriate documentation, establish rules about duties and responsibilities for operators, authorities and individuals in the non-proliferation area;*

- *National legislation should include requirements on duties and responsibilities and on the distribution of responsibilities between nuclear authority, operator and employees.*

Follow-up Activities

In comparison with other international organisations that work under the auspices of the United Nations, it is obvious that also an International Regime should have a follow-up right, to convince itself and others, that NPT requirements, including recommendations to the NPT, have been implemented by States that are parties to the treaty. Such right has been assigned to the International Labour Organisation (ILO) within its area. The IMO has, for its part, based the follow-up activities on port state control, where the sea-worthiness of foreign ships is verified. Also the ICAO is carrying out frequent checking of the legislation of the party States.

It is, furthermore, worth mentioning that special follow-up systems are included in several international conventions of importance to mankind, such as the Convenant on Civil and Political Rights, and the Children's Convention.

Of particular interest is to observe the development of follow-up systems within the ICAO, where a continuous improvement of civil aviation safety rules has taken place. Improved safety rules have often been developed on basis of hard-earned experience from breakdowns and crashes, and must be implemented promptly. The civil aviation safety regulations are referred to the 1944 Civil Aviation Convention and annexes. It was early realised, that certain States had no, or a very slow, implementation of aviation safety requirements. The ICAO did then nominate groups, which on a voluntary basis, carried out reviews of the national aviation legislation, and, wherever needed, provided technical assistance for improving the situation to a satisfactory level.

Experience showed, however, that this, more or less voluntary system, did not work satisfactorily in all countries. The system has therefore now been changed, and the implementation of certain annexes of the Convention, concerning licensing and operation, has been made compulsory. ICAO has also established a universal safety oversights audit programme, comprising regular, mandatory, systematic and harmonised safety audits, to be carried out by ICAO. It was also established, that greater transparency and increased disclosure should be implemented in the release of audit results.

With respect to serious crashes, the State in which the crash has occurred, is under obligation to submit a preliminary report within a certain time limit, and later, a final report. The ICAO is following-up that this obligation is fulfilled, if necessary through written inquiries. In Annex 10 of this report, the ICAO Assembly Resolution A32-11 from September 1998 is quoted, describing the fundaments of ICAO's way of operating in the case of auditing of aviation safety systems implementation.

The question is, whether the IAEA has established a sufficient form of a follow-up system in its area of responsibility. According to the Convention on Nuclear Safety, the IAEA has been assigned the right to address matters related to nuclear safety in the nuclear power plants of an individual State. An agreement on so called "peer review" has been established on voluntary basis. An individual State can also request from the IAEA to get a review of its national system for physical protection of nuclear material and nuclear facilities. Such a review would also include the national legislation.

In the area of safeguards of nuclear material, the IAEA verification activities imply evidently a checking that the IAEA's requirements on the safeguards system and procedures are being adhered to. The IAEA has, however, no formal right to follow-up within the entire NPT area. Neither has it established any form of follow-up system concerning legislation. This is not sufficient for the fulfilment of the NPT requirements. The Additional Protocol would offer the IAEA improved tools for detecting clandestine nuclear activities.

It was learnt from the Iraqi event that, in spite of the fact that Iraq was party to the NPT and subject to IAEA safeguards under an INFCIRC/153 safeguards agreement, a nuclear weapons program was realised on its territory. Although if the IAEA did carry out inspections at "declared" nuclear facilities, it is supposed that the IAEA was ignorant about what actually took place.

It is not known whether the IAEA knew about the development of the nuclear weapons programmes in the two non-NPT States, India and Pakistan. Even if that was the case, the IAEA could not intervene, because of limitations in its Statute. Still, these events must be considered as serious failures of the world community's efforts to prevent nuclear proliferation. The nuclear weapons activities in India and Pakistan have not triggered any powerful intervention from any international organisation or elsewhere. What has happened in these countries must be considered as extremely serious and as an alarming risk for violation of peacekeeping efforts and the peaceful co-existence between people in the world.

For States, that are parties to the NPT, but might have clandestinely and in secrete started nuclear weapon programmes, or might be considering to start such a programme, the implementation of a strengthened safeguards regime in accordance with the Additional Protocol should be a deterrent effect and should thus be strongly pursued. The IAEA would thereby have the right and obligation to trace any signs or indications of a clandestine nuclear weapons programme.

As will be demonstrated in the following, a series of measures must be taken in order to establish a satisfactory system for combating illicit trafficking. It is also necessary to follow-up on the implementation of these measures and the functioning of the system.

A concluding remark of what has been argued in this section is, that focus should be put on the necessity to establish a far-reaching follow-up duty within the NPT area, in analogy with ICAO's duties.

PROPOSAL

A follow-up system should be established, similar to the ICAO system, to ensure that:

- *the NPT, the Physical Protection Convention, the Export Control Guidelines, related IAEA recommendations, as well as an effective system for combating illicit trafficking, are being implemented into national legislation, and*

- *through audit, this legislation is being adhered to.*

Safety Culture, Quality Assurance and Internal Control

In Chapter C above, the requirements on nuclear safety have been discussed, as well as the safety philosophy applied in Western countries with an advanced nuclear programme, or in areas with high technology, such as aviation and off-shore industry. In connection with the nuclear safety investigations that were made after the Three Mile Island and the Chernobyl accidents, the focus was directed on human failure. As an overall outcome, the necessity of developing a high safety culture in all nuclear activities was being emphasised. It is evident that such a safety culture is of importance also in the area of non-proliferation and for the prevention of illicit trafficking.

A high safety culture can be developed only if each individual is motivated and engaged to carry out his/her duties in accordance with rules and regulations. These must, however, be clear, distinct and understandable. The facility operator must promote training and education of the personnel and see to it that each individual is well suited for the tasks assigned to and requested of him. Even if the rules and regulations are complete and adequate, they are of little value, if the individual, because of insufficient sense of responsibility or carelessness neglects them. The facility operator must make great efforts for getting and keeping reliable personnel. This is an important element in achieving "protection" against illicit trafficking incidents, caused by employee negligence or through insider crimes.

One of the duties of the supervisory authority is to follow-up on the way in which the operator is taking care of his personnel. One way of doing it, is the introduction of Internal Control, in combination with Quality Assurance. Thereby, the responsibility of the individual, as well as his role in responding to the different requirements, which are established in the operator’s manuals and instructions, would be clarified. The facility operator must also monitor how the employee is managing his tasks, and if deviations occur, take prompt precautions in order to prevent a recurrence of a mistake.

The basis for a well developed internal control system is that deviations and defects that are found, are being documented, and that information about the problems are directly being shared with the personnel. A special team should be assigned the task to review, with regular frequency, the operation and follow-up on how corrective actions are being carried out. There are indications that modern internal control systems, in combination with quality assurance, are not sufficiently applied in nuclear operation. This might be referred back to the fact that internal control is not included in the IAEA INFCIRC documentation series. IAEA's Safety Series No. 58-C/SG-Q includes, however, a Code and Safety Guide for Quality Assurance for Safety in Nuclear Plants and Other Nuclear Installations.

The fast and comprehensive technical development in modern society has led to that a State supervisory authority does not have the possibility to supervise its entire area of responsibility. A modern inspection system must therefore be established on another basis than what has been the case in the past. It might be of interest to see how another international organisation has motivated its position in this respect.

The European Joint Aviation Authorities have, in the first part of this decade, developed a legislation package for civil aviation. Quality Assurance and Internal Control have been included in the legislation with the following motivation:

> *"The aviation industry has changed very substantially since the early sixties. The increasing complexity of both aircraft and the companies engaged in aviation, has been accompanied by corresponding changes in the number of the requirements and the demands put upon the regulators. The result is that the Authorities can no longer obtain an adequate picture of a whole operation without considerable, and progressive, enlargement of their resources. The scale of the increases which would be required are not affordable by the industry as a whole, nor would such an increase be the best response to the problem.*
>
> *An alternative is to formalise the complementary nature of the duties of the Authority on the one hand, and the operator on the other. The Authority continues to be responsible for drawing up the regulations, which form the base on which a safe operation is built, and also for overall surveillance. The operator remains responsible for the safety of the operation and for compliance with the requirements. The concept of Quality Assurance is not new to the aviation industry. The change, introduced by Joint Requirement Aviation-Operations (JAR-OPS), is that the operator is called upon to set in place structured internal quality assurance procedures acceptable to the Authority. It is the 'assurance' of regulator compliance, which is the primary goal of the quality programme and a primary function of the operator's quality system.*
>
> *The emphasis in regulation is therefore likely to change from regular inspections by the regulatory Authority to a system whereby operators self-audit their own operation against a clearly defined Quality System. The Authority's role will, with time, shift to the verification of operators compliance with their Quality System and with the requirements. The development of internal audit and evaluation programmes relies heavily upon Air Operators Certificate (AOC) holders to continuously monitor and audit their operations to ensure that they are safe and conform to the requirements and the operator's standards".*

PROPOSAL

The national legislation should include requirements on:

- *the operator's responsibility to establish a system on thorough examination of the trustworthiness and competence of his personnel (executives and employees);*
- *the operator's responsibility to establish a Quality Assurance and Internal Control System and also to urge on high safety culture,*

motivation and commitment in the operation of facilities and installations;

- *the operator's responsibility to establish a positive working climate through different means, like performance development, etc.;*

- *the National Authority's programme for approval and acceptance of the operator's Quality Assurance and Internal Control System and on the Authority's use of the system in its follow-up and audit activities.*

Supervision

According to modern supervision methodology, the supervisory authority has to establish the adequate requirements. As a condition for obtaining an operation license, the operator must demonstrate that he has the capability and capacity to fulfil these requirements. It is his task to work out detailed requirements in the form of manuals, instructions, etc. It is also important that he has a training and education programme for the personnel, to ensure that they are being well prepared for their tasks.

A well functioning licensing system is also one of the corner stones for the supervision of operators and for the combating of illicit trafficking.

In the safeguards area, the IAEA has established a comprehensive and well developed control programme, all in accordance with the NPT conditions. The implementation of this programme is done with a great number of staff members, both at Headquarters and in the field. The question could be raised, however, whether IAEA's role in this specific area should not be reconsidered.

It would be natural that the IAEA applied the same system that is used in modern supervision and control operations. That would mean, that the IAEA should make a review of and a judgement on a State's prerequisites for supervising and controlling its nuclear activities, including the SSAC. If the outcome is positive, the IAEA would give its approval and acceptance and reduce the inspection regime to spot checks, in combination with a continued review of relevant information on that State.

Such a change of IAEA's role need be formalised and possibly reflected in the Statute. The right of "independent verification" through inspections must, however, be retained. Thus the number of inspections would be reduced, and much of the human resources could be available for other purposes, possibly related to prevention of illicit trafficking, including the processing and use of modern information systems. The introduction of the Additional Protocol is clearly an important step in this direction, the proper implementation of which would provide the IAEA a second step in applying a modern supervisory role.

It is important that the IAEA urges all States, also the Non-NPT States, to implement an effective system for combating illicit trafficking, and that the

States, to the general extent, are fulfilling the requirements of the Additional Protocol.

PROPOSAL

States should urge that, the IAEA and any International regime involved in combating of illicit trafficking

- *promotes efforts to have non-NPT States voluntarily submitting information and becoming subject to safeguards, and promote all States to ratify the Additional Protocol;*

- *incorporate a more modern safeguards inspection technique of the national systems for accountancy and control, in accordance with standards and procedures that were intended to be established on the basis of the Additional Protocol. This would allow the IAEA to allocate more resources for combating illicit trafficking.*

Principle of Public Access to Information

Another question is, whether the outcome of the IAEA safeguards activities are, to a large extent, "wrapped in obscurity"? Against such an insinuation could be argued that the results of the safeguards inspections are reported in a transparent way in the annual Safeguards Implementation Report (SIR).

The request, from the side of the member States and the Board, to have a far-going transparency of the safeguards activities, was raised already in 1979, and led to a comprehensive transformation of the reporting of inspection results. Even if the reporting of serious deviations at a facility of an individual State is formally confidential to other member States than the State concerned, it is almost always possible for other member States to conclude from the SIR information which facility is meant. Furthermore, if the deviation is very serious and not dealt with in an acceptable way, the IAEA goes public to the United Nations. Example: Iraq and North Korea.

But this not withstanding, most of IAEA’s activities are not made public, and an individual or media journalist has no right to look into all IAEA's documents concerning a specific safeguards case. Nor can he get information from the IAEA database.

The current NPT safeguards agreements do not allow the public to have access to IAEA's safeguards evaluation of a State and its nuclear facilities, or to the inspection reports or information reported to or collected by the IAEA. The confidential information might concern illegal export of nuclear material, nuclear items or dual-use items, or analysis results of samples indicating clandestine nuclear weapons manufacturing. Other material that is not publicly accessible may concern details about illicit trafficking events reported to the IAEA by an individual State.

The question could be raised whether it is acceptable to classify information within IAEA's area of responsibility, and whether, to the extent possible, a full public insight would not be beneficial to the combating of illicit trafficking.

Turning to another area, namely nuclear safety, it can be noted that the reporting to the public of serious nuclear accidents, incidents and other abnormal events is a legally binding duty of the nuclear authorities in most countries. Such reporting must include a objective information of the events by the authority, or the industry concerned. The reason for this reporting duty is the following: Experience from serious events within the nuclear power industry shows that the authorities and the entire nuclear establishment might get into a crisis of confidence if a complete and fast reporting is not done of the event and, as far as possible, of its causes. It is well known that the public in many countries feels anxiety about nuclear accidents and the serious consequences they may cause. People, therefore, consider it a right to have full and correct information on incidents and accidents

Coming back to non-proliferation, it is first recalled what was said in the ICAO Assembly resolution referred to above, namely that greater transparency and increased disclosure of information shall be implemented through the release of audit results. One can argue that illicit trafficking events, that are in violation of the NPT and that can lead to the manufacturing of nuclear weapons, are extremely serious and could, in the worst cases, be considered as crimes against humanity. One could, therefore, claim that each member of the society should be entitled to full insight and information about such grave criminal activities, and that this right might be even more legitimate than in case of a nuclear accident. A criminal event of this kind that is occurring in one State cannot be considered as a matter for that State alone. Investigation reasons may, however, not permit that information to the public is given immediately.

An extensive freedom of speech and information is a basic criterion for an open and democratic society, and that freedom must be confirmed in the law, so that the free access to different kinds of information is guaranteed to the public. Freedom of speech and information is, thus, a basic condition for one of the most important objectives of democracy, namely, to give to each individual member of the society the rights and means to evaluate and judge his or her environment and, individually, take position in important matters. This principle is also valid for representatives of the press and other public media.

Consequently, it is important that the public and the media are getting full insight in the manner States are fulfilling the non-proliferation commitments. Such an insight is, no doubt, a pressure on States to establish and maintain effective systems for safeguards, physical protection and export/import control.

PROPOSAL

The principle of public access to information should apply regarding events related to illicit trafficking. This principle should apply to Operators, Authorities as well as to an International Regime.

Co-operation and Exchange of Information

Activities aimed at combating illicit trafficking involve several authorities, which can lead to bureaucratic difficulties. The seriousness of nuclear crimes makes it, however, necessary that extensive, effective and fast measures are undertaken, both for preventing such crimes and, in case of accomplished crimes, for disclosing the perpetrator and his accomplices. This calls for effective and flexible co-operation between all national authorities concerned, in order to reach successful results of the invested efforts. With such co-operation, it is expected that existing negative influence from prestige between national authorities in certain States would be diminished.

The countries that have contributed to this study have unanimously emphasised the necessity of co-operation. Their experience is that co-operation is often obtained through a personal and informal contact net. In Sweden, a reference group, composed of all national authorities concerned, was formally established in 1992. The Group meets regularly, and the main issues on the agenda are a review of the actual threat situation, and reporting of specific cases of illicit trafficking. It has also proven beneficial that when an incident occurs, meetings can be held less officially and oral communication between Group members can be maintained, involving representatives of several authorities.

Making an overall judgement of the co-operation issue, the conclusion is drawn that a more formalised co-operation, national and/or international, should be established for combating illicit trafficking.

When preventive measures and activities are planned, more complete information would be available from authorities and international organisations, concerning relevant events, statistics, threat assessments, different combating methods, etc. A formalised co-operation programme should be established, with specially appointed contact persons. Such a programme would become particularly valuable, if several States join, in making access to special laboratories and technical expertise available, in a common effort to investigate the crime, including disclosing the actual "place of origin".

Regions, like the Baltic States or the Caucasus States, should also be able to benefit from combining their resources for the combating of illicit trafficking. Such a region could establish co-operation on intelligence information and the civilian and military authorities could assist by supplying services and information from, among others, local open sources. In case of the Baltic States, such co-operation could be sponsored under the Baltic Sea States Council for Regional Co-operation Agreement.

To organise such co-operation does not require a large bureaucratic organisation. It could be sufficient to have a chairman, assigned by the Government, or recognised as such by relevant institutions, and this assignment could be combined with another position. The unit should have representatives from a variety of authorities, which are directly concerned by the illicit trafficking activities. A suitable working form would be a committee with a secretariat and a certain on-call duty. The committee would be immediately called into action whenever a serious case of illicit trafficking occurs. The

committee would play an important role as the co-ordinating body for knowledge and contacts between authorities, including across borders, laboratories and other services required and with the International Regime.

On the international level, the work by the national law enforcement authorities to detect and investigate cases of illicit trafficking would be very much helped by improvements of the communication links between national authorities and with the international organisations, including the IAEA. From discussions held with representatives of several of the reference countries to this study, the conclusion can be drawn that bilateral agreements that have been concluded to facilitate investigation activities, are not always working so well in practice. This is, in particular, the case with agreements concluded with Russia. The customs authorities in many countries have, however, the right to carry out pre-investigations concerning smuggling of goods across borders.

With respect to information exchange, the development of information databases based on open sources, by national as well as international organisations, will most certainly lead to an increased exchange of information and techniques for establishing such open source information systems. Such systems are essential also for the efficient control of export and import of nuclear material. As established in chapter D above, the IAEA database on open sources would be an important tool in the overall combating scenario, provided it can be accessed to and utilised by both States and other international organisations. In that way, it can assist not only in disclosing criminal activities, e.g. concerning export/import of nuclear and dual-use material, but also in the investigation of such activities in its whole extent.

The improvements of the national systems for combating illicit trafficking that have been brought into focus above, as well as the improved communication links across borders, would lead to an increased efficiency in both preventing and combating the crime of such trafficking. But since illicit trafficking is a highly international, across-border crime, a strategy for its combating can be successfully established and implemented only in the international perspective. This argument is made, not only because the illicit trafficking "goods" are moved, across borders, from one country, through one or more other countries, to the final destination in yet another country, where it can be used for making nuclear weapons (i.e. the most "scaring" scenario). The fabrication of clandestine nuclear weapons by any State or terrorist organisation, maybe in combination with development of a missile launching system, is an act, once it has been detected that, most likely, can be halted, only through an international effort under the auspices of the Security Council of the United Nations.

PROPOSAL

- *States should individually establish a body of national authorities concerned with combating illicit trafficking;*

- *Each region of States, including the Baltic States, should investigate the possibility of establishing a joint task force for the combating of such trafficking;*

- *The Baltic States should also investigate the possibility to establish a task force under the Baltic Sea States Council for Regional Co-operation Agreement.*

The International Regime should:

- *develop recommendations for national systems for combating illicit trafficking, taking into account the utilisation of open source information;*

- *promote co-operation between national and international information databases on proliferation;*

- *promote bilateral agreements between national authorities and/or international organisations for investigation procedures, across borders, of illicit trafficking cases.*

Preparedness

In general terms, preparedness is necessary for fast response to situations of threat or crisis. In activities where emergency situations may occur, assessments must be made of possible cases of emergency, and countermeasures must be planned in advance. Preparation includes exercises and tests.

In the case of illicit trafficking, the threat scenario focuses on nuclear weapons proliferation and potential players and activities linked thereto. Intelligence and other information are important components in the system of preparedness. In the ideal case, the most efficient form of preparedness would be to maintain an overall high level of prevention in all areas of nuclear or radioactive activities, so that all kinds of illicit trafficking would become next to impossible. Should a case of illicit trafficking occur, however, the system of prevention and preparedness should be able to react fast and to prevent or reduce possible further consequences. The preventive measures against illicit trafficking, notably safeguards, physical protection and export/import control, are the cornerstones of the system of nuclear non-proliferation. Consequently, each State shall have established a system of prevention and protection, that maintains continuous knowledge and control of nuclear material, items and technology on the State's territory.

Ultimately, the system of prevention and protection is dependent on the reliability and trustworthiness of human beings (the human factor), in particular, when the system can be violated through criminal actions. Even strong sanctions do not always have sufficient deterrent effect. This is, in particular, the case, when illicit trafficking is done as part of a clandestine nuclear weapons

programme of a state or terrorist organisation and not because of profit interests alone.

Essential components of a system of prevention against illicit trafficking are: preparedness, fast investigation and prosecution, as well as strong punishments. They would also have a deterrent effect.

It has already been argued that the most serious forms of illicit trafficking, involving nuclear weapons or weapons material or equipment, must be considered as crimes against humanity. Therefore, every attempt at, or complicity in, such a crime, must be restrained in its initial steps. It is evident, therefore, that the law enforcement authorities, i.e. customs, police and border guards, are focusing their watching and guarding activities on State borders, including seaports and airports.

But also the illegal or criminal possession of nuclear material is a part of the illicit trafficking chain of events. The preventive measures must, therefore, also be focused on reactor facilities, fuel fabrication factories, reprocessing facilities, research facilities, and other locations where nuclear material is used, stored or transported. The means and measures used for disclosing illegal activities, aiming at nuclear weapons fabrication, would be much improved by the implementation of the control and reporting procedures in accordance with the enhanced safeguards system resulting from the implementation of the Additional Protocol.

It has also been argued, that it is not realistic to assume that a prevention system could be established that would prohibit illicit trafficking of dual-use items. It would, however, be worthwhile to try a comprehensive system of compulsory registration and licensing of manufacturers of dual-use products and for those who are trading in such products. Other business partners, like salesmen and transport companies, should, at least, obtain licenses for dealing with these products. Such a system would eliminate out of business those individuals that are ignorant about the potential danger of trading in such goods. Furthermore, one would expect that, with this approach combined with intensified information, the public would become more aware of that certain products could be used for fabrication of nuclear weapons. Such knowledge would have a preventive effect.

Since there might be a connection between dual-use products and techniques used for the manufacturing of nuclear weapons, a State's programme and plan for preparedness should also be focused on the prevention of illicit trafficking in such technique, including design drawings, instructions and of knowledge.

As seen from Annex 8, modern technical equipment for detection and monitoring at borders is also needed.

PROPOSAL

The national legislation should stipulate requirements on a Preparedness Programme for combating illicit trafficking, including among others licensing requirements and information procedures for dual-use products, technology and know-how. It is also proposed that an introduction of registration and/or licensing of manufacturers and traders of such products should be considered.

Investigation

The ICAO has established guidelines for State investigation of abnormal incidents (serious aircraft accidents and narrow escapes), based on the 1944 Convention on International Civil Aviation. Annex 13 of that Convention outlines the standards and recommended practice, which pertain internationally to accident and incident investigation. This means, that the investigation, independently of in which country the accident has occurred, follows common practice, and is concluded with a report in a standardised format. The content of the report can, therefore, easily be transferred into ICAO's database, which is available on international level as an important source of information on aviation safety matters.

In the initial phase of an incident or accident investigation, one of the most important tasks is to ensure that the composition of the investigation team is appropriate to the particular investigation. This means that the team should possess adequate operation and technical expertise. Only then, can the team carry out its tasks promptly, effectively and in a professional manner. Another important factor is the team's obligation to inform all parties concerned about the initiation of the investigation and, when possible, allow them to follow the investigation.

As has repeatedly been emphasised in this report, illicit trafficking is a very serious crime, in particular when it concerns nuclear material, nuclear items, technology or expertise that can be used for manufacturing nuclear weapons. In order to effectively investigate such crimes, large resources are needed. In conformity with the ICAO, the International Regime should establish a "Standard and Recommended Practice" for illicit trafficking investigation. Responsible for investigation is always the State where the event has occurred. For each case of serious illicit trafficking, or attempt thereto, an investigation team should be assigned the task to, as quickly as possible, find out as many facts as possible, including how the material or equipment has been moved and its origin.

To achieve a successful result, the team should have a multinational staff, representing different areas of expertise, including chemical and nuclear technologies. It should also have representatives from national security organs such as civil and military intelligence services. With a well composed team, one could, in a fast and flexible manner utilise different contact routes to authorities,

agencies and organisations across borders, with the aim to collect all relevant information and to track down the source.

In practice, the investigation of an illicit trafficking case is a custom or police investigation that shall be carried out in accordance with valid national legislation. Procedures should be established in order to guarantee effective co-operation across borders. In this context, attention should also be given to the agreement reached at the October 18, 1999, meeting in Moscow by the foreign ministers of the Group of 8 States, to establish inter-State procedures for combating international crimes. This would permit the law enforcement authorities of one State to carry out investigation activities in another State.

The investigation report should include a comprehensive description of the events, and conclusions, on the basis of which, recommendations should be made with aim to prevent a recurrence of the event. It is suggested that the report with recommendations should be addressed directly to relevant national authorities in the States concerned. The report should be suitable for data processing.

PROPOSAL

The International Regime should

- *in consultation with Interpol and WCO, establish standards and procedures for the investigation of illicit trafficking, and for the reporting of investigation result (preliminary and final reports);*
- *establish recommendations for content and format of the report;*
- *establish a database for storing and handling of information from investigation of illicit trafficking events.*

Sanctions

In spite of the fact, that illicit trafficking aiming at the manufacturing of nuclear weapons has to be considered as a dangerous criminal act against humanity, the rates of penalty and sanctions applied in many countries are relatively low or modest, as is described in chapter C and in Annex 7. Only a few States can impose life imprisonment. In order to use the penalty rate as a deterrent, the penalty must not be too low. Also due to the psychological effect, a serious case of illicit trafficking of nuclear weapons related material must be judged as very severe.

Illicit trafficking crimes should, therefore, render rigorous punishments. In serious cases, the consequence should be life imprisonment. This calls for immediate arrest and fast prosecution of the perpetrator, whenever such a crime is disclosed. Other forms of punishment should be extensive fines, as well

as confiscation of property. The proposed measures, in combination with a high success rate for prosecution, should have an essential public-preventive effect.

PROPOSAL

The national legislation should stipulate an offence on severe crime of illicit trafficking to long imprisonment, up to lifetime.

National Authority or Regulatory Body

In order to obtain an effective system for the combating of illicit trafficking, certain conditions must be fulfilled.

A State authority with supervisory responsibility in such a politically sensitive and technically advanced area as nuclear and radiation safety, must have a special structure. It should, among others, have high competence both technically and administratively and be well established internationally, through active participation in the international work in the nuclear energy sector. Economical and personnel resources should be so adopted, that assigned tasks can be carried out efficiently. Authorities should also work with high degree of integrity and be independent, which is emphasised in the Convention on Nuclear Safety. For an authority, "independent" means that it alone takes decisions in singular cases, but that it, of course, has the duty to follow rules and instructions that Government or Parliament have issued for its operation.

Considering, in the first place, the NIS States from this point of view, one may argue that many of the requirements are fulfilled, for instance concerning the competence. On the other hand, sufficient economical resources are lacking, and this can also have an impact on the personnel resources. Furthermore, it is not clear whether the requirement on independence is fulfilled.

Also the legislation is a source of concern. As has been demonstrated in previous sections, the content of legislation has a decisive impact on the combating of illicit trafficking. The legislation should be based on the NPT requirements and applicable recommendations and it must be implemented and applied. It is regrettable, that Quality Assurance and Internal Control have not been introduced, nor is there a clear distribution of responsibility between authorities, operators and individuals. Where the necessary competence exists within the supervisory authority, it could be a fruitful co-operation between the authority and the industry.

The preparedness for the combating of illicit trafficking can, as has been discussed above, be improved, and preparedness plans should be developed in order to obtain a flexible co-operation between all the authorities and organisations involved in this activity. Education and training should also be improved for obtaining highest personnel efficiency and use of equipment, etc.

In general terms, these imperfections and shortcomings could be overcome, and the national systems brought up to a higher quality level. This would require, however, that proper assistance be made available.

PROPOSAL

The International Regime should:

- *ensure assistance to States requesting such assistance with the aim to enhance the quality of work of the National Authorities or Regulatory Bodies, as relevant. This might include, but not be limited to, to educate and train key-persons how to establish an advanced national system, modelled on existing, modern standards and taking into account established international guidelines, requirements and recommendations;*

- *pursue Governments to make the financial resources available that are needed to bring their national systems up to international requirements and recommendations;*

- *pursue countries with sufficient knowledge and experience in these matters to provide support to States that request assistance for the improvement of their national systems. Such support would include transfer of know-how as well as technical means needed to enhance their work.*

The Role of the International Regime

General

The evaluation made in this study of the circumstances in different countries, with respect to the combating of illicit trafficking, has led to the conclusion, that an international inter-state regime or organisation should be established. Without such an organisation, it is not realistic to assume that illicit trafficking, and proliferation of nuclear weapons, can be stopped. Such an organisation, with a follow-up and audit system, in combination with a technical assistance programme, would have the possibility to force different States to adopt and apply a satisfactory, mandatory set of regulations on nuclear and radiation matters.

The organisation should also have the power, with different means, to impose on States to adhere to existing international agreements aimed at improving their non-proliferation credentials, such as the NPT and the Additional Protocol, and also to pursue all States to accept an international supervisory organisation, the aim of which is to ensure effective and efficient combating of illicit trafficking. In cases of serious failure, this international organisation should hand over the matter to the United Nations.

Characteristic for combating illicit trafficking is great complexity, and it is based on prosecution and response activities from several authorities and organisations, such as police, military forces, prosecutors and courts, as well as customs, border guards and co-operation organisations. The International Regime must be well initiated in and have field experience of activities relevant to combating illicit trafficking.

Considering what has been said above in this chapter, it is evident that a supervisory international regime should be established. Many of its functions would be similar to those of the ICAO. When decision is made on this organisation, important factors to be taken into account are:

- that it has good knowledge and field experience of activities relevant to combating illicit trafficking;

- that it can work with wide international acceptance;

- that it has the ability to work with sensitive matters, sometimes considered to be closely related to one or more State's national security issues;

- that it has access to the United Nations and, in extreme cases, to the Security Council;

- that it can work independently and in a fast manner and with a high degree of flexibility and transparency;

- that it should work with a limited number of staff, but should have access to supporting expertise from States or other international organisations, as needed for specific tasks;

- that its organisation should be flexible and allow its abolition when it is not needed any longer;

For the purpose of this study, two different alternatives (1 and 2) for such an international regime has been discussed. There is however no reason why other alternatives could not be considered.

Alternative 1

The IAEA is the recognised international organ for both nuclear energy promoting activities, and non-proliferation, and it has an overall nuclear and radiation capability and competence, including qualified staff, information systems, etc. The IAEA has been given a great number of tasks regarding nuclear and radiation safety and nuclear non-proliferation issues. It has also a unique responsibility for safeguarding nuclear material. Recommendations and guidelines for physical protection of such material and facilities have been developed under the auspices of the IAEA, as has the Convention on physical protection. The IAEA has also been given a certain role with regard

to trade in nuclear items. It has established contacts with Interpol and WCO on illicit trafficking matters, and, so far, some limited services have been provided to Member States on physical protection and illicit trafficking. The IAEA is also in the process of building-up an extensive database and operating system, based on open sources.

The question is, however, whether the IAEA can serve the purpose of the International regime for Illicit Trafficking, given that there are a number of restrictions and limitations built into the IAEA system of work, among others:

- The fact that the IAEA has limited field experience of activities relevant to combating illicit trafficking, such as the detection and investigation of smuggling;

- Even if the Additional Protocol were implemented in most States, there are restrictions and limitations in the IAEA structure and procedures, partly related to the IAEA Statute, but also to "tradition", that limit the possibility to carry through an efficient "inspection and combating" programme. Some of these constraints are caused by Member States and have a political overtone.

- Because of IAEA's policy that all States must be treated equally in order to avoid discrimination, there is slowness and bureaucracy built into the system that makes it difficult to play the role of the international regime in question. Furthermore, the IAEA is, in almost all its activities, restricted with respect to confidentiality. It is not possible for an outsider to get an sufficient insight into the results of the activities it carries out in the non-proliferation area.

- IAEA's budget, including the safeguards budget, is since many years a zero-growth budget which seems to suggest that Member States are of the opinion that the IAEA will have to manage its work without compensation for “addition obligations” or for inflation. As long as IAEA's budget is not increased by the member States, the human resource problem can be dealt with only in a trade-off/partnership way, or by re-locating budget resources between the departments. Even if the IAEA gets some financial support through voluntary contributions, there is no guarantee for continued such support. There seems also to be an overall difficulty to get funding for new activities. Experience has shown that many States are objecting to an increase of IAEA's mandate.

- The fact that tasks related to illicit trafficking are split between several departments and divisions does not increase the probability that these matters will get the proper attention to ensure adequate dealing with related matters.

Alternative 2

Another alternative is to establish a new international regime, which should be independent of other organisations and should report directly to the United Nations and have a small, highly competent staff. Its mandate should be to develop and implement, internationally, a follow-up and audit programme, as has been discussed earlier in this chapter, for the combating of illicit trafficking, and to promote effective support to States aimed at enhancing the effective and efficient combating of illicit trafficking.

The starting point could be that the UN Security Council, through a resolution, establishes a Regime, possibly as a committee. Terms of reference for the Committee could also be given in that resolution. Its mandate would be limited in time and not long lasting. The Committee would have only few (less than 10) highly qualified staff members. Since very small administrative arrangements are needed, it would be possible to get this Committee established in a reasonably short period of time. Given the urgency, the operational work could start rather quickly. The budget for the Committee would need to be relatively small. Considering the politically sensitive nature of the Committee's task, among others the question about a State’s sovereignty, the chairman of the Committee should have a high level diplomatic experience.

In fulfilling its mandate, the Committee need to be able to organise and perform the activities with a large degree of flexibility and individual tasks would, most often, have to be assigned to ad-hoc task forces. To these task forces would need to be assigned experts from States and international organisations, including Interpol, WCO, IAEA, national authorities, universities, national research organisations, and industries. The purpose being to get access to the most relevant and most highly competence in all relevant areas, including the nuclear field, for a specific task. The Committee should, to the extent possible, work in a transparent manner and its reports should be given a broad as possible distribution and with a minimum of confidentiality.

The Committee should report directly to the UN Security Council.

Conclusion

An assessment of what has been said above, seems to suggest that there are convincing reasons that a new International Regime should be established and be given the task to follow-up and audit the activities in all areas relevant to combating illicit trafficking in different States.

Such a new Regime would not be intended to alter the current obligations of the IAEA as defined by its Statute and mandate. The role of the Regime, as suggested, would be to supplement the obligations of the IAEA, as necessary, for the combating of illicit trafficking. Thus, the new Regime would assume

responsibility for implementing a follow-up and audit system. The other measures should be allocated to the IAEA.

PROPOSAL

A new International Regime should be established and be given the task to:

- *define the set of requirements and recommendations to be implemented in States for the effective combating of illicit trafficking, and to promote and pursue the implementation of and adherence to them;*
- *develop and establish a follow-up and audit system, with the purpose to review the implementation of those requirements and recommendations;*
- *carry out audits;*
- *when necessary, based on follow-up findings, initiate the development of improved requirements.*

RADIATION SOURCES

The IAEA Basic Safety Standards (BSS; IAEA Safety Series No. 115) are well suited for being a necessary code for the safe handling of radiation sources. At present, the IAEA is developing a Safety Guide on Preventing, Detecting and Responding to Illicit Trafficking in Radioactive Materials. In a draft to that guide, reasons and motives for illicit trafficking (including unintentional trafficking according to the IAEA definition of the term) are brought forward, e.g. that the user of the radiation source is not adhering to established procedures, or that there are imperfections in the legislation and its implementation. Another reason could be insufficient checking routines for processing, storage, disposal and transportation of contaminated goods. The draft guide argues further:

"Radioactive material, including nuclear material, may also be trafficked with the idea that they have a value as a commodity, most notably that they could be useful in a nuclear weapons programme or as a threat. The persons involved usually know that they are breaking the law. Very often, persons committing such offences have very little understanding of the technological utility of such materials, their hazards or their market value. Often, in these cases, the radioactive materials are obtained in one country and attempts made to deliver or market them in another. Another reason for the diversion of such material might be to avoid fiscal or other fees".

This catches in a nutshell the usual motive for the criminal act. Experience from occurred smuggling cases shows, that the perpetrator most often is indulged in expectations to be able to sell the material for big money, and that he is lacking nuclear know-how. He is frequently not even aware of the fact that the material is radioactive and hazardous (unintentional trafficking).

The draft guide furthermore suggests detailed regulations concerning prevention of illicit trafficking in areas of national legislation, authorisation to possess radioactive materials and to transfer such materials by transport, export, commercial distribution, and also regulations on the security of the materials. The draft guide also contains detailed standards and procedures for detection of and response to illicit trafficking, training and co-operation and exchange of information.

To sum up, it could be said that the guide, which is expected to be published in its final version within short, is well in harmony with the proposals presented in this report as far as intentional illicit trafficking is concerned. It should, together with the IAEA Basic Safety Standards, establish the basis for national legislation. Also in this area, the IAEA should be actively and forcefully working for that States are going to incorporate this guide in national legislation.

PROPOSAL

- *Intentional illicit trafficking with radioactive material should be fully included as a parallel to the trafficking with nuclear material in the combating scheme proposed in this report with due consideration of the additional concepts presented in the IAEA Guide mentioned above;*

- *Unintentional trafficking with radioactive material is considered only briefly in this report but is included in the IAEA analysis. It is likely that many countermeasures against intentional trafficking are equally valid against unintentional, but the problems are basically different and other measures might be more cost-efficient. A further study based on the IAEA analysis, the conclusions of this report and other relevant material should be initiated.*

WEAPONS OF MASS DESTRUCTION

The Project Directives (Annex 1) state that the study should also consider whether the conclusions, recommendations and proposals made by the study could be applied also for the combating of illicit trafficking of mass destruction weapons (WMD) other than nuclear.

After considering this question, the Working Group has found itself without sufficient expertise to analyse and deliberate on it in depth. It is, nevertheless, relevant and appropriate to assume that, if the proposals and recommendations

made by the study are being implemented, this would have a positive impact on the non-proliferation of all types of WMD.

F. PROPOSALS

By the States

1. States should establish national legislation on the requirements stipulated in the NPT, in the Convention on Physical Protection of Nuclear Material, in the Nuclear Suppliers Group's Guidelines, and also on the requirements recommended by the IAEA in related parts. The national legislation should include requirements on:

    - duties and responsibilities within nuclear activities and on the distribution of responsibilities between nuclear authority, operator and employees;

    - the operator's responsibility to establish a Quality Assurance and Internal Control System and also to urge on high safety culture, motivation and commitment in the operation of facilities and installations;

    - the operator's responsibility to establish a system on thorough examination of the trustworthiness and competence of his personnel (executives and employees);

    - the operator's responsibility to establish a positive working climate through different means, like performance development, etc.;

    - the National Authority's programme for approval and acceptance of the operator's Quality Assurance and Internal Control System and on the Authority's use of the system in its follow-up and audit activities;

    - a Preparedness Programme for combating illicit trafficking, including among others licensing requirements and information procedures for dual-use products, technology and know-how. It is also proposed that an introduction of registration and/or licensing of manufacturers and traders of such products should be considered;

    - an offence on severe crime of illicit trafficking to long imprisonment, up to lifetime.

2. States should individually establish a body of national authorities concerned with combating illicit trafficking.

By the IAEA

3. The IAEA should:

    - in assisting States, through appropriate documentation, establish rules about duties and responsibilities for operators, authorities and individuals in the non-proliferation area;

- ensure assistance to States requesting such assistance with the aim to enhance the quality of work of the National Authorities or Regulatory Bodies, as relevant. This might include, but not be limited to, to educate and train key-persons how to establish an advanced national system, modelled on existing, modern standards and taking into account established international guidelines, requirements and recommendations;

- incorporate a more modern safeguards inspection technique of the national systems for accountancy and control, in accordance with standards and procedures that were intended to be established on the basis of the Additional Protocol. This would allow the IAEA to allocate more resources for combating illicit trafficking;

- promote efforts to have non-NPT States voluntarily submitting information and becoming subject to safeguards, and promote all States to ratify the Additional Protocol;

- pursue Governments to make the financial resources available that are needed to bring their national systems up to international requirements and recommendations;

- pursue countries with sufficient knowledge and experience in these matters to provide support to States that request assistance for the improvement of their national systems. Such support would include transfer of know-how as well as technical means needed to enhance their work;

- develop recommendations for national systems for combating illicit trafficking, taking into account the utilisation of open source information;

- promote co-operation between national and international information databases on proliferation;

- promote bilateral agreements between national authorities and/or international organisations for investigation procedures, across borders, of illicit trafficking cases;

- in consultation with Interpol and WCO, establish standards and procedures for the investigation of illicit trafficking, and for the reporting of investigation result (preliminary and final reports), and establish recommendations for content and format of the report, as well as a database for storing and handling of information from investigation of illicit trafficking events.

<u>By the New Regime</u>

4. A new International Regime should be established and be given the task to:

- define the set of requirements and recommendations to be implemented in States for the effective combating of illicit trafficking, and to promote and pursue the implementation of and adherence to them;

- develop and establish a follow-up and audit system, with the purpose to review the implementation of those requirements and recommendations;

- carry out audits;

- when necessary, based on follow-up findings, initiate the development of improved requirements.

Such a new Regime would not be intended to alter the current obligations of the IAEA as defined by its Statute and mandate. The role of the Regime, as suggested, would be to supplement the obligations of the IAEA, as necessary, for the combating of illicit trafficking. Thus, the new Regime would assume responsibility for implementing a follow-up and audit system. The other measures should be allocated to the IAEA.

Others

5. The principle of public access to information should apply regarding events related to illicit trafficking. This principle should apply to Operators, Authorities, as well as to the IAEA and the new International Regime.

6. Each region of States, including the Baltic States, should investigate the possibility of establishing a joint task force for the combating of such trafficking. The Baltic States should also investigate the possibility to establish a task force under the Baltic Sea States Council for Regional Co-operation Agreement.

7. Intentional illicit trafficking with radioactive material should be fully included as a parallel to the trafficking with nuclear material in the combating scheme proposed in this report – with due consideration of the additional concepts presented in the IAEA Guide mentioned above.

   Unintentional trafficking with radioactive material is considered only briefly in this report but is included in the IAEA analysis. It is likely that many countermeasures against intentional trafficking are equally valid against unintentional, but the problems are basically different and other measures might be more cost-efficient. A further study based on the IAEA analysis, the conclusions of this report and other relevant material should be initiated.

8. Sweden should arrange an international meeting on the combating of Illicit trafficking during the first half of 2000.

ANNEX 1 PROJECT DIRECTIVES

Joint Swedish-Norwegian-Latvian Project on the Illicit Trafficking Combating (ITCP) (informal translation of the instruction for the ITCP Working Group)

BACKGROUND

Most States are signatories or parties of international treaties, conventions and agreements that aim at ensuring that all radioactive material, possessed and used for peaceful purposes (i.e. nuclear material, ionising radiation sources, radioactive waste, and other material with induced radioactivity), are being used, stored and transported in a manner that will not cause impermissible and harmful exposure of ionising radiation to man and the environment. In this context, special attention is given to such nuclear material that can be used for the manufacturing of nuclear weapons.

The fundamental international legal instruments for ensuring secure nuclear activities involving *nuclear material* are a) the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and b) safeguards agreements with the IAEA (based on the IAEA document INFCIRC/153 corrected), according to which a party State is committed to establishing a State System of Accounting for and Control of Nuclear Materials (an SSAC). For the fulfilment of the agreement obligations, the State must also establish and implement procedures and measures for the physical protection of nuclear material (against theft and terrorism attacks), and for export/import control of such material.

The treaty/agreement requirements on SSAC, physical protection and export/import control of nuclear material must be imposed on the users of such material (facility operators) in the State's legislation, which also must identify responsible authorities for the control and supervision of nuclear activities. For the safe handling and use of *ionising radiation sources*, similar legislation is established, preferably based on the IAEA document "International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources", referred to as the BSS (IAEA Safety Series No. 115). The measures and procedures for the safe and secure use of radiation sources, that are recommended in the BSS, can, in principle, be considered as similar to those applicable for nuclear material.

In spite of the existing international agreements for the safe and secure use of nuclear material, as well as the nationally established legislation and implemented safety and control systems for nuclear material and radiation sources, such materials are subject to unauthorized and criminal activities in the form of smuggling, sale, purchase and use. The risks and threats to the third party that such activities imply are a) accidental exposure to ionizing radiation, and b) terrorist attacks. There are several recorded cases in which

stolen radioactive material have caused injuries and death to people unaware of the handling of such material.
The unauthorized and criminal activities that can lead to harmful acts on individuals or the community are, in the international jargon, referred to as *Illicit Trafficking*.

To the acts of Illicit Trafficking are also referred unauthorized and criminal handling of and trade with *non-nuclear material* in the form of components and equipment that can be used for the manufacturing of nuclear explosives ("nuclear items"), including so called "dual-use items". To that category of criminal activities one can also refer the unauthorized transfer of technology and technical know-how.

With the continuos growth of organized crime in general, on the international level, follows an increased concern of the world community about Illicit Trafficking and terrorism in the nuclear field. Much of that crime goes undetected. Organised crime in combination with access to illegally obtained radioactive material, including weapon-grade nuclear material, leads to:

- increased threat of further proliferation of nuclear weapons and international nuclear terrorism;
- risk of serious radiation injuries affecting both those engaged in the illegal activities and other individuals; and
- risk of a more extensive long-term degradation of the radiation environment, if Illicit Trafficking is allowed to grow out of proportion.

During recent years, the awareness of the threat to individuals and the community of Illicit Trafficking activities has lead to joint efforts with the purpose to detect and prevent such activities. Such efforts on the international level are referred to as the *Combating of Illicit Trafficking*.

Reference is here made to the United Nation's Sixth Committee concerning a convention on preventing terrorism; the IAEA International Conference on Physical Protection in November 1997; the initiatives by the Nuclear Suppliers' Group, and the Group of Eight Major Industrialised Countries (G-8) and its Group of Experts (P-8). The problem of illicit trafficking is also discussed within the task group of the Baltic Sea Council on nuclear safety and radiation protection.

SCANDINAVIAN INITIATIVE

Within the Swedish nuclear support programme to the Newly Independent States (NIS), the Baltic States and Russia, the Swedish Nuclear Power Inspectorate (SKI) arranged a meeting in December 1997 with the Latvian Ministry of Environmental Protection and Regional Development (VARAM) with the purpose to agree upon and establish a joint project study to combat Illicit trafficking. Following contacts with other interested parties, an agreement was reached between SKI, VARAM, the Swedish Radiation Protection Institute

(SSI), and the Norwegian Radiation Protection Authority (NRPA) to carry out a Project study, focused on the Latvian situation, but with reference to the European region, of means and measures aimed at the combating of Illicit Trafficking.

This Project study has been given the name "The Joint Swedish-Norwegian-Latvian Project on Illicit Trafficking Combating" (ITCP).

PROJECT OBJECTIVES

With focus on the Latvian and NIS situation, but with reference also to the European region, the Project study shall investigate the different means and procedures, on the national and international level, that are essential for detecting and combating Illicit Trafficking. This includes, in the nuclear area, legislation, SSAC, physical protection, export/import control, radiation protection, as well as border and customs control and security police activities.

With a reference to the Scandinavian practice, the Project study shall identify actions within the various implementation areas that should be subject to improvement, and suggest how the network of involved State authorities and institutions can be developed to facilitate combating Illicit Trafficking.

Based on a survey and analysis of the current situation, the Project study shall make suggestions that would assist an assessments of what support activities, from the side of the Scandinavian countries, that could be implemented in the NIS and the Baltic States, with the purpose to improve the combating of Illicit Trafficking.

PROJECT SCOPE

The Illicit Trafficking activities to be covered by the Project study should include:

- unauthorised use or transport of radioactive material, i.e. nuclear material, ionising radiation sources, radioactive waste, and other material with induced radioactivity, that could cause harmful ionising irradiation to man or environment;
- unauthorised use or transport of non-nuclear material or equipment, that can be used for the manufacturing of nuclear explosives ("nuclear items"), including so called "dual-use items"; and
- unauthorised handling of metals containing radioactive material, such as iron scrap, which might cause health problems in industrial use.

The study shall not include: unknown radioactive sources; the systematic search or management of such sources, or the unauthorized transfer of technology and technical know-how.

The following subjects should be covered by the Project study:

- legislation infrastructure, including sanctions and penalties,
- State authority responsibilities and organisational structure,
- co-operation/co-ordination between national authorities and organisations and need for the establishment of a co-ordinating function,
- collection and processing of information, national as well as international,
- technical tools and equipment, including resources for measurements and analysis,
- international co-operation, and
- cost-related consequences of recommendations made by the Project study.

PROJECT IMPLEMENTATION

A Project Working Group is established, to which a Scientific Secretary is assigned (see Appendix). A Reference Group of experts is also established, with the task to give advice on subjects in the area of physical and radiation protection, customs and security police activities, as well as military matters and related areas. As need arises, additional experts may be consulted, subject to resource availability.

The Working Group should co-operate with and compile relevant information from countries and organisations involved in Illicit Trafficking combating activities and programmes, such as the United States Department of State and Department of Defence, and the European Union Joint Research Centre (JRC), and in particular the Institute for Transuranium Elements in Karlsruhe.

The Project study should also utilise the existing international networks within and between countries and authorities, such as customs, security police, nuclear and radiation protection authorities and organisations for obtaining relevant and useful information.

PROJECT REPORTING

The result of the Project study shall be presented in a Report, that in its general perspective should give a comprehensive description of all application areas that are essential for the combating of Illicit trafficking. In particular, the Report should suggest measures and procedures for the improvement of relevant infrastructures, including legislation, instructions for authorities and co-operation agreements between concerned parties, nationally and internationally, in the combating of Illicit trafficking.

The recommendations to be presented in the Project Report should contribute to a more efficient prioritisation of resources assigned by Scandinavian support programmes in the NIS and the Baltic States for the combating of Illicit trafficking. They should, therefore, be generally applicable, and, as far as

possible, be used as a basis for the development of an overall and comprehensive policy for combating Illicit Trafficking.

In addition, it should be considered whether the conclusions and recommendations of the Project study and the proposals therein could be applied also for the combating of Illicit Trafficking of mass destruction weapons other than nuclear.

TIME SCHEDULE

The initial activities of the Project study began in January 1999. The Project Report should be presented in November 1999.

FINANCING

The Project is financed jointly by SKI, NRPA and SSI according to concluded agreements. The Latvian party will participate without compensation for working hours, but will be fully compensated for travel expenses, investments in equipment, etc.

The members of the Reference Group and other co-opted experts have to secure
their own funding of their participation. This also applies to other approached organisations (such as the Transuranium Institute, the US DoS, and US DoE).

SPONSORS

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ANNEX 2 DEFINITIONS AND ABBREVIATIONS

DEFINITIONS

For the purpose of this study:

Nuclear Material means:

1. Uranium, Plutonium or another substance which is, or may be, used for extraction of nuclear energy (nuclear fuel), or a compound containing such a substance;

2. Thorium or another substance suited for conversion into nuclear fuel, or a compound containing such a substance;

3. Spent nuclear fuel, which has not been placed in final storage.

Dual-Use Items means:

Equipment or non-nuclear materials that could be used in both non-nuclear activities, as well as for the production of nuclear weapons.

The term **Nuclear Items** includes both Nuclear Material and Dual-Use Items.

ABBREVIATIONS

International Organisations

IAEA	International Atomic Energy Agency (the Agency)
OECD	Organisation for Economic Co-operation and Development
NEA	Nuclear Energy Agency of the OECD
IMO	International Maritime Organisation
ICAO	International Civil Aviation Organisation
WHO	World Health Organisation
ILO	International Labor Organisation
FAO	Food and Agriculture Organisation of the United Nations
PAHO	Pan-American Health Organisation
WCO	World Customs Organisation

International Committees and Commissions

ICRP	International Commission on Radiological Protection
UNSCEAR	United Nations Committee on the Effects of Atomic Radiation
NSG	Nuclear Suppliers Group
ITWG	Nuclear Smuggling International Technical Working Group

National Authorities

VARAM	Latvian Ministry of Environmental Protection and Regional Development
NRPA	Norwegian Radiation Protection Authority
SKI	Swedish Nuclear Power Inspectorate
SSI	Swedish Radiation Protection Institute
USNRC	United States Nuclear Regulatory Commission
UKNRPB	United Kingdom National Radiological Protection Board
SÄPO	Swedish Security Service
POT	Norwegian Police Security Service Headquarters
STUK	Finnish Centre for Radiation and Nuclear Safety
TAD	Norwegian Directorate of Customs Excise
FM:HKV	Swedish Army Forces Headquarters
FOA	Swedish Defence Research Organisation

Others

NPT	Treaty on the Non-Proliferation of Nuclear Weapons
SSAC	State System of Accounting for and Control of Nuclear Material
BSS	International Basic Safety Standards for Protection Against Ionising Radiation and for the Safety of Radiation Sources (IAEA Safety Series No. 115)
ILG	International Group of Legal Experts
CNS	Centre for Non-proliferation Studies at the Monterey Institute of International Studies, USA
URENCO	Uranium Enrichment Company, Amelo, The Netherlands
HEU	Highly Enriched Uranium
LEU	Low Enriched Uranium
MOX	Mixed Oxide Nuclear Fuel
WMD	Weapons of Mass Destruction
NIS	Newly Independent States, i.e. Armenia, Azerbaijan, Belarus, Georgia, Kazakstan, Kyrghyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.
Baltic States	Estonia, Latvia, Lithuania

ANNEX 3 QUOTATIONS FROM A CNS REPORT
(CNS Occasional Paper No. 3)

In July 1999, the CNS launched a new initiative: formation of the Monterey Nonproliferation Strategy Group. This international body of seasoned policy practitioners and renowned non-proliferation analysts aims to generate innovative but practical non-proliferation policy recommendations for global adoption and implementation. The report "Nonproliferation Regimes at Risk" (CNS Occasional Paper No.3) compiles works prepared for and based on the first meeting of the Strategy Group, held July 5-7, 1999. Together, these papers comprise a concise yet comprehensive examination of the many new and ongoing proliferation challenges.

The following are quotations from that report.

<u>On Proliferation in general</u>

Proliferation challenges have intensified over the last two years, and have come in many forms and on many different fronts, including:

- Russia's economic collapse and the growing difficulty of safeguarding its vast arsenal of weapons of mass destruction and related material, technology, and know-how;
- emerging Indo-Pakistani nuclear and missile arms races;
- Iraq's defiance of United Nations Security Council-mandated weapons inspections;
- North Korean nuclear and missile brinkmanship;
- fractious NPT PrepComs auguring likely disputes at the Review Conference in 2000;
- increased risks of chemical, biological, and radiological terrorism;
- erosion of US-Russian cooperation on nonproliferation; and
- widespread complacency among the public at large and their elected representatives.

These and other developments have undermined the nonproliferation regimes to such a degree that their long-term viability is now in question.

Moreover, as this decade ends, interest in and concern about proliferation seem to be wavering, creating uncertainty about the international community's commitment to nonproliferation. The message is a garbled one. States have engaged in efforts to strengthen several regimes—the IAEA's Model Protocol, the enhanced NPT review process, the Ad Hoc Group for the BWC (Biological Weapons Convention), and the CWC (Chemical Weapons Convention) verification regime—but these efforts appear to be losing momentum. Instead of strengthening their respective regimes, such efforts may be revealing the hollowness of commitments that states are making today. Nonproliferation rhetoric is not being supported by resources or political will, as is evident in the continued inadequate funding given to the IAEA, to the Agreed Framework with North Korea, and to

Russian chemical weapons dismantlement. Examples where political support has been inconsistent and insufficient include the failures to complete the dismantlement of Iraq's WMD programs, negotiate a verification protocol for the BWC, and bring the CTBT into force.

The transitional nature of today's world brings with it an uncertainty that pushes states to protect their own needs first and worry about international or long-term implications second. States have become more reluctant to relinquish sovereign rights to international agreements or organizations.

Resource constraints plague international efforts to support nonproliferation regimes. Despite increasingly demanding responsibilities, notably with regard to undeclared nuclear facilities, the IAEA's budget has remained consistently inadequate. US-Russian Cooperative Threat Reduction programs to address Soviet nuclear legacies are likewise under-funded.

Scant political will and inconstant attention among potential leaders of the international community pose an across-the-board challenge to sustaining and strengthening all of the nonproliferation regimes, and to related arms control measures such as the CTBT and START. The paucity of high-level commitment is a product of the dominance of domestic factors in setting the agendas of key states, the low priority of nonproliferation among foreign and security affairs, and commercial incentives overriding efforts to control technological diffusion.

<u>On the NPT</u>

The NPT is presently under threat on several fronts:

- Nuclear tests by India and Pakistan have challenged the international nonproliferation norm established by the Treaty, and the international community remains at a loss over how to categorize and deal with these two states: as non-nuclear weapon states not party to the NPT; nuclear weapon states not party to the Treaty; or threshold nuclear weapon states? Similar concerns also apply to Israel.
- Compliance with the safeguards obligations and overall intent regarding the Treaty by two states—the DPRK and Iraq—remain in question.
- Nuclear disarmament obligations of the nuclear weapon states remain unfulfilled, with bleak prospects for further reductions in the near term, despite nuclear arms reductions agreed bilaterally between the United States and the Russian Federation and unilateral cuts by these two NWS and by France and the United Kingdom.
- Cooperation in the peaceful uses of nuclear energy continues to be constrained by some members of the Nuclear Suppliers Group who have concerns about the intent of certain states, notably efforts by the United States to deny Iran access to civilian nuclear technology.
- Many non-nuclear weapon states believe that the strengthened review process for the Treaty is being undermined, principally by the nuclear weapon states.

On Russia and the NIS

The newly independent states (NIS) of the former Soviet Union, particularly Russia, inherited the world's largest stockpile of nuclear weapons, chemical weapons, fissile material, and weapons-related technology. However, their weak governments and ongoing financial problems have left them in a poor situation to deal with this inheritance. Newly privatized enterprises have also had significant financial incentives to subvert existing state export controls in search of hard currency and the external markets they need to survive. This combination of significant WMD capabilities and technologies and difficult economic circumstances in the NIS countries create some of the most dangerous threats to the viability of existing nonproliferation regimes. This situation has highlighted the unique set of problems raised by "declining" WMD powers: i.e., those that retain large quantities of WMD materials, technologies, and scientists, but possess greatly diminished capacities for maintaining control over them.

A related problem in the NIS is the difficulty faced by states that seek to join and implement international agreements for nonproliferation, but lack even the minimal financial resources necessary to do so. Several cash-poor governments have been unable even to become members of certain nonproliferation regimes due to the costs of membership (tens or hundreds of thousands of dollars per year).

Ample evidence exists that various states in the NIS are subverting their own export control laws (and international commitments) through lax enforcement. In Ukraine and Russia, there is solid evidence of government collusion in this process. In Russia, cases against proven illegal exporters of gyroscopes to Iraq have been dropped on spurious legal technicalities. Better enforcement is required if the international community is going to be convinced of the sincerity of NIS nonproliferation intentions.

ANNEX 4 INCIDENTS AND EVENTS OF ILLICIT TRAFFICKING

INCIDENTS INVOLVING NUCLEAR MATERIAL OR NUCLEAR ITEMS

The following cases of illicit trafficking have been selected to illustrate the situation. Four of them occurred in 1999 and one in 1998. They have been reported by the American Center for Non-proliferation Studies (CNS).

Case 1: Uranium Traffickers arrested in Brussels.
(ref: P.Leprince, Le Soir, Brussels, 8 August 1999).

Four suspects were arrested by Belgian police on 4 August 1999 when they attempted to sell 5kg of uranium to undercover police agents for 45 million Belgian francs ($1.2 million). The report does not specify the level of enrichment of the uranium. The arrests were the result of a "sting" operation launched on 30 July 1999, when police received a report from an informer about a group trying to sell uranium smuggled from the Democratic Republic of the Congo (DRC, formerly Zaire). The material was a metal box containing five 30 x 10 cm uranium ingots. The uranium was smuggled into Belgium via the port of Antwerp in May 1999.

Three suspects have been charged with violating Article 488 of the Belgian Penal Code (trafficking in illicit substances), and may be sentenced to up to 10 years in prison if convicted.

Case 2: Three Peddlers of Highly-Enriched Uranium are Arrested in Almaty.
(ref: Panorama, 6 August 1999).

Three people were arrested in Almaty, Kazakhstan, after police discovered over 5 kg of "highly enriched uranium" in a container they were carrying. The report did not specify the level of enrichment of the uranium, but said the material was used in the NIS "as fuel for experimental nuclear reactors." According to Panorama, sources at the Kazakhstani Ministry of Security said that if the suspects had managed to sell the uranium, it would have made them quite wealthy while allowing the purchaser to acquire the raw material for a nuclear weapon. The sources refused to reveal any additional details about the case to the newspaper.

Case 3: 10 Arrested for Trafficking in Stolen Uranium.
(ref: ANSA, Rome, 29 July 1999).

Ten members of a Rome and Palermo-based gang, which tried to sell an HEU fuel rod stolen from the Democratic Republic of the Congo (formerly Zaire), were arrested by Italian authorities in Palermo and Rome. The gang is believed to have obtained 10 of the fuel rods (containing 20 percent U), one of which was

recovered by Italian police in a March 1998 sting operation. Since that time the authorities have been seeking to recover the other nine fuel rods. Colonel Vittoria Tomasone, an Italian police official, told ANSA that "we are certain the persons we have detained have been or still are in possession" of the fuel rods. The report did not specify whether any of the nine missing rods has yet been recovered. The police officials said that the gang, with a total of 35 members, was highly organised, with one division handling attempts to sell the uranium, usury, and extortion, while two other divisions handled finances and fraud against banks. The investigation revealed that the gang had access to diplomatic passports from many countries, and had also engaged in sophisticated schemes to defraud banks.

Case 4: Ukrainian Authorities Arrest Four Armenians Selling Russian Uranium.
(ref: Y. Halas, Fakty i Kommentarii, Kiev, 22 May 1999).

Ukrainian authorities on 19 May 1999 arrested four Russian citizens of Armenian descent who were attempting to smuggle 20kg of "enriched uranium ore" to Western Europe. Colonel Vasyl Vartsaba, head of the Transcarpathian directorate for fighting organized crime, said that the suspects, residents of the Krasnoyarsk and Stavropol regions of Russia, had brought the uranium to Ukraine in December 1998, hoping to find a buyer. They originally hoped to sell it for $60,000/kg, which would have netted them $1.2 million, but later reduced their asking price to $35,000/kg. After several weeks of searching for a buyer, they made a deal in the town of Berehovo (located near the Ukrainian-Hungarian border) to sell 2 kg of the uranium. When one of the suspects met with the buyer to complete the deal, carrying the uranium in a sports bag, he was arrested at the Berehovo bus station. After his arrest, the suspect told the police that another 18 kg of uranium was buried outside a house in nearby village, and it was subsequently recovered. The other suspects were apparently arrested after the buried cache of material was recovered. According to the report, the suspects did not exercise caution in handling the uranium ore, and may have been exposed to "heavy radiation doses."

The material was sent to Uzhorod State University for analysis, where physicists said it was "enriched uranium ore." The level of enrichment was not specified. According to the report, the uranium "is known to have been stolen at a radioactive materials recycling facility in Krasnoyarsk." This information comes from police interrogation of one of the suspects. Other sources, however, report that the material involved is low-enriched uranium metal suitable for making fuel for RBMK-type reactors. The material's properties and origin may be clarified by a second examination by the Kiev Institute of Nuclear Research. As of 27 May 1999, the material is in storage at the Lviv branch of the radwaste cleanup organisation Radon. This may indicate that the material is not metallic uranium.

A criminal case has been opened against the suspects, and an investigation into how and when the uranium was stolen is underway. They will be charged with violating Section 1 of Article 228-2 of the Ukrainian Criminal Code, and could receive up to five years in prison if convicted.

Case 5: 22 tons Special Metal seized in Azerbaijan.
(this case was also reported to the ITCP Chairman and Secretary at a visit by to Baku on 22 September 1999).

In March 1998, Azerbaijani Customs officials detained a shipment of alloyed steel on the Azerbaijani-Iranian border because the shipping documents were not in order. The shipment was transiting Azerbaijan from Russia. The Azerbaijani government informed the United States of the interception, and the US government in turn analysed a sample of the steel. It was determined that the steel was suitable for use in the construction of liquid propellant missiles. On 7 April 1998, the Russian Federal Security Service (FSB) announced that it had arrested three individuals for plotting to smuggle 22 tons of alloyed steel to Iran via Azerbaijan.

INCIDENTS INVOLVING RADIATION SOURCES

The most frequently reported accidents of this type occur in radiography activities. The IAEA has prepared a special publication on lessons learned. Some of these accidents have involved the temporary loss of control over the source. Two cases are described here, as examples; one at Tammiku in Estonia, and one at Goiânia, Brazil.

Case 6: Tammiku, Estonia

In January 1994, in a scrap-yard in Tallinn, Estonia, routine radiation measurements with a hand held monitor of a consignment of scrap metal identified a metal container accommodating a radioactive source. The Estonian Rescue Board recovered the item and transferred it to the national waste disposal facility at Tammiku. The facility was in a desolate location, and it had inadequate security.

On 24 October 1994, three unemployed brothers from the nearby village broke into the facility to look for items that they could sell to scrap metal dealers. One of the items removed was the metal container found in January. In the process, a cylindrical source fell out, it was picked up by one of the brothers and placed in a coat pocket. Very soon after entering the repository, he felt ill, and a few hours later he began to vomit.. He was admitted to hospital with severe injuries to his leg and hip and he died on 2 November 1994.

The injury and subsequent death were, by the hospital, not attributed to radiation exposure. The source, therefore, remained in the man's house with his wife and stepson and the boy's grandmother. The boy was hospitalised on 17 November with severe burns on his hands, which were identified by a doctor as radiation induced. The authorities were alerted and finally the source (Cs-137 3.7 TBq) was returned to the Tammiku facility. The occupants of the house and one of the two surviving brothers were hospitalised and diagnosed as suffering

radiation induced injuries of varying severity. Later that year, by chance, one of the radiation experts found a second Cs-137- source with an activity of 1.6 TBq in another metal container close to the highway between Tallinn and Narva.

Case 7: Goiânia, Brazil, 1987

Following the break-up in 1985 of a medical partnership in a clinic in Goiânia, Brazil, a teletherapy unit containing a 50.9 TBq Cs-137- source was abounded in the clinic's former premises, which were partly demolished. In September 1987, the source was removed from its protective housing by local people who had no knowledge of what it was and were simply after its scrap metal value. The source was later ruptured, and over the next weeks the activity was widely dispersed in the city. Many people incurred large doses from both external and internal exposures. Four of these people died, and 28 suffered radiation burns. The extent and degree of contamination were such that seven residences and various associated buildings had to be demolished, and topsoil had to be removed from a significant area. The decontamination took about 6 months and generated some 3500 m^3 of radioactive waste. A total of 575 professional and technical staff and many support staff were used for the operation.

Health consequences:

249 people were contaminated externally;
129 people had significant internal contamination,
21 people received doses in excess of 1 Gy and were hospitalised;
10 needed special medical treatment;
4 died.

Countermeasures and actions:

200 people were evacuated from 41 houses;
85 houses required significant decontamination;
7 houses were demolished;
3500 tons of active waste was produced.

ANNEX 5 COUNTRY REVIEW

Nine reference countries were adopted for the ITCP study, namely:

The Czech Republic, Finland, Germany, Latvia, Norway, Poland, the Russian Federation, Sweden and Ukraine. All these countries are parties to the NPT; eight of them as non-nuclear weapons States, and the Russian Federation as a nuclear weapons State.

During the preparation of this report, visits were paid to the reference countries and State authority representatives were interviewed on subjects related to nuclear legislation and infrastructure relevant to the combating of illicit trafficking, through prevention, detection and response. For these countries a review has been made of legislation and infrastructure, and the following is a summary of that review, country by country.

Regarding Sanctions and Penalties, see also Annex 7.

CZECH REPUBLIC

LEGISLATION

a) 1997 Act on the peaceful uses of nuclear energy and ionising radiation (Atomic Act).
   Under the Act, applications to construct and operate a nuclear installation must be submitted to the State Office for Nuclear Safety (SONS), which is the State Regulatory Body for both nuclear and radiation safety. SONS grants licenses and establishes the licensing conditions. Furthermore, the Act establishes the principles and conditions for radiation protection of the public and the environment.

b) 1990 Act on control of products and technologies.

c) Regulation 144/1997 "On Physical Protection of Nuclear Material and Nuclear Facilities and their Classification".

d) Regulation 145/1997 Sb. "On Accounting for and Control of Nuclear Material and their Detailed Specification".

INFRASTRUCTURE

In the Czech Republic, the following steps of the nuclear fuel cycle are covered:

- Exploration, mining and milling of uranium ore;
- Storage of uranium concentrate (yellow cake);
- Operation of nuclear reactors;
- Storage of highly enriched uranium and other nuclear materials;
- Interim storage of spent fuel (away from reactor);
- Storage of high level radioactive wastes;
- Disposal of low and medium radioactive wastes;
- Transportation of nuclear materials.

The physical protection of nuclear facilities and nuclear materials in the Czech Republic is considered to be an integral part of nuclear safety. There is no difference in the damage to the environment by the release of radioactivity whether it is due to failure of technological systems or to radiological sabotage.

The ultimate objective of the physical protection system is to prevent unauthorised, overt or covert, actions regarding nuclear facilities and nuclear materials. When a physical protection system is applied to a nuclear facility or to nuclear materials, its objective is to prevent radiological sabotage of facilities and theft of nuclear materials. Thus, an effective system of physical protection plays an important role in preventing illicit trafficking of nuclear materials.

Before the former Czechoslovakia was split into two parts, the State Office for Nuclear Safety (SONS) was established, and from 1 January 1993, SONS as a regulatory body has carried out most of the activities performed by the former Czechoslovak Atomic Energy Commission in the field of nuclear safety. Since 1 July 1995, SONS also performs State supervision of radiation protection.

Focusing on strengthening the national regulatory program, a new comprehensive Atomic Law was approved by the Parliament in January 1997. The Law defines the basic provisions for accounting for and control of nuclear material and export/import of nuclear material. To follow these provisions, the new national regulation Decree No. 145/1997 was issued in June 1997.

According to the Atomic Law, the licensee bears the responsibility for physical protection of his facility and of nuclear material. The licensee has to submit to SONS for approval a safety report that has to show how the requirements to ensure physical protection are fulfilled, i.e. analysis of the necessity and possibility and a proposal of the means and manner to ensure physical protection.

All nuclear material in the Czech Republic is under "full-scope safeguards", in accordance with an NPT safeguards agreement with the IAEA. Prevention of illicit trafficking in nuclear material is established by strengthening the State system of physical protection of nuclear material. Following the requirements on the physical protection of nuclear material and nuclear facilities as given in the Atomic Law, the new basic national regulation Decree No. 144/1997 was issued in June 1997. At nuclear installations in the Czech Republic, the provisions to ensure the physical protection of nuclear material are very strictly followed. They are in accordance with INFCIRC/225/Rev. 3. In addition, the national regulation and the SONS decision stipulate to protect all nuclear material of Categories I, II and II by using technical alarm systems. There is still a potential for seizure of depleted and natural uranium, and small samples of enriched uranium and plutonium in quantities lower than the limit for Category III.

The necessity of providing proper measures on physical protection of seized nuclear material in the course of investigation is pointed out. The material should be protected according to the level of nuclear material categorisation. In the Nuclear Research Institute (NRI), there are suitable facilities to handle and store nuclear material of even Category I.

Combating illicit trafficking of nuclear material is ensured through extensive co-operation of the State authorities, focusing on investigation of illegal activities concerning illicit trafficking in nuclear material from other countries into or through the territory of the Czech republic. This also includes provisions to disclose the possibility of illegal dealing in nuclear material at the national level. The police and the Security Information Service play a principal role in this matter. SONS has an important role in the co-ordination of the activities performed in this field.

A standing working group of experts has been established, with representatives of SONS, the Ministry of Interior, the police, the Ministry of Foreign Affairs, and the Directorate of Customs.

SONS also supports R&D programs on the development of analytical methods suitable for precise and forensic analysis of nuclear material of unknown origin. The Central Analytical Laboratory of NRI carries out these programs, in close co-operation with the EU Joint Research Centre, the Institute for Transuranium Elements in Karlsruhe. The NRI is the only laboratory in the Czech Republic which provides, of request of SONS and the police, destructive analysis of nuclear material for safeguards and illicit trafficking purposes.

SONS has also supported the development of procedures and manuals for police and customs on how to handle seized samples. The NRI has developed a comprehensive database, including all available data on the analysis of seized nuclear material.

In case of illicit trafficking of nuclear material, the police and/or the customs inform SONS. The seized samples are transferred to the NRI Central Analytical Laboratory for a preliminary analysis. This analysis obviously covers

determination of the quantity of the seized material, the concentration and the isotopic composition. On the basis of the results, the NRI is obliged to follow the requirements of the national regulation on the accounting for and control of nuclear material and on the physical protection of nuclear material. Data on accounting and on illicit trafficking are reported to the IAEA.

FINLAND

LEGISLATION

a) Nuclear Energy Act (1987/990).
The purpose of this act is to make sure that the use of nuclear energy is in accordance with the social interest that it is safe for people and environment and does not contribute to the proliferation on nuclear arms. The law includes requirements for general principles of the use on nuclear energy, nuclear waste management, licensing procedures, of the competent authorities and authority supervision.

b) Nuclear Energy Decree (161/1988)
contains mainly requirements for licensing procedures for establishing and operating a nuclear facility, for mining and chemical enrichment of uranium and import, export and transport of nuclear material and waste. Also there are procedures of provision for financial costs due to the nuclear waste management.

c) Radiation Act (512/1991)
The purpose of this act is to prevent and limit the harmful effects of radiation. The act regulates the use of radiation and other activities, which may cause radiation exposure. The act contains general duties of the operator (user), licensing procedures, general requirements for the radiation equipment and radioactive materials and their import and export. Also requirements for health control of radiation workers are included. There are requirements for medical use of radiation, non-ionising radiation, natural radiation, radioactive waste management, means of authority supervision and sanctions.

e) Radiation Decree (1521/91)
deals mainly with the control of radiation exposure. There are requirements for import and export of radioactive materials and some obligations for the border control authorities.

f) In addition, there are guides published by STUK (YVL-guides based on the Nuclear Energy Act and ST-guides based on the Radiation Act). These guides explain to the operator in more detail how to proceed in certain situations, and at the same time they define a certain safety level for acceptable operation.

This legislation, together with some other regulations based on international agreements or conventions (Nuclear liability act; Decisions of the Council of State on the physical protection of nuclear facilities and material, or preparedness for accidents) cover all matters related to nuclear and radiological activities of the Finnish nuclear program. This comprises four LWR nuclear power plants in operation and approximately 1800 licenses for using ionising radiation.

It is the opinion of the concerned authorities that the current legislation with amendments and regulations is satisfactory and sufficient for the State Regulatory Body (STUK) and for the Customs and Police Services to assume their respective responsibilities in all areas of export/import control of nuclear material and radiation sources.

INFRASTRUCTURE

Finland was among the first countries to sign the NPT and the first to conclude a safeguards agreement with the IAEA. Finland has always supported the role of the IAEA and seen it as unproblematic to transfer additional competence to the Agency. In the early 1990s, there has been support for the establishment of the New Partnership Agreement that shares safeguards obligations between the IAEA and Euratom. Furthermore, it was with Finnish backing that the Agency was granted the right to conduct special inspections and that the decision to improve the general safeguards system in the shape of the new Model Protocol was made.

With respect to export control on nuclear technology and materials, Finland holds a similar comprehensive record. From October 1995 till April 1996, Finland held the chairmanship of the Nuclear Suppliers Guidelines (NSG). During this period, a number of new important nuclear exporters became members of the NSG and the NSG started to adopt measures for increased transparency. At the first Review Conference of the NPT in 1975, Finland proposed that export controls be complemented with import restraints in the sense that NPT adherents would commit themselves to only purchase nuclear materials and technologies from other faithful NPT states. In order to be a nuclear supplier to NPT states, a given state would thus have to join the NPT and this would create incentives to join the NPT both for the states that would demand and/or supply nuclear technologies and materials.

STUK belongs formally to the administrative sector of the Ministry of Social and Health Affairs when health affairs are concerned, and under the administrative sector of the Ministry of Trade and Industry, when nuclear energy is concerned. STUK has quite a wide power of decision. The Ministries decide only principal questions. Licenses for export/import are issued mainly by STUK.

The Customs Service has the authority to carry out investigations in criminal cases and to bring cases to prosecution (same as the police). The Customs Service co-operates with the police in criminal cases, and also with other

authorities. There is, however, no permanent organisation/committee established for such co-operation.

In the Finnish law, criminal acts related to nuclear material are, in general, considered as grave crimes, that would lead to several years of imprisonment.

GERMANY

LEGISLATION

a) In the 1959 Atomic Energy Act the following subjects are covered:
   - Import and export of nuclear material,
   - Transportation of nuclear material,
   - State custody of nuclear material,
   - Storage and use of nuclear material outside State custody,
   - Construction and operation of interim and final storage facilities (radwaste, spent fuel),
   - Physical protection as a licensing condition,
   - Security clearance for trustworthiness,
   - Competent authorities (licensing, supervising),
   - Modification, amendment and revocation of licenses,
   - Administrative penalties for unauthorised activities.

b) The 1989 Ordinance on the Protection against Damage and Injuries caused by Ionising Radiation.

c) Law on the 1979 Convention on Physical Protection of Nuclear Material, 24 April 1990.

d) The following subjects are covered in Guidelines (Richtlinien):
   - Design basis threat,
   - Physical protection of LWR nuclear power plants,
   - Transportation of nuclear material and radioactive waste (road, rail, air, waterways),
   - Security guards, physical protection commissioners, escort personnel,
   - Security screening for trustworthiness,
   - 48 hours advanced notification of shipment,
   - Reporting of abnormal events relevant to physical protection,
   - IAEA/INFCIRC/225/rev. 3.

e) Penalties for offences against nuclear laws and regulations, so called "nuclear crimes", are stipulated in the Penal Code (Strafgesetzbuch) in paragraphs 307 through 312. The German definition of "nuclear crimes" is “illegal activities involving radioactive materials or materials which the perpetrator claims to be radioactive". Illicit Trafficking is considered to be part of nuclear crimes. The German system for "combating" nuclear crimes

covers both prevention and executive/operative activities, i.e. prevention-detection-response. Prison terms for serious nuclear crimes are up to lifetime imprisonment.

INFRASTRUCTURE

In 1992, the number of illicit trafficking events in which radioactive substances were confiscated in Germany rose to 21. Therefore, the German law enforcement authorities (police, criminal investigation, customs) and radiation protection authorities increased their efforts to improve co-ordination and co-operation between the various federal and State agencies involved in dealing with cases of unlawful possession or use of radioactive substances, in particular illicit trafficking and threats concerning the release or dispersion of radioactive materials.

Germany is a federation of sixteen States; as a consequence of this federal structure, each State has its own police, including criminal investigation and public prosecution authorities, as well as radiation protection authorities. These State authorities are primarily responsible for law enforcement and danger prevention in most of the cases of illicit trafficking.

In addition to these State authorities, several federal authorities with specific responsibilities may be involved, depending on the specific nature of the case: the Federal Criminal Investigation Office, the Federal Border Police, the Customs Border Control and Customs Investigation Services, the Federal Intelligence Services, the Federal Ministry for the Environment, Conservation of Nature and Reactor Safety, and the Federal Office for Radiation Protection.

When special technical or scientific support pertaining to radiation detection and analysis, criticality safety, radiation protection or risk assessment is needed, the State authorities and the federal authorities can also draw from the experience and the resources available at the nuclear research centres in Jülich and Karlsruhe, at the European Institute for Transuranium Elements and at university institutes.

The German system for "combating" nuclear crimes covers both prevention and executive/operative activities, i.e. prevention-detection-response. Illicit trafficking in nuclear materials is part of nuclear crime in Germany. According to the German definition, nuclear crime means: "illegal activities involving radioactive materials or materials which the perpetrator claims to be radioactive". The term therefore includes more than just the smuggling of radioactive materials.

In the national German system for combating the illegal use of radioactive substances (including illicit trafficking), the tasks of the various federal and State authorities have been specified in additional regulations or administrative guidelines, taking into account what had been laid down already in a more general way in existing federal and State legislation.

The tasks assigned to law enforcement authorities (police, customs border control and investigation services) are:

- collection of indications, information or evidence for cases of illegal use of radioactive substances and information of other authorities possibly affected;
- assessment of the credibility and feasibility of threats;
- criminal investigation and criminalistic assessment of the situations;
- support of search activities by police officers;
- urgent measures such as measurements of radioactivity for self-protection, isolation or access control of target areas, confiscation and transport of radioactive substances, as long as radiation protection authorities have not yet arrived on the scene;
- control of vehicle and personnel traffic crossing borders or entering the country through airports or seaports;
- confiscation of radioactive materials, arrest of perpetrators, collection of evidence, forensic measures.

The radiation protection authorities and their experts have been assigned the following tasks:

- expert advice to and support of the law enforcement authorities from the very beginning of a specific case, regarding radiological or nuclear criticality risk assessment, detection, radiation protection, analysis or safe handling;
- assessment of the technical feasibility of threats involving radioactive or nuclear materials, and of potential radiological consequences;
- search for radioactive materials with technical means;
- radiation measurements on the scene (local radiation fields, contamination of people or vehicles, isotope analysis);
- specification of isolation or access control areas and of permissible radiation exposure limits for law enforcement personnel;
- radiation protection measures, including measurements of incorporated material and decontamination;
- decisions regarding emergency measures;
- safe handling, packaging and transport of confiscated radioactive materials to secure storage places;
- detailed laboratory analysis of the physical, chemical and nuclear characteristics of confiscated radioactive materials, including isotopic composition, enrichment factor, impurities, etc., and nuclear forensic measures.

As far as possible, actions to be taken are specified and agreed upon jointly by law enforcement and radiation protection authorities; the advice and participation of the protection authorities are sought as early as possible.

For constitutional reasons, danger prevention and - in most cases - criminal prosecution pertaining to the illegal use of radioactive substances are the responsibility of the sixteen German States. Therefore, all law enforcement authorities will first turn to the respective State radiation protection authorities for assistance. The Federal Office for Radiation Protection will only be called upon for support if a State radiation protection authority is not capable of solving a specific problem because of limited resources or lack of expertise.

Detailed analysis of all confiscated nuclear materials for determining their isotopic composition and chemical characteristic, as well as their possible origin, is done by the European Institute for Transuranium Elements in Karlsruhe.

The federal authorities are responsible for co-ordinating the response to cases of illegal use of radioactive substances if such cases affect several States or if a case cannot be localised within the territory of one specific State. The Federal Ministry for the Environment, Conservation of Nature and Reactor Safety also has the task to maintain liaison with the IAEA, Euratom Safeguards and foreign countries with regard to nuclear or radiological aspects. This ministry is the point of contact under Article 5 of the Convention on the Physical Protection of Nuclear Material, the point of contact of the Eight's Non-Proliferation Experts Group (NPEG) program for combating illicit trafficking, and the point of contact for the IAEA databank on illicit trafficking.

All relevant information on a new case of illegal use or trafficking of radioactive substances will be quickly distributed via a rapid reporting system in the form of telex messages to all State and federal authorities which may contribute to risk assessment or which may have to take action. The rapid reporting system connects the lower level police authorities of each State with the criminal investigation offices of another State and with the State ministries for internal affairs and for radiation protection and nuclear subjects. The system is operable 24 hours a day.

All German authorities on the State level and the federal level participating actively in dealing with cases of illicit trafficking or other illegal use of radioactive materials - be it in law enforcement or in danger prevention actions - can be reached 24 hours a day. The communication links (telephone, telefax) through which these authorities can be reached have been compiled in a catalogue which is continuously being updated and has been widely distributed.

Appropriate training courses for police and customs officers are being organised on a regular basis. Experience from actual cases is being fed into these courses, especially regarding the types of radioactive material confiscated, the kind of packaging used and other characteristic features of the specific cases.

A standing working group of the States and federal experts on combating illegal use of radioactive substances, involved in the creation of the German system for combating illicit trafficking, is closely observing the system's operation and is discussing improvements and further evolution of the system.

LATVIA

LEGISLATION

a) The basic nuclear law is the "1994 Act on Radiation and Nuclear Safety", which establishes the basic principles for any radiation application, i.e. justification, optimisation, limitation, compulsory civil liability insurance and law enforcement, including the basic requirement that only authorised (licensed) practices are legal. The Law also identifies "undeclared materials", which is applied in the border control regime.

b) According to the Law on the Structure of the Cabinet of Ministers, regulations (on nuclear activities) are issued by the Cabinet of Ministers, and not by the State Regulatory Body, i.e. the Ministry of Environmental Protection and Regional Development (MEPRD or VARAM). At present the MEPRD is the Regulatory Body, but according to the decision of the Cabinet of Ministers, a new Regulatory Body will be established in the year 2000; it will be called the Radiation Safety Centre.

c) The 1996 Regulations on "Licenses and Permits for Activities with Radioactive Substances and other Ionising Radiation Sources" (amended 1998):
   - divide responsibility between the Committee for Control of Strategic Goods and Radiation and Nuclear Safety Control Division of Environmental State Inspectorate,
   - establish licensing system for radiation and nuclear activities,
   - introduce requirements for and the rights of the applicants,
   - establish conditions for civil liability insurance,
   - introduce supplementary funding for radioactive waste management by "import duty".

   The Regulations furthermore prescribe, as a licensing/permit condition, that physical protection of materials or facilities shall be ensured in accordance with the requirements set by the Ministry of Interior and Radiation and Nuclear Safety Inspectorate. The Ministry of Interior has responsibility to verify physical protection systems at the facilities and provide the conclusion about compliance with the requirements; such conclusion is one of the pre-conditions for applicant of license/permit. The MEPRD has responsibility to draft necessary requirements (proposal for Cabinet Regulations) in collaboration with the Ministry of Interior.

d) The Regulations on "Protection against Ionising Radiation" (referred to as the national BSS):
   - divide responsibility among all major institutions,
   - introduce "safety culture" as part of the radiation protection system,
   - introduce several national level databases,
   - elaborate on requirements for dose limits,
   - establish technical requirements for radiation sources,
   - introduce intervention requirements,

- establish system for preventive measures and notification in case of accidents.

The Regulations stipulate requirements for the design of ionising radiation devices and for databases and the need for detailed information on facilities, sources and users.

e) The Regulations on "Safe Transport of Radioactive Materials" prescribe packaging requirements to ensure safety during all phases of transportation. The requirements for physical protection are mentioned in one article, but are not elaborated in detail.

f) The 1998 Regulations on "State System of Accounting and Control of Nuclear Materials" (SSAC regulations):
- introduce a system for Declaration of the Technical Characteristics,
- establish notification requirements for the Program of activities,
- introduce "person responsible for safeguards" at facilities,
- describe the system for nuclear material accounting,
- prescribe the form and content of Accounting Reports,
- establish requirements for Special Reports,
- prescribe requirements for export and import of nuclear materials.

g) The 1995 Regulations on "Radiation Control of the Border of Latvia". There are new draft regulations on radiation control at the borders being prepared, which aim at improving requirements and clarifying responsibilities of involved institutions. The new regulations may also include requirements for training of border control staff and technical requirements for measurement devices.

h) (Draft) Regulations on Physical Protection of Radioactive Materials, including Nuclear Materials.

i) (Draft) Law on Administrative Penalties.
Penalties for law violations are stated in the Administrative Code, of which the Ministry of Justice is preparing a new version. The following penalties are proposed in the Draft Law:

Unlicensed activities with radioactive substances: maximum 500 LVL
Business activities without a license: max. 1000 LVL
Violation of regulations: max. 1000 LVL for physical persons and max. 10 000 LVL for legal persons.
Note: 1 LVL = 1.59 EUR (August 1999)

j) New Regulations on Control of Strategic Goods and Import of Radioactive Substances (1997-1998) dealing with:
- basic definitions – certificate for import, license, strategic goods (based on all relevant lists).
- system for control – establishment of Committee for licensing and its responsibilities,

- responsibilities and rights for applicant – need for special authorisation supplementary conditions,
- procedures for licensing – as for any special authorisations, i.e. application together with relevant documents, etc.,
- procedures for export, import and transit – only via special designated control points, notification of actual receipts etc.,
- procedures for control of export, import and transit – additional notifications of activities, accounting and control procedures.

k) Criminal Law (Penal Code).

The following nuclear crimes are stipulated in the Law:

Crime subject	Imprisonment or financial penalty
Weapons of mass destruction	life imprisonment
Theft of radioactive materials	3 - 15 years prison
Robbery of radioactive materials	8 - 15 years prison
Cheating with radioactive materials	5 - 13 years prison or max 150 x minimal salary level, with or without confiscation of property
Misappropriation of rad. materials	6 - 15 years and confiscation of property
Smuggling of radioactive materials	up to 10 years and confiscation of property
Unlawful disposal of rad. waste	up to 4 years or max 100 x minimal salary level
Violation of requirements for possessing, use, accounting and transport of rad. materials	up to 2 years, or up to 5 years prison if activity lead to significant impact
Violation of requirements for safe use of radiation sources	max 40 x minimal salary level, activities if more than once per year, or max 80 x minimal salary level, if activities lead to significant impact to environment, human health or property.

INFRASTRUCTURE

The total number of users of radioactive materials in Latvia is 172, in different agriculture and industrial enterprises with a wide variety of sealed sources.

There are several ministries with sub-ordinate institutions dealing with prevention of illicit trafficking. The major of them are:

a) The Ministry of Internal Affairs with:
   - Security Police responsible for assessment and supervision of physical protection at facilities, and assessment of threats;
   - Border-guards responsible for the prevention of smuggling (undeclared movement across the State border) of radioactive materials;
   - Fire and Rescue Service responsible for emergency management in case of radiological contamination.

b) The Ministry of Environmental Protection and Regional Development with:
   - Environmental State Inspectorate responsible for maintaining supervision at facilities, data bases on users and radiation sources;
   - Environmental Data Centre responsible for laboratory services in case of disclosure of radiation sources;
   - The State enterprise "Radons" responsible for disposal of radioactive waste and fast deployment emergency team for decontamination activities;
   - The State enterprise "Reaktors" responsible for maintaining reactor in safe enclosure phase and decommissioning; provides also laboratory services.

c) The Ministry of Welfare with:
   - National Environmental Health Centre responsible for supervision at medical facilities and for maintaining relevant data bases on users and radioactive sources;
   - Centre of Radiology with TLD laboratory responsible for individual dosimetry services for all personnel including emergency workers.

d) The Ministry of Economy with:
   - Latvian Development Agency responsible for maintaining the nuclear supplier group regime;
   - National Centre for Metrology responsible for laboratory services and for maintaining adequate measurement systems.

e) The Ministry of Finance with:
   - Customs Board responsible for State control of legal movement of radiation sources across the border, and investigations of smuggling cases.

NORWAY

LEGISLATION

Nuclear Energy Activities

Act No. 28 of 12 May 1972 concerning Nuclear Energy Activities lays down the general regime for radioactive products and nuclear fuels. Under the 1972 Act, nuclear fuels mean fissionable materials in the form of uranium or plutonium metal, alloy or chemical compound; radioactive products mean other radioactive materials which are made or have become radioactive by radiation incidental to the production or utilisation of nuclear fuels; nuclear substances mean nuclear fuels, other than natural or depleted uranium, as well as radioactive products, except radioisotopes used for industrial, commercial, agricultural, medical or scientific purposes.

The 1972 Act provides that it is unlawful to manufacture, own, store, handle, transport, sell or otherwise dispose of nuclear substances without a permit from the Ministry of Health and Social Affairs.

The Ministry may make exceptions to the obligation to obtain a permit, provided that certain conditions are complied with. A permit may be revoked if its requirements are being substantially or repeatedly disregarded or for safety reasons.

The King may decide that any activities involving nuclear fuels or radioactive products other than nuclear substances should be subject to notification or licensing. As Norway is becoming a Party to the Additional Protocol to the Safeguards Agreement pursuant to INFCIRC/153 and INFCIRC/540, new regulations will inaugurate such notification and licensing.

Trade

Nuclear trade in Norway is governed by several imperatives, namely, nuclear non-proliferation (i.e. safeguards), nuclear safety and physical protection as well as radiation protection. These considerations are reflected in the legislation in force and such trade is subject to a system of permits under legislation covering nuclear energy, radiation protection and export/import control.

Act No. 32 of 6 June 1997 on import and export control authorises the King to regulate the import or export of any article, and to establish such licensing systems as may be appropriate. The Act is general in its scope, and thus applies equally to nuclear or radioactive materials of any kind.

Regulations made under the two Acts of 13 December 1946 on Import and Export Control are still in force, and authorise the Ministry of Foreign Affairs to establish a list of goods that require an import licence (Regulations No. 1596 of 1 November 1983) and a list of goods that can be exported without restrictions (Regulations No. 52 of 10 January 1989). At present, these two regulations do not specify licensing requirements for nuclear or radioactive materials.

Act No. 93 of 18 December 1987 on Export Control for Strategic Goods, Services and Technology applies to sensitive nuclear materials, equipment and technology. The Ministry of Foreign Affairs has established an export control regime pursuant to this act, and by Regulations No. 51 of 10 January 1989 set up a system of lists of goods requiring an export licence. Any nuclear material, technology or equipment that is strategic or may have military use (dual purpose use or which may be converted to military use) is covered by this export control regime. Regulations No. 157 of 10 March 1989 prohibits the export of heavy water from Norway, except in special cases.

Since 1980, Norway exports nuclear materials and equipment only to those countries where IAEA Safeguards cover all nuclear activities.

The 1972 Act provides that the King may issue provisions required to ascertain by supervision that nuclear installations, equipment, fuel, radioactive products and other materials used for nuclear energy purposes which are subject to international safeguards pursuant to agreements to which Norway is a Party are used for non-explosive, peaceful purposes only. The Act also specifies that persons engaged in activities in accordance with the Act have an obligation to preserve secrecy concerning confidential technical information acquired in the course of their work.

As regards to non-proliferation, Norway has been a Party to the Treaty on the Non-Proliferation of Nuclear Weapons since 5 March 1970.

Physical Protection

Norway has been a Party to the Convention on the Physical Protection of Nuclear Material since 8 February 1987, but had enacted legislation on the subject beforehand (Regulations No. 1809 of 2 November 1984). The NRPA is designated as competent authority for the physical protection of nuclear materials and is empowered to make rules in this respect.

The operators are responsible for their nuclear materials and installations and must establish and maintain a system for physical protection of the installations and materials during storage, processing and transport. The sender, in co-operation with the Norwegian Radiation Protection Authority and the recipient, must ensure in advance that during shipment the nuclear material will be subject to a minimum level of physical protection as set out in INFCIRC/225 Rev. 4. The operators must prepare a safety analysis report on physical protection for the approval of the Ministry of Health and Social Affairs. Operators must also appoint one or more persons to be responsible for the physical protection aspects of stored material or material being processed or shipped. They must check that the system is operative in accordance with the rules issued by the NRPA.

The regulations lay down specific requirements for protecting nuclear material in storage as well as for nuclear installations and divide the materials into three categories according to their risk potential. Emergency plans have to be prepared, also for transport operations.

Adoption of the regulations gave rise to amendments of the Penal Code (Section 152a) to include a provision dealing with unlawful possession, utilisation, transfer or distribution of plutonium or uranium, thereby endangering human life, health or property or the environment. Such acts are liable to a fine or a maximum term of imprisonment of four years. Such acts which may result in loss of human life or extensive damage to property are liable to the penalty prescribed in Section 148 of the Penal Code, namely, imprisonment ranging from two to 21 years, but not less than five years if death or serious injury occurs.

Radioactive Materials

Under the Act 18 June 1938 on the Use of X-rays, Radium etc., Regulations 1 March 1983 states that the production of radioisotopes is subject to a permit issued by the Norwegian Radiation Protection Authority.

The import and sale of radioisotopes require a permit from the NRPA. Permits are issued on a case-by-case basis, but may also be delivered as a general permit. The main criteria for obtaining a general permit are demonstration of its need and observance of the relevant radiation protection regulations.

INFRASTRUCTURE

Ministerial level

The Ministry of Health and Social Affairs is the competent authority as regards the 1972 Act. The Ministry issues licences for nuclear installations. The Ministry is also responsible for the protection of public health and is therefore competent to deal with questions of radiation protection according to the 1938 Act. The Ministry performs its licensing and control functions, and to some extent, drafts regulations through the Norwegian Radiation Protection Authority.

The Ministry of Trade and Industry has general co-ordinating functions and deals with budgetary matters concerning research and development in the field of nuclear energy.

The Ministry of Foreign Affairs is the competent authority under Act No. 32 of 6 June 1997 on export and import control, and thus has responsibility under that legislation for export and import of nuclear materials and equipment. It is also responsible for the export control regime, established by Regulation No. 51 of 10 January 1989 on export control. The Ministry is also responsible for international relations and agreements in the nuclear field, *i.e*. Norwegian participation in international organisations in this field.

Subsidiary level

The Norwegian Radiation Protection Authority (NRPA) is placed under the Ministry of Health ad Social Affairs as the highest specialised agency on questions of nuclear safety and is the supervisory authority in that field. The

NRPA may, on its own initiative, put into effect all the measures it considers necessary from the viewpoint of safety and is responsible for ensuring that all rules and conditions connected with safety precautions are complied with. It is responsible for the licensing aspects of nuclear installations and must exercise continuous supervision over the construction and operation of such installations. It also grants permits for import, production and sale of radioactive materials.

The Crisis Committee for Nuclear Accidents is lead by the NRPA.

Other Agencies

The Institute for Energy Technology is the only agency in Norway carrying a licence
to operate nuclear installations. It operates the two research reactors, JEEP II at Kjeller and HBWR in Halden. In addition to income from research and development work undertaken on a contractual basis, it gets its funding from the Ministry of Trade and Industry.

POLAND

LEGISLATION

Poland is a party to the NPT since 1970, and has concluded a safeguards agreement with the IAEA according to INFCIRC/153. Starting with the first reporting in 1972, all movements of nuclear materials between Material Balance Areas inside the country and export/import from/to the country are reported to the IAEA.

Poland signed the Additional Protocol to the Safeguards Agreement in 1997, but has not yet ratified it.

The use of nuclear and radioactive materials in Poland are regulated by the Parliament Bill, called ”The Atomic Energy Act” of 10 July 1986, and later amendments. The Act describes the conditions necessary to be met for obtaining a license for specified activities involving nuclear and radioactive materials (production, storage, transport, and use).

A new Atomic Energy Act is being prepared, including applicable ordinances and regulations. It is expected to be passed to the Parliament by November 1999.

The NAEA has issued the following regulations concerning nuclear and radioactive materials:

- Rules of Accountancy and Control of Nuclear Materials (1987),
- Rules of Physical Protection of Nuclear Materials (1988),
- Conditions of the Import into, and Export out of, and Transit through the

Republic of Poland of Nuclear Materials, Radioactive Sources and Devices Incorporating such Sources (1988, changed in 1997).

In 1993, the Polish Parliament issued the Act on Special Control of Foreign Trade in Goods and Technologies subject to International Agreements and Obligations. According to the Act, the Minister of Economy has defined a list of goods and technologies covered by the Act. The last amendment of the list was done on 31 December 1996, and its format is based on the control list of the European Union. With a reference to nuclear materials, equipment, technologies and dual-use items important for nuclear fuel cycle, a license by the President of the NAEA is a precondition to the general export/import license.

The Penal Code provides for punishments for nuclear crimes with up to 10 years imprisonment.

INFRASTRUCTURE

Poland has long experience in combating illegal trafficking in nuclear and radioactive materials. After the Chernobyl accident in 1986 and political change in 1989, the needs and possibilities of performing the national program on combating illicit trafficking in these materials increased. The Polish authorities were aware that the primary responsibility for combating illicit trafficking of nuclear materials and radiation sources rested with the Government, not only because of Poland's international obligations, but also because of the concern of public health.

All measures taken in Poland in order to enhance the effectiveness of control and reporting of illicit trafficking in nuclear materials can be grouped as follows:

- National Law;
- Preventive measures: detection, investigation, monitoring and training;
- Response to the cases of illicit trafficking in nuclear materials; and
- Information flow, inside the country and outside, including international reporting.

Preventive Measures

The Polish borders are guarded by several State services, in particular the Border Guards (BG) and the Customs. They have the authority to control, stop or deny entry into Poland of radioactive and nuclear materials and waste, according to the Parliament Act on Border Guards of 1990.

In order to ensure proper functioning of these mechanisms, the NAEA has signed special agreements with the Border Guards and the Customs, under which NAEA may assist both partners in training of personnel, evaluation and identification of detected suspicious and undocumented goods, and the consultation on procurement of instrumentation. The NAEA has signed a similar agreement with the Office of State Security that is involved in physical protection and in prevention measures against the illicit trafficking of nuclear materials. NAEA's obligations are executed by services of nuclear research

institutes and by the Central Laboratory for Radiological Protection (CLRP), including a special emergency service squad, that is on the alert around the clock.

NAEA has also concluded co-operation agreements with neighbour countries with the purpose to facilitate investigations of criminal cases. Responsible for investigations are the Border Guards, but contacts with neighbor countries are via NAEA. The Police or Security Police makes prosecutions.

In 1990, radiometric devices were installed at all border checkpoints. The main equipment are stationary devices (called portal monitors), type UK-1M. They are manufactured in Poland and consist of large volume sodium iodine scintillation counters and digital control signal panels. The sensitivity of these detectors is high enough to detect low activity gamma ray sources, transported in a vehicle (car, train), or carried by a person. From a distance of 5 meter, a 125 μCi Cs-137 source is detectable even when moved with a speed of up to 30 km per hour, if unshielded. There are about 120 such monitors installed at the borders; at road checkpoints, at railroad checkpoints, at the airports and in the harbours. They are installed at all entry points on the Eastern borders (with Russia, Lithuania, Belarus and Ukraine).

In 1997, out of more than 82 million cars and trains passing by the portals, 14978 indicated an elevated radiation, and after some additional examination, the entry was denied in 487 cases.

The BGs are equipped with more than 600 portable dosimeters and surface contamination meters, using GM detection devices, manufactured in Poland. These instruments enable the guards and the custom officers to check persons more carefully, identifying reasons for the detected radiation, and also to find any substances already smuggled into Poland. In 1997, there were 10 cases when illegally carried radioactive substances were discovered, but no nuclear materials were found (See Table I).

In June 1996, the BGs were provided, by the US Government, with a special van, equipped with instrumentation for the detection of arms, drugs and radioactive materials. This mobile unit is usually used at the Warsaw International Airport, but is also often used at the road checkpoints of the eastern borders. A second van with detection equipment was received from the Danish Government in August 1999.

Also customs officers, who check baggage crossing the border, are equipped with the instruments enabling them to detect radiation sources and to intervene in such cases. Customs services have about 150 hand held gamma detectors used at border checkpoints and during operational inspections.

TABLE I.

Number of cases of increased radiation and denials of entry.

Year	Events of increased radiation	Events when entry was denied
1990	4	-
1991	8	3
1992	148	47
1993	461	79
1994	1648	867
1995	11 347	409
1996	18 995	640
1997	14 978	487

The Polish borders are considered to be well protected against any illegal trafficking of radioactive materials. In case of the smuggling of nuclear materials, however, the situation is more difficult, since there are no devices, neither stationary nor portable, for neutron measurements to detect HEU or Plutonium. The Central Laboratory for Radiological Protection is, at present, unable to determine neither enrichment of HEU or Plutonium, nor the origin of these materials.

The Border Guards and Customs officers are being trained at special courses run by the CLRP and other courses organised in the framework of international co-operation with services of neighbour countries and international organisations, like the IAEA, the World Customs Organisation and others.

Response

When any of the State services inspectors find a material that requires identification, the emergency squad of inspectors from Central Laboratory of Radiological Protection is informed. If the results of the ”in field” measurements indicate presence of radioactive or nuclear materials, the material is confiscated and the legal investigation procedures are started. If necessary and possible, more accurate laboratory measurements (alpha and high-resolution gamma-ray non-destructive assay) are performed at the CLRP in Warsaw.

Information Flow and International Reporting

A Point of Contact to the IAEA international system of information exchange on illicit trafficking in radioactive and nuclear materials is located at the NAEA. The Contact Point was established in November 1996 after signing co-operation agreements between the NAEA, BG and Customs. Cases of finding illegal nuclear materials (Table II) and other radioactive materials revealed at the

Polish borders or within the Polish territory are being reported to the Illicit Trafficking Data Base Office.

TABLE II

Cases of Illegal Nuclear Materials reported as "gain accidental" to the IAEA

Element	Weight Kg	Material description	Date	Place found	Origin
N	2.00	MAOR	Nov 1992	Terespol	Soviet
D	0.49	PNOR	Mars 1993	Gdansk	Soviet
D	18.00	MAOR	Mars 1993	Gdansk	Soviet
N	2.70	MAOR	Apr 1993	Rzeszow	unknown
N	2.54	MACR	Nov 1993	Lublin	Soviet
LEU	855 (g)	CPSF	Mars 1995	Cieszyn	RBMK
D	1.80	MPOF	Jan 1998	Zielonka	unknown

THE RUSSIAN FEDERATION

LEGISLATION

Even if the Soviet Union was one of the first states with a nuclear program, it did not have any nuclear legislation during a period of about forty years. It was not until 1995 that the President of the time, Michael Gorbachev, signed the first nuclear law, i.e. the basic nuclear law "On the Use of Atomic Energy". Almost at the same time the law "on Radiation Safety of the Population" was also brought into force.

a) 1995 Federal Law on the Use of Atomic Energy; adopted by the State Duma on 20 October 1995;
   The Law defines the legal basis and principles for regulation of relations arising during the use of nuclear energy, is directed towards protection of the health and life of people, protection of the environment, and protection of property during the use of nuclear energy, and is required to facilitate the development of nuclear science and engineering and to assist in strengthening the international regime for the safe use of nuclear energy.

b) 1996 Regulations in the field of nuclear energy in the Russian Federation;

c) 1991 Declaration on State Committee for Nuclear and Radiological Safety;

d) 1997 Act on radiation safety of the public;

e) 1988 Decree on criminal liability for illegal activities involving radioactive materials;

f) 1996 Regulation on nuclear materials;

g) 1996 Regulation on nuclear weapons.

The basic responsibilities of Gosatomnadzor (GAN) of Russia in the area of physical protection of nuclear materials and nuclear facilities are:

- develop, approve and enforce the federal norms and rules in the field of nuclear energy use;
- issue licenses for the activities in the field of nuclear energy use to provide safety;
- oversight activity for the physical protection of nuclear materials, radioactive substances, radioactive wastes, storage facilities of nuclear materials and radioactive substances;
- inspection activity in the framework of GAN authorities;
- take the administrative measures according to the legislation of the Russian Federation.

INFRASTRUCTURE

The following are quotations from a (1997) Minatom paper by M.Belyaeva and V.Ergina "Reporting on the Trafficking of Nuclear Material as a Function of State Systems of Accounting for and Control of Nuclear Material"

1. State systems of accounting for and control of nuclear materials in Russia.

   Nuclear material account and control system has been successfully in operation since the establishment of nuclear industry in the former Soviet Union. It based on strict personal responsibility of the individuals of different positions and confidential regime at all stages of nuclear material technological cycle, precise documentation tracking and independent inspection procedures providing with high level physical protection.

   The Ministry of Medium Machine Building -predecessor of Minatom of Russia - performed the functions of facility administration and management as well as supervision of the status of nuclear material account and control system.

Multiyear experience of nuclear fuel cycle operation in the former USSR up to the beginning of its disintegration and establishment of new independent states confirmed the effectiveness of that system. Newly independent states signed the safeguards agreements with IAEA, thus putting all their peaceful activity under its control, and established their national account and control systems in accordance to IAEA requirements. The Russian Federation kept up the main principles being the basis of nuclear material account, control and physical protection system. New political and economic conditions in the Russian Federation put forward new requirements to improve nuclear material account and control system. They include:

- Considerable increase of the amount of sensitive nuclear materials, plutonium and highly enriched uranium being transferred to peaceful nuclear activity due to large scale nuclear weapons reduction, which are required to be properly accounted, controlled and secured under disposition and long-term storage.

- Prevention of illegal trafficking of nuclear materials due to nuclear material theft being the case in the world community, due to aggravation of criminogenic situation in the country and rumour dissemination of black market existence as well as growth of extremist and terrorist activity. It is also necessary to point out that large-scale reforms in all areas of human activity considerably influenced upon the motivation of individual's actions.

Since 1994 the President and the Government of the Russian Federation issued a number of decrees and acts which determine the directions of the activity to improve nuclear material account, control and physical protection system being in force in the Russian Federation and to put it in conformity with the present conditions. In particular, the Decree of the President of the Russian Federation "On high priority measures for upgrading nuclear material account and physical protection system" dated by September 15, 1994, as well as corresponding Act of the Government of the Russian Federation "On high priority activity for development and adoption of the state system of nuclear material account and control for 1999" dated by January 13, 1995.

The federal Law "On the Use of Atomic Energy" was adopted in November 1995. It determined the requirements for establishing the state system of nuclear material account, control and physical protection. The Law sets the following main principles:

- All nuclear materials are federally owned;
- The Government of the Russian Federation conducts nuclear material management and provides its protection;
- The Government of the Russian Federation determines the procedure to establish state system of nuclear material account and control and assigns the relevant bodies to perform state account and control of nuclear material;
- State account and control of nuclear materials is implemented at federal and interagency levels;

- State account and control of nuclear materials as well as its physical protection is performed by regulatory body responsible for the use of atomic energy;
- Prohibition to operate nuclear installations, radiation sources, storage facilities as well as to conduct any activity related to the use of nuclear material and radioactive substances of any form and at any stage of manufacture, use, reprocessing, transportation or storage if the requirements to provide physical protection of the specified facilities are not satisfied.

According to the regulations of the state nuclear materials accounting and control system, Minatom of Russia is responsible for the state accounting and control over the nuclear materials designated for peaceful and defence use, and the Ministry of Defence of the Russian Federation is responsible for the state accounting and control over the nuclear materials designated for defence uses. The Concept identifies entities responsible for supervision over the state nuclear materials accounting and control at the federal level. These entities are Gosatomnadzor of Russia with regard to the nuclear materials designated for the peaceful uses and the Ministry of Defence of the Russian Federation with regard to nuclear materials designated for nuclear weapons and military nuclear power facilities.

On July 10, 1998 the Rules for Organisation of the State Nuclear Materials Accounting and Control System were approved by the Russian Federation Governmental Decree No. 746. The Rules determine the procedure for establishing of the State Nuclear Materials Accounting and Control System, which is mandatory for all legal persons, independently of their legal and organisational form, which exercise activities associated with fabrication, use, reprocessing, storage, transportation and transfer beyond the Russian customs' border of nuclear materials, as well as for the federal executive bodies, which exercise, within their jurisdiction, the state control over the use of atomic energy and the state regulation of safety at the use of atomic energy.

2. Information Reporting to IAEA.

Because of the fact hat the Russian Federation is a party to the Non-Proliferation Treaty, we submit the data to IAEA, which subject to:

- Agreement between ex-USSR and IAEA on the application of safeguards (INFCIRC/327);
- Commitments to notify IAEA on export and import of nuclear materials (INFCIRC/207);
- Voluntary reporting of information on export and import of nuclear and special non-nuclear materials, equipment and technologies to IAEA in accordance with the IAEA document GOV/2588 and GOV/2589.

The procedure and system for reporting of information to IAEA has been formed as a part of the export control system of the state regulation of external trade, which existed in the ex-Soviet Union.

The following are quotations from a Minatom paper by V. Erastov on "Organisational Activities in Minatom of Russia to improve safeguards and security of nuclear materials as the key element of nuclear material illicit trafficking prevention". The paper was presented at the fifth meeting of the Nuclear smuggling ITWG in Helsinki in June 1999:

Three basic elements of the Program:

- reliable and safeguarded storage of nuclear materials and effective measures of their protection, control and accounting for prevention of illicit trafficking;
- joint investigations, customs and law-enforcement measures for prevention of international transportation and sale of the stolen materials;
- joint efforts on identification and elimination both of the illicit proposals and demand for fissionable materials with the purposes of counteraction to criminal elements.

Within the framework of co-operation Minatom of Russia with Joint Research Centre of European Commission in the field of the accounting for and control of nuclear materials implementing on the program TACIS, in the Institute of Inorganic Materials by name of Academician Bochvar are organised a Lab for identification of nuclear materials of an unknown origin (LINMUO).

Tasks LINMUO:

- identification of fissile materials of an unknown origin and issue of experts conclusions about its origin, properties and performances;
- making and support of the database under the list, properties, performances and origin of fissile materials;
- making and support of bank fissile materials samples;
- realisation of arbitration analysis of nuclear materials;
- realisation of inter-laboratory comparisons and international experiments for maintenance of uniformity of measurements.

Jointly by Institute of Transuranium Elements (Karlsruhe) and Institute of Inorganic Materials by name of Academician Bochvar (Moscow) is created the database for analysis of materials of an unknown origin. It includes the known data on all nuclear fuel materials of the Russian origin and European industry, besides it is added with information from the references on a nuclear fuel cycle of nuclear fuel manufacturing other countries.

SWEDEN

LEGISLATION

a) The basic nuclear law is the "Act on Nuclear Activities" from 1956 (1984:3, latest amended 1998:1706). The Act concerns "Nuclear Activities" which are defined in a comprehensive way as follows:
   - the commission, possession or operation of a nuclear installation,
   - the acquisition, possession, transfer, handling, processing, transport or other dealings with nuclear material, nuclear items or radioactive waste,
   - the import into Sweden of nuclear material, nuclear items or radioactive waste,
   - the export out of Sweden of radioactive waste.

   In the fundamental provisions of the Act is stated that nuclear activities shall be conducted in such a manner that the requirements on safety are met and the obligations are fulfilled that follow from Sweden's agreement for the purpose of preventing the proliferation of nuclear weapons.

   The Act prescribes that "a license under this Act is required for nuclear activities".

   The Act also stipulates:
   - the general obligations of license-holders,
   - the conditions for revocation of licenses,
   - public insight, and
   - liability provisions.

b) The 1984 Ordinance on Nuclear Activities establishes import and exports quantity limits for radioactive materials. It also stipulates licensing responsibilities for the nuclear safety and radiation safety regulatory authorities with respect to radioactive materials and nuclear waste, i.e. the Swedish Nuclear Power Inspectorate (SKI) and the Swedish Institute of Radiation Protection (SSI).

c) The 1958 Radiation Protection Act; amended 1988 and 1995. The purpose of the Act is to protect people, animals and the environment against the harmful effects of radiation. For the purposes of the Act "activities involving radiation" are understood to mean:
   1. the manufacture, import, transport, sale, transfer, lease, acquisition, possession or use of, or any comparable dealings with, radioactive materials,
   2. the use of, or any comparable dealings with, technical devices capable of generating radiation.

   The Radiation Protection Act prescribes that a permit is required for:
   - the manufacture, import, transport, sale, transfer, lease, acquisition, possession or use of a radioactive substance,

- the manufacture, import, sale, transfer, lease, acquisition, possession, use, installation or maintenance of a technical device capable of, and intended for, emitting ionising radiation, or a part of such a device that is of substantial importance from the viewpoint of radiation protection,
- the manufacture, import, sale, transfer, lease, acquisition, possession, use, installation or maintenance of technical devices, other than those referred to in 2 above and which are capable of generating ionising radiation and for which the Government, or the authority appointed by the Government, has prescribed a permit requirement,
- the export of radioactive waste.

The Radiation Protection Act further states that a permit to export radioactive waste must not be granted for export to:

- a destination south of latitude 60° south,
- a State party of the fourth ACP-EEC Convention promulgated on 15th December 1989, and not a member of the EU,
- a State which has forbidden the import of radioactive waste or a State which is presumably incapable of managing such waste in a safe manner.

d) The 1974 Royal Decrees laying down the duties of the Nuclear Power Inspectorate (SKI) , replaced by 1988 Ordinance.

e) The 1989 Regulations on the removal of goods from controlled areas.

f) The 1992 Amendment of 1984 Ordinance on Nuclear Activities, adding provisions on import/export.

g) Apart from the nuclear laws and regulations, nuclear installations are subject to the provisions of other legislation, such as the 1987 Planning and Building Act, the 1987 Act on the Economising of Natural Resources, the 1983 Water Regulations Act, the 1977 Work Environment Act, and the 1969 Environmental Protection Act.

h) Since 1995, when Sweden became a member of the EU, the EU legislation is also applied. Examples are:
Council Regulation (EURATOM) No. 1493/93 on shipments of radioactive substances between member States, and
Council Directive 92/3 EURATOM on the supervision and control of shipments of radioactive waste between member States and into and out of the Community (implemented SSIF 1995:4).

i) Strategic Products Act (1998:397) applies to the control of strategic products, which are defined as products that can be used both for civil and military purposes (dual-use items). The Act also contains additional provisions under EU Council Regulations.
The Act applies to:

- Nuclear substances, minerals containing nuclear substances, products from nuclear substances or goods containing such substances,

- Equipment or material specially designed or installed for the processing, use or production of nuclear substances,
- Equipment or material that can be used to produce nuclear charges,
- Other high technology products that can be used directly or indirectly for destructive purposes,
- Software for automatic data processing and other software specially designed for the products, equipment and material referred to above.

Nuclear substance means uranium, plutonium or other substances used or which can be used for extracting nuclear energy /nuclear fuel) or compounds containing such substances, thorium or other substances intended to be converted into nuclear fuel or compounds containing such substances, and spent nuclear fuel that has not been put into terminal storage.

Permits to export under the Act or in accordance with regulations issued by virtue of the Act shall be granted if this does not conflict with Sweden's foreign policy, security or defence policy interests.

INFRASTRUCTURE

Competent Authorities

a) SKI

Under the provisions of the 1984 Act, the Government has general responsibility for overseeing the licensing procedure for nuclear fuel and nuclear installations. However, the national body responsible for administering the licensing procedure for nuclear installations is the Swedish Nuclear Power Inspectorate (SKI). Administratively, SKI comes under the Ministry of Environment and acts as the State Regulatory Body for nuclear activities. Its independence as the State Regulatory Body is guaranteed in the Swedish Constitution.

SKI is in economical matters and overall, strategic priorities directed by a Board, appointed by the Government. In operational and professional matters, the Board has merely advisory functions. The Chairman of the Board is the Director General of SKI, under whose responsibility and supervision are placed the Departments of Inspection, Regulation, Administration, Personnel and Information. The Director General, together with the Department heads, constitutes the Executive Office.

Three advisory committees are linked with SKI:
- The Reactor Safety Committee, follows SKI's supervisory activities and assists with advice regarding reactor safety and licensing matters;
- The Safeguards Committee, has an advisory capacity in matters related to safeguards of nuclear material; it also assists with advice regarding physical protection of nuclear facilities and transports;

- The Research Committee, evaluates major research projects and generally advises on priorities with respect to the SKI Research Program.

b) SSI

The State body responsible for the enforcement of the 1988 Radiation Protection Act is the National Institute of Radiation Protection (SSI). Administratively, SSI comes under the Ministry of Environment and is responsible for radiation safety and protection, including the issuance of permits for the manufacture, import, transport, sale, transfer, lease, acquisition, possession or use of a radioactive substance, and the performance of inspections.

SSI is directed by a Board appointed by the Government. The board decides on economical matters, the issuance of regulations and gives advice on priorities. In operational and professional matters the Board has merely advisory functions. The chairman of the Board is the Director General of SSI under whose responsibility and supervision are placed the Departments of Occupational and Medical Exposure, Waste Management and Environmental Protection, Emergency Preparedness and Biomedicine, Environmental Monitoring and Dosimetry, Administration, Personnel and Information.The Director General together with the department heads constitutes the Execution Office.

There is one advisory committee appointed by the Government linked to – the SSI – the research committee, which gives advice to SSI on priorities with respect to the SSI research programme.

Both SKI and SSI are involved in the licensing procedure and in the inspection of nuclear facilities, but in different areas. SKI is concerned with the nuclear safety of installations, while SSI deals with the environmental effects from radiation and radioactive discharges, as well as radiation exposure of personnel.

Supervision Philosophy

In accordance with the Swedish Nuclear Energy Law (the Act on Nuclear Activities), the holder of the license for the operation of a nuclear facility carries the entire responsibility for the safety of the facility. Paragraph 10 of the Law stipulates that: "The holder of a license for a nuclear activity (e.g. operation of a nuclear facility) shall ensure that such measures are taken as are needed in order to maintain safety, in view of the nature of the activity and the conditions under which it is conducted".

What in the Act is said about nuclear safety, is also applicable to non-proliferation (safeguards).

The Operator, being the Licensee for the plant operation, has thus the entire responsibility for the safety and safeguards of the plant. SKI is the Regulatory

Body and Supervisory Authority and has to see to it that the Operator fulfils that responsibility. To that end, SKI is prescribing licensing conditions for the operation of the facility and is also carrying out inspections. SKI can also apply other measures in the case the Operator is not meeting with the requirements stipulated in laws and regulations or in the licensing conditions. In the most serious case, SKI can close down the operation of a nuclear power plant.

In its supervisory function, SKI applies what is referred to as the "Swedish model". This means, in principle, that SKI imposes on the Operator the responsibility to define the required and acceptable safety level. The Operator has, in accordance with the Law, the responsibility to operate the nuclear power plant in a safe way. By giving the initiative for the safety work to the Operator, one is minimising the risk that the safety responsibility is not gradually transferred back to the Authority.

Rules and Regulations

The SKI's own rules and regulations, together with the Operators' safety analysis reports, are the basis for SKI's supervision and are prescribed as licensing conditions. One of the licensing conditions is that the "Safety Technical Rules" (STF) are applied. These rules are developed by each plant Operator and are approved by SKI. They are establishing the framework for the permissible operation of the plant. Changes of the Rules must be approved by SKI before they can be implemented. SKI has also published Quality Assurance Rules that stipulate the requirements for the plant internal control system and the system for the continuous monitoring of the staff competence.

In the Nuclear Activity Act, there are no requirements specifically related to safeguards. The nuclear safety rules and regulations are, in general terms and in applicable parts, also valid for safeguards.

Treaties, conventions and agreements in the nuclear area, to which Sweden is a party, are to the full extent applicable in all Swedish nuclear activities. This is stipulated in the Nuclear Act in the form of a general requirement. That such a "simple" law making act has been made possible, has to be explained by the authority and right which is assigned by the Government to SKI to include in the licensing conditions requirements of conventions, international agreements and, even, IAEA's circular recommendation documents. This has been the case for safeguards and physical protection of nuclear material and facilities.

With regard to Illicit Trafficking, SKI has since a long time been involved in a co-operation program on the national level with, among others, the security police, the customs, SSI and the Swedish military defence research organisation. This co-operation structure is described in Chapter D.

UKRAINE

LEGISLATION

Laws

a) Law on Adhering to the Treaty on Non-Proliferation of Nuclear Weapons, November 1994;
b) Law on the Use of Nuclear Energy and Radiation Safety, February 1995 (Basic Nuclear Law). Amendments made in 1996 and 1997.
   The Law stipulates as offences theft, illegal acquisition, storage, transfer, sale or use of nuclear materials and radioactive sources, as well as the concealing of information concerning such offences.
c) Law on Participation of Ukraine in the 1980 Convention on Physical Protection of Nuclear Materials, May 1993;
d) Law on Radioactive Waste Management, April 1995;
e) Law on Ratification of the Nuclear Safety Convention, December 1997;
f) Law on Ratification of the Agreement between Ukraine and IAEA for Application of Safeguards in Connection with the Treaty on Non-Proliferation of Nuclear Weapons, December 1997;
g) Law on Protection of population from Ionising Radiation, January 1998;
h) Law on Uranium Ore Mining and Processing, December 1997;
i) Law on Basic Principles Governing the Further Operation and Decommissioning of Chernobyl, December 1998;
j) Draft Law on Permissive Activities in the Nuclear Energy Field, approved in first reading in Parliament in November 1998;
k) Draft Law on Physical Protection of Nuclear Materials, Nuclear Installations and Other Radiation Sources; passed a first reading in the Parliament in May 1998;
l) Draft Law on Regulatory Bodies for Nuclear and Radiation Safety, submitted to Parliament in 1998;
m) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
n) Joint Protocol on adherence of Vienna and Paris Conventions for Nuclear Damage.

Regulations developed during 1998

a) The Order of the Issuance of Safety Certificates during the Transportation of Nuclear Materials, April 1998;
b) Provisions on Licensing of the NPP of Ukraine Personnel Training, July 1998.

On-going legislation activities in 1999

- The initiation of a comprehensive analysis of the legal framework aimed at the further codification and reduction in a number of laws.
- Submission for ratification of the Joint Convention on Safe Management of Radioactive Waste and Safe Management of Spent Nuclear Fuel and Development of the Amendments to Legal Acts due to the Joint Convention.
- Adoption of the IAEA (recommendations for) Regulations for Safe Transport of Radioactive Materials for use in Ukraine.
- Finishing the development of safeguards regulations.

- Determination of radiation sources which could be released from regulatory control.
- Development of a set of regulations on physical protection.
- Putting into force new regulations on radioactive waste management.

In addition to the nuclear legislation, some norms regulating the prevention of illicit trafficking are as follows:

In addition to the special legislation establishing special requirements, different from the requirements of general regime of external economics activity, there is the Basic Law ”On External Economics Activities” in place. The Law was adopted in 1991 and in force with a number of amendments and supplements. This Law establishes the legal regulation of all types of external economics activities including external trade, economics and scientific and technical co-operation etc. One of the main principles of free external economics activity postulated in the Law is responsibility to observe the procedure established by the Ukrainian laws whilst carrying out external economics activity.

Article 8 of the said Law, called ”The state regulation of external economics activity”, includes reference to special legislation establishing more strict requirements to activities dealing with nuclear material. ”The state and its bodies have no right to interfere directly in the external economics activity of subjects of this activity, except for the cases when the interference is made in compliance with the said and any other Laws of Ukraine”.

Article 20 of the Law ”On external economics activity” establishes that ”Being specially authorised by the Government of Ukraine, subject of external economics activity can export and import of armament, ammunition, military equipment and other commodities for fabrication of explosives, nuclear materials (including materials in a form of fuel assemblies), technologies, equipment, special non-nuclear material and services associated with, radiation sources, and any other types of production, technologies and services which are used for creation of military purpose goods. Orders of the President of Ukraine and Resolutions of the Cabinet of Ministers of Ukraine are exceptionally important normative acts establishing main provisions, procedure and structure of export control, for instance, Orders of the President of Ukraine ”On Further Improvement of State Export Control” and ”On Provision on State Export Control”.

For example, the Civil Code of Ukraine establishes norms to determine non-compliance of agreements against to requirements of the legislation:

- Article 48 says that agreements failing to meet the law requirements are invalid.
- Article 49 says that an agreement shall be invalid when the placed agreement clashes the interests of the state and society.
- Article 50 says that an agreement of a legal entity shall be invalid when placed against with his goals.

The Criminal legislation of Ukraine has codes determining sanctions to an offence related to illicit purchase, storage, use, transfer or destroy of radioactive

materials (imprisonment up to 5 years, if resulted in a human death - 10 years imprisonment):

- Article 228-2 - Illicit purchase, storage, use, transfer or destroy of radioactive materials
  "Illicit purchase, storage, use, transfer or destroy of radioactive materials (radiation sources, radioactive substances and radioactive materials locating in any physical form in facility or in form a of goods or any other shape) shall be punished by up to 5 years imprisonment. Similar actions resulted in a human death or severe consequences shall by punishable by imprisonment up to 10 years".
  (The Code was supplemented with Article 228 – 2 in pursuance to Order # 5723-11 dated of 14.04.88 of the Supreme Rada of Ukraine).

- Article 228-3 – Theft of radioactive materials
  "Theft of radioactive materials shall be punishable by term from 3 to 10 years imprisonment with or without property confiscation".

  (The Code was supplemented with Article 228 – 3 in pursuance to Order # 5723-11 dated of 14.04.88 of the Supreme Rada Ukraine).

- Article 228-4 - Threat of committing a theft of radioactive materials and their posterior use.
  "Threat of committing a theft of radioactive materials aimed to make state, international organisation, physical or legal entity to take any action or resist from if there were reasons to intimidate commitment of the treat shall be punishable by imprisonment up to 3 years.
  Threat of radioactive materials use to cause death of people or any other severe consequences if there were reasons to intimidate commitment of the treat shall be punishable by imprisonment up to 5 years".
  (The Code was supplemented with Article 228 – 4 in pursuance to Order # 5723-11 dated of 14.04.88 of the Supreme Rada Ukraine).

- Article 228-5 – Violation of rules for storage, use, accounting and transportation of nuclear materials.
  "Violation of rules for storage, use, accounting and transportation of nuclear materials and other rules to handle them shall be punishable by imprisonment up to 3 years or corrective works up to 2 years (corrective works - punishment by being officially forced to carry out certain works), or fine from 50 to 120 minimal amount of the salary.
  Similar actions resulted in a human death or severe consequences shall by punishable by imprisonment up to 10 years".
  (The Code was supplemented with Article 228 – 5 in pursuance to Order # 5723-11 dated of 14.04.88 of the Supreme Rada Ukraine, and amendments in compliance with Laws, #41/95 –SR (the Supreme Rada) of 08.02.95, #81/96 – SR of 06.03.96).

Norms of the Custom Code of Ukraine envisages liability for breaching Custom Rules by imposing fine, seizure of property and administrative arrest of property.

INFRASTRUCTURE

Illicit trafficking in nuclear materials is a threat in terms of nuclear weapons proliferation. The potential of removal and smuggling large quantities of weapon-grade nuclear material is low in Ukraine, but irrespectively of this fact, illicit trafficking of even small quantities of nuclear material needs great attention, because it may serve as a basis for gradually accumulating nuclear material in quantities sufficient for nuclear weapon manufacturing.

Ukraine is a state with a developed nuclear industry, with the following nuclear facilities and installations:

- Five Nuclear Power Plants (NPPs), i.e. Zaporozhye, Rovno, Khmelnitsky, South-Ukrainian and Chernobyl, with in total 15 reactor units;
- One "Shelter" object;
- Two research reactors, i.e. the Scientific Center Institute for Nuclear Research (INR), and the Sevastopol Institute of Nuclear Energy and Industry (SINEI);
- One sub-critical assembly out of operation (at SINEI);
- nuclear facilities at the National Scientific Center Kharkov Institute of Physics and Technique (NSC-KIPT);
- uranium mining and reprocessing enterprises, i.e. industrial enterprise Eastern Mining and Enrichment Plant (VostGOK).

There are about 5000 institutions, enterprises and organisations that use or store about 100 000 instruments with radioactive isotopes. A considerable number of various radioactive waste from the Chernobyl accident is stored in a "Shelter" at the facility and at special storage sites within the exclusion zone.

Attention must be given to the physical protection of and illicit trafficking in nuclear materials, because of continuing protest actions of the nuclear workers, creating a fertile ground for increasing the threat of the removal and use of nuclear materials.

More than ten State agencies and legal persons are, more or less, involved in measures directed to the prevention of illicit trafficking in nuclear materials and other radioactive sources.

Distribution of responsibilities for illicit trafficking prevention between State authorities and other legal persons:

Authority	Reporting to	Functions concerning illicit trafficking prevention, detection and response
Nuclear Regulatory Administra-tion (NRA)	Ministry of Environment and Nuclear Safety (MEPNS)	Regulation in the field of illicit trafficking prevention; coordination of legislation development; preventive activities (physical protection of nuclear facilities and nuclear materials in transport); coordination between domestic agencies and with international organizations; information exchange with IAEA's database; participation in development of technical means
Regional State Authorities on Environ-ment Safety	MEPNS	Radiation monitoring at borders and within regions territories; response procedures when illicit trafficking is detected
Security Service	Cabinet of Ministers	Preventing attempts of illicit trafficking; criminal investigation in the field of nuclear material smuggling
Customs Service	Cabinet of Ministers	Preventing attempts of illegal transfer of nuclear materials and other radioactive sources across borders; primary response illicit trafficking is detected
Ministry of Internal Affairs	Cabinet of Ministers	Preventing attempts of unauthorized removal of radioactive sources; participation in physical protection measures of nuclear facilities and nuclear materials in transport; primary response and investigation of criminal cases connected with unauthorized removal of radioactive sources
Sanitary and Epidemic Service	Ministry for Public Health	Primary response when detecting radioactive sources illicit trafficking
Ukrainian State Enterprise "Radon"	Ministry for Emergency Situations	Transport of seized nuclear materials and other radioactive sources to temporary storage or to SC-INR for further examination and analysis
Scientific Center INR	National Academy of Sciences	Seized materials examination, analysis and issuing of expert opinion on isotopic contents, origin, etc.; provision of temporary storage of seized materials

An additional component of the problem of illicit trafficking in Ukraine is the re-structuring of State administration, following independence. This has lead to a re-distribution of responsibilities in areas relevant to the combating of illicit trafficking.

In 1995, the Cabinet of Ministers issued the decree No.198 ”On Ecological Monitoring Execution at the State Border Cross-points”. This decree charged the State Ecological Inspectorate of the MEPNS with the responsibility to provide ecological monitoring at the border cross-points of: transport vehicles, including aeroplanes, ships, military ships, cargoes consisting of industrial raw materials, wastes and other substances dangerous to environment and public health.

The increase of illicit trafficking incidents in Ukraine and a growing terrorism threat, called for urgent measures for improving the co-ordination of efforts by all parties involved. A first important step to solve this problem was a Decree of the Cabinet of Ministers in March 1997: "On Establishment Procedures of Executive Authorities and Relevant Legal Persons for Interaction in the Case of Radioactive Sources Detection in Illicit Trafficking". The principal provisions of this Decree are the following:

1. Establishment of a Procedure for Executive Authorities and Relevant Legal Persons Interaction in the Case of Radioactive Sources Detecting in Illicit Trafficking, including a mechanism of interaction of all parties involved, priorities and a scheme for data exchange, information exchange with international organisations, as well as information to the public in case of either nuclear material accidental detection, or when its detection is a result of investigation activities of law enforcement bodies.
2. Assigning the status of the main expert organisation on illicit trafficking in nuclear materials to the Scientific Centre "Institute for Nuclear Research" in Kiev.
3. Instruction to develop and to submit to the Cabinet of Ministers a draft three-year Program on Prevention of Illicit Trafficking Until 2001. The draft Program has been elaborated and contains provisions for the comprehensive approach to solve the problems of illicit trafficking in nuclear materials. Its objective is to protect the public and the environment from harmful radiation impact by preventing radiation source illicit trafficking through upgrading of systems for radioactive material accountancy, control, security and physical protection. In addition to the laws and regulations in force, the following legislation (relevant for the Program) has been adopted by the Cabinet of Ministers:
    - Provision on State system of accountancy and control of nuclear materials;
    - Provision on procedure for control of export, import and transit of items related to nuclear activity and that can be used in the creation of nuclear weapons;
    - Procedure for interaction between executive authorities and involved legal entities in case of the reveal of radiation source illicit trafficking;
    - Decree on the establishment of a State radiation source register.

The current normative and legal basis is considered not to be sufficient for an effective prevention of illicit trafficking of radiation sources. For the necessary upgrading, an interagency group of experts from interested ministries and other central executive bodies has been established with the task to ensure legal-normative and scientific-methodical support to the Program measures.

The Scientific Centre "Nuclear Research Institute" has been recognised, by decision of the Government, to be the main State expert organisation to define characteristics of radiation sources subject to illicit trafficking. To that end, the Institute would need re-equipment and modernisation of equipment, as well as the establishment of a mobile and a stationary laboratory.

The Program envisages urgent measures concerning development and implementation of modern technical means for physical protection, security of radiation sources, dosimetric and monitoring instruments. At the State borders, the Program plans to equip entry control points with special radiation monitoring equipment of domestic manufacture.

Information about radiation sources, including their analytical composition, will be maintained at the State System for Accountancy and Control, as well as at the State Registers for radiation sources and radioactive waste. The information data base will be linked to an information and analytical network between the concerned ministries and agencies, with the main centre at the MEPNS.

Under the Program, international co-operation will be established for exchange of experience of scientific-technical and methodology information with donor countries, international organisations and scientific institutions taking part in the programs of TACIS, Nunn-Lugar and others.

Even if initiated by a Cabinet of Ministers Decree, and agreed to by all concerned ministries and agencies, the Draft Program has not been finally approved by the Government because of lack of funding. Part of the Program will, however, be implemented, with the help of funds allocated by the MEPNS and international assistance.

In August 1997, Ukraine joined IAEA’s program for collecting and sharing information on trafficking incidents involving nuclear materials and other radioactive sources.

Even if Ukraine has made considerable progress with respect to legislation and procedures for the combating of illicit trafficking, the practical implementation of means and measures is facing serious difficulties. The main reasons are acute shortage of devices and equipment for radiation monitoring, analytical and spectral measurements, and the lack of qualified personnel.

For example, at the 158 State border cross-points where, according to Decree, ecological monitoring must be introduced, such equipment has been installed at only about 75 % of the crossing-points.

It is evident that the number of devices and installations for radiation monitoring is insufficient to meet requirements of effective radiation monitoring at the State borders. For example, there are no radiation monitoring means at the border cross-points in the large Donetsk region, and at some airports and seaports, radiation monitoring is not carried out. Furthermore, most of devices and installations are out-of-date and many of them were designed and manufactured in the former Soviet Union and does not meet modern standards for detecting, searching and analysing.

The devices and installations used at the border cross-points are more suitable for radiation monitoring than for nuclear materials detection.

The State Customs Service (SCSU) has purchased 2200 PM1202 radiation monitoring devices made of JV ”Polimaster” in Belarus. This device was developed specially for customs purposes according to the order of the State Customs Committee of Russia. Under the Ukraine-USA agreement on providing Ukraine with assistance to eliminate strategic nuclear weapons and to prevent proliferation of mass destruction weapons (Nunn-Lugar), the SCSU received 6 mobile ”Rapiscan” Roentgen-TV installations, 16 fixed ”Rapiscan” installations, and 68 radiation monitoring devices of type 12SA.

With respect to training of personnel, ten SCSU officers were trained by STUK, Finland, in 1996. Since 1997 the representatives of SCSU have been involved in training courses under WCO and IAEA joint programs on prevention of radioactive materials smuggling.

Recognised problems

In November 1998, on the request of the Ukrainian Government, an International Regulatory Review Team (IRRT) carried out a study with the objective "to perform an objective and systematic review of the Regulatory Body of Ukraine and to exchange information and experience in the regulation of nuclear, radiation and radioactive waste safety". The following is an extract from the observations and recommendations made by the Team:

- The legislation in force and drafts submitted to Parliament as a whole is comprehensive and meets internationally recognised requirements.
- The NRA is still understaffed and overworked and needs more resources than available ones.
- The Government of Ukraine should support a Decree forming a State Nuclear Regulatory Administration and thereby effectively giving NRA independent status within the Ministry (MEPNS).
- Ukraine has an extensive program of using radiation sources, a lot of waste sources, as well as radioactive wastes accumulated.
- A national campaign to search for and collect abandoned and spent radiation sources has been initiated.
- A national register of source users is under development.
- Development of new regulations in the field of radiation protection, waste management and radioactive material transportation is under way and based on the current international practice, particularly the IAEA Basic Safety Standards (BSS) and other documents.

The Government should support both a national campaign to prevent unauthorised use of radiation sources and a national inventory of radiation sources and users with the resources.

ANNEX 6 NPT AND SAFEGUARDS AGREEMENTS

Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

The Treaty obligations of the nuclear-weapon States and the non-nuclear-weapons States are stipulated in Article I and II, respectively. Those articles stipulate, for the parties of the Treaty, that:

> *"The nuclear- weapon States undertake not to transfer to any recipient, and the non-nuclear-weapon States undertake not to receive from any transferor nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly".*

Furthermore, the nuclear-weapon States undertake:

> *"not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, and the non-nuclear-weapon States undertake not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices".*

The control requirements of the Treaty (i.e. safeguards) are specified in Article III.1:

> *"Each non-nuclear-weapon State party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the IAEA and the Agency's safeguards system, for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices".*

The safeguards shall be applied on all source fissionable material, such as natural uranium, or special fissionable material, whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility, in all peaceful nuclear activities. Furthermore, each State party to the Treaty undertakes not to transfer nuclear material or nuclear equipment to a non-nuclear-weapon State, unless the material is being subject to NPT safeguards.

IAEA Safeguards Agreements

The following is a quotation from the IAEA Fact-sheet "International Safeguards and the Peaceful Uses of Nuclear Energy":

> *"Legal agreements are the basis of IAEA safeguards. Many are popularly known as full-scope agreements because they extend to all peaceful nuclear activities and materials in the State. These mainly relate to the NPT*

and also to the Treaty for the Prohibition of Nuclear Weapons in Latin America (the Treaty of Tlatelolco) and to the South Pacific Nuclear-Free Zone Treaty (the Rarotonga Treaty). Other safeguards agreements cover individual nuclear installations or individual quantities of nuclear material. At the end of 1998, 222 safeguards agreements were in force in 138 States (and Taiwan). This includes safeguards agreements, which were in force with 126 States pursuant to the NPT. The greater part of the safeguards activities was in those States where safeguards were being applied pursuant to full scope safeguards agreements (INFCIRC/153 type). Safeguards were also being applied to facilities, equipment, and non-nuclear material under agreements covering individual facilities (INFCIRC/66 Rev.2 type).

As of 17 June 1999, 187 Non-Nuclear Weapon States (NNWS) had adhered to the NPT in addition to China, France, the Russian Federation, the United Kingdom and the United States of America and have thus entered into an international legal commitment not to acquire nuclear weapons or other nuclear explosive devices in any manner whatsoever.

IAEA safeguards are applied in the nuclear-weapon States in a limited number of facilities selected by the IAEA under so-called voluntary-offer agreements concluded with the Agency.

There are a number of States not party to the NPT or the Treaty of Tlatelolco which have nuclear facilities in operation or under construction. In some of these States only some installations are under safeguards and there are unsafeguarded nuclear facilities known to be in operation or under construction".

ANNEX 7 SANCTIONS AND PENALTIES

BELGIUM

The “Law of 17 April 1986 on Implementation of the Convention on the Physical Protection of Nuclear Material” implements Article 7 of the Convention in Belgian domestic law. The 1986 Law provides for sanctions to be applied for the offences as described in the Convention.

- The threat to use nuclear material to commit an attack against persons or properties or to commit a theft of nuclear material in order to compel a natural or legal person, international organisation or State to do or to refrain from doing any act is punished by servitude.
- The theft of nuclear material is punished by servitude.
- The theft of nuclear material is punished by hard labour from 10 to 15 years if it was committed with force or threats, or with burglary.
- An act constituting a demand for nuclear material by threat or use of force is punished by hard labour from 10 to 15 years.
- Anyone who, intentionally and without authorisation or without compliance with requirements prescribed in the licence, receives, possesses, uses, alters, disposes, abandons, transports or disperses nuclear materials is liable to servitude. The penalty is hard labour from 10 to 15 years if the act gives rise to personal injury or damage to property. The penalty is hard labour from 15 to 20 years if the act causes death.

The “Law of 9 February 1981” lays down a prior licensing system for the export of nuclear materials and equipment as well as of technological data and prescribes that the transfer to non-nuclear weapon States of nuclear materials, equipment, technological data and derivatives is subject to a licence. Infringements to the provisions of this Law are punished by imprisonment from one month to 5 years and a fine from 100 Francs to one million Francs.

Pursuant to the “Law of 15 April 1994 relating to the Protection of the Public and of the Environment against the Danger of Ionising Radiation and concerning the Federal Agency for Nuclear Control” and its implementing Decrees, possession, use, import, export, transit and distribution of radioactive substances without authorisation or without compliance of prescribed requirements is punished by a fine from thousand Francs to one million Francs and by imprisonment from 3 months to 2 years or by one of these two penalties.

CANADA

The “Penal Code” provides for offences in connection with the use of nuclear material. A person commits an offence if he receives, has in his possession, uses, transfers the possession of, sends or delivers to any person, transports,

alters, disposes of, disperses or abandons nuclear material and thereby causes or is likely to cause the death of, or serious bodily harm to, any person, or causes or is likely to cause serious damage to, or destruction of, property.

The Act to establish the Canadian Nuclear Safety Commission and to Make Consequential Amendments to Other Acts of 20 March 1997 provides that an offence is committed by anyone who:

- Alters or misuses anything the purpose of which is to protect the environment or the health of persons from any risk associated with the development, production or use of nuclear energy or the possession or use of a nuclear substance, prescribed equipment or prescribed information;
- Fails to comply with any condition of a licence;
- While in charge of nuclear facility, fails to ensure safe conditions.

Anyone who commits such offences is liable on indictable offence to a fine not exceeding $1 000 000 or to imprisonment for maximum five years or to both; or on summary conviction to a fine not exceeding $500 000 or to imprisonment for maximum eighteen months or to both.

Anyone who possesses a nuclear substance, prescribed equipment or prescribed information that is capable of being used to produce a nuclear weapon or a nuclear explosive device is guilty of an indictable offence and is liable to imprisonment for a term not exceeding ten years.

The “Radiation Emitting Devices Act”, as amended, provides that anyone who sells, leases or imports into Canada a radiation emitting device if the device creates a risk to any person of genetic or personal injury, impairment of health or death from radiation, or labels, packages or advertises a radiation emitting device in a manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its design, construction, performance, intended use, character, value, composition, merit or safety, commits an offence.

Pursuant to the “Transportation of Dangerous Goods Act of 17 July 1980”, anyone who handles, offers for transport or transports any dangerous goods without complying with prescribed safety or packaging requirements is guilty of an offence and is liable, on summary conviction, to a fine not exceeding fifty thousand dollars for a first offence, and not exceeding one hundred thousand dollars for each subsequent offence, or on conviction on indictment to imprisonment for maximum two years.

Pursuant to the “Export and Import Permits Act”, as amended, anyone who exports or imports any goods included respectively in an Export / Import Control List without licence is guilty of an offence and is liable on summary conviction to a fine not exceeding five thousand dollars or to imprisonment for maximum twelve months or to both; on conviction upon indictment to a fine not exceeding twenty-five thousand dollars or to imprisonment for maximum five years or to both.

CZECH REPUBLIC

The “Act N°18/1997 on the Peaceful Uses of Nuclear Energy and Ionising Radiation and on Amendments and Additions to Related Acts of 24 January 1997” provides that:

- Those who violate the prohibition on nuclear energy utilisation for other than peaceful purposes or the prohibition on international transfers of nuclear items into States not owing nuclear weapons and on import of radioactive waste into the territory of the Czech Republic are punished by a fine up to the CZK 100 million;
- Those performing without licence activities of siting, construction, operation, decommissioning of a nuclear installation, discharge of radionuclides into the environment, handling of ionising radiation sources or nuclear materials, radioactive waste management, import or export of nuclear items or transit of nuclear materials, transport of nuclear materials and radionuclide sources are punished by a fine up to CZK 50 million;
- A licensee violating his obligation of ensuring nuclear safety, radiation protection, physical protection and emergency preparedness or his obligations in the event of a radiation accident or in transport and shipment of nuclear items and radionuclides sources is punished by a fine up to CZK 10 million;
- A person violating the prohibition on import of radioactive waste for disposal or not fulfilling the obligation to entrust the disposal of radioactive waste to an authorised person is punished by a fine up to CZK 10 million.

The amount of the penalty shall reflect the seriousness, significance and time period of the illegal activity and the extent of consequences that were caused, and timely and efficient co-operation in removing the deficiencies.

These penalties may be imposed within 3 years from the date on which the State Office for Nuclear Safety identified the violation of an obligation, but not later than 10 years after the occurrence of the violation.

FRANCE

The “Law N°80-572 of 25 July 1980 on the Protection and Control of Nuclear Materials” provides for penalties as follows:

- appropriation of nuclear materials, which covers embezzlement and theft, carrying out activities without authorisation, or providing knowingly incorrect information in order to obtain this authorisation, is punished by imprisonment from two to ten years and by a fine from FF 5000 to FF 50 000 000, or by only one of these two penalties;

- import and export of nuclear materials without licence, as well as the production, possession, transfer, use or transport of nuclear materials outside the French Republic without licence is punished by the above mentioned penalties;
- the non-declaration of the theft, the disappearance or the loss of nuclear materials is punished by imprisonment from fifteen days to two years and a fine from FF 5000 to FF 250 000, or by only one of these two penalties.

Pursuant to the “Law N°76-663 of 19 July 1976 on Installations classified for Environmental Protection Purposes” and its implementing decrees, anyone who operates a nuclear installation without licence is liable to a fine from FF 2000 to FF 20 000. Administrative offences are also provided for.

Pursuant to the ”Law N°75-633 of 15 July 1975 on Waste Disposal and the Recycling of Material”, as amended, and its implementing decrees, an offence is committed by, *inter alia*, anyone who:

- disposes, abandons or stores nuclear waste or materials without authorisation;
- transports or markets nuclear waste without authorisation;
- imports, exports or carries in transit nuclear waste without authorisation.

These offences are punished by imprisonment from two months to two years and a fine from FF 2000 to FF 500 000.

GERMANY

The “Penal Code of the Federal Republic of Germany” in its 28th chapter « Offences Causing Public Danger » contains a series of provisions dealing with crimes in connection with the use of nuclear energy and ionising radiation.
The causation of a nuclear explosion entailing the risk of personal injury or major property damage is punished:

- in case of negligence by imprisonment for maximum ten years and not less than five years in particularly serious cases,
- and if it is undertook wilfully by imprisonment for minimum five years and for life or for not less than ten years in particularly serious cases.

The misuse of ionising radiation intended to cause damage to another person is punished:

- by imprisonment from six months to ten years, and in particularly serious cases by imprisonment for not less than five years;
- if the perpetrator undertakes to expose an indeterminable number of persons to such radiation, by imprisonment for not less than five

years, and in particularly serious cases by life imprisonment or imprisonment for not less than ten years.

The preparation of said crimes is punished by imprisonment from six months to ten years.

The defective production of a nuclear installation and its components, which causes the risk of personal injury and major damage to property is punished by imprisonment for not less than six months and maximum five years. In particularly serious cases the penalty is imprisonment from one to ten years.
The provisions of the Penal Code on crimes involving nuclear energy or ionising radiation apply irrespective of whether the crime is committed inside or outside the German territory.

The Penal Code penalises activities of persons who, in violation of licence conditions or of other administrative directives, release dangerous ionising radiation or store, transport, handle, import or export radioactive substances without the necessary licence.

In addition to those provisions, the “Act on Peaceful Uses of Atomic Energy and Protection against its Hazards (Atomic Energy Act) of 23 December 1959”, as amended, and the accessory ordinances contain provisions for the case of administrative offences incurred by the violation of, or non compliance with, valid regulations. An administrative offence is committed by anyone who:

- erects a nuclear facility without a valid licence,
- handles radioactive materials without a valid licence,
- as the ultimately responsible person fails to see to it that the protective and supervisory regulations of the Radiation Protection Ordinance are fulfilled.

A person committing an administrative offence is liable to a fine not exceeding DM 100 000.

The “Foreign Trade Ordinance of 22 November 1993”, implementing the Foreign Trade Act of 28 April 1961, provides that any person who, wilfully or negligently, exports without authorisation goods enumerated in the list related to nuclear energy, or markets such goods as part of transit trade, or who organises a prohibited transit of such commodities, is liable to a fine not exceeding DM 500 000.

Such acts committed deliberately constitute offences punished by imprisonment for maximum three years or by a fine. These acts committed by negligence are punished by imprisonment for maximum one year or by a fine.

HUNGARY

The “Penal Code”[1] provides for sanctions in the event of:

- acts endangering the public ;
- acts of terrorism ;
- acts endangering persons or the public by professional activities ; and
- misuses of radioactive materials .

The misuses of radioactive materials are punished by imprisonment for maximum 5 years.

The “Act N° CXVI on Atomic Energy of 10 December 1996” provides that « the Hungarian Atomic Energy Authority may oblige the licensee to pay a fine for violating a legal regulation, safety regulation, for failing to comply with an obligatory standard or with the provisions set forth in an individual regulatory licence ». A licence is notably required to carry out activities related to the design, manufacture, installation, commissioning, operation, modification, imports from abroad, putting out of operation and decommissioning, as well as for nuclear exports and imports, transport of radioactive materials, and storage and disposal of radioactive waste. Concerning the fines, the Act refers to special legal regulations being to be adopted.

SPAIN

The “Nuclear Energy Act of 29 April 1964” provides for criminal offences and administrative sanctions. Concerning the criminal offences, the Law provides that:

- Any person who intentionally causes a release of nuclear energy and thereby endangers the lives or health of other persons or their property, even if no explosion occurs, shall be liable to the maximum term of penal servitude (”reclusion mayor”).
- Any person who interferes with the operation of a nuclear installation shall be liable to the maximum term of imprisonment (”prision mayor”).
- Any person who intentionally causes another person or persons to be exposed to ionising radiation and thereby endangers their life, health or property shall be liable to the minimum term of penal servitude (”reclusion menor”).
- Any person who, without the necessary authorisation, operates a nuclear installation, a nuclear ship or aircraft or a device generating ionising radiation, or who supplies, receives, transports or possesses radioactive material or nuclear substances, or trades in them or

[1] Concerning the Penal Code, our source dates of 1992, and the Penal Code has been revised since this date.

extracts or utilises waste therefrom, or makes use of radioisotopes, shall be liable to the minimum term of imprisonment (”prison menor”).

The provisions of the Penal Code complete those of this Law.

As for the administrative sanctions in regard to nuclear matters, the Law provides that infringements of statutory and regulatory provisions concerning mining, processing and extraction of radioactive ores, registration and supplying of particulars, methods of work, conditions of technical safety and health protection of personnel, handling, transport, use and discharge of radioactive material and radioisotopes, as well as of provisions relating to the setting up and operation of nuclear installations and any other installation producing or working with radioactive material, or working with devices generating ionising radiation , shall give rise to administrative sanctions, including cancellation or suspension of licences, permits or concessions, and/or a fine not exceeding 5 million Pesetas.

The “Royal Decree N°158/1995 of 3 February 1995” implements the Convention on the Physical Protection of Nuclear Material ratified by Spain on 6 September 1991. The handling, use, transport, import or export of nuclear material is subject to a licence. The Decree provides that infringements to these provisions are liable to administrative sanctions as established in the Nuclear Energy Act.

JAPAN

The “Law N°166 for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors of 10 June 1957 , as amended, sets out the following penalties in the case of violation of its provisions.

- A person who endangers human lives or property by causing a fission chain reaction or radiation due to the unauthorised use of the specified nuclear fuel material is punished by imprisonment for maximum ten years.
- A person who threatens to harm human lives or property by using the specified nuclear fuel material is punished by imprisonment for maximum three years.
- A person is punished by imprisonment for maximum three years, or by a fine not exceeding one million yen, or both, for carrying on the refining or fabricating business without authorisation, installing or holding a reactor without authorisation, violating the order of stopping the reactor operation, obtaining a reactor or the facility indispensable to the reactor or the nuclear ship by transfer without authorisation, carrying on the business of waste disposal or waste management without authorisation, or using nuclear fuel material without authorisation.
- A person who contravenes restrictions aiming at the transfer or the receipt of nuclear fuel, or who does not comply with emergency

measures having to be taken is liable to imprisonment for maximum one year and a fine not exceeding 500 000 yens.
- A person who does not comply with rules of safety and radiation protection is liable to a fine not exceeding 300 000 yens.

The “Law N°167 on Prevention of Radiation Hazards due to Radioisotopes, etc., of 10 June 1957”, as amended, provides that:

- anyone who sells radioisotopes without authorisation or who contravenes an injunction of stopping such a sell, is liable to imprisonment for maximum three years and a fine not exceeding 500 000 yens, or one of these two penalties;
- anyone who transfers radioisotopes without permission or who does not notify modifications of his activities relating to conditions written in the authorisation, or who makes such modifications without permission, is liable to imprisonment for maximum one year and a fine not exceeding 300 000 yens, or one of these two penalties;
- anyone who gives false information on the conditions of using radioisotopes is liable to a fine not exceeding 200 000 yens;
- anyone who sells radioisotopes and who does not provide his personnel with necessary radiation protection instructions and training, or who does not take requested measures in respect of the exposed-personnel, is liable to a fine not exceeding 100 000 yens.

UNITED KINGDOM

The “1983 Nuclear Material (Offences) Act” implements the Convention on the Physical Protection of Nuclear Material. It provides that an offence is committed by anyone, whatever his nationality, who, in the UK or elsewhere:

- receives, holds or deals with nuclear material, intending, or for the purpose of enabling another, to do by means of that material an act of murder, manslaughter, culpable homicide, assault to injury, malicious mischief or causing injury, or endangering the life of the lieges, by reckless conduct; or theft, embezzlement, robbery, assault with intent to rob, burglary or aggravated burglary; or fraud or extortion;
- makes to another person a threat that he or any other person will do by means of nuclear material such an act as above mentioned.

Such offences are punished by imprisonment for maximum fourteen years.

Other Acts also governs offences related to the use of nuclear material.

Pursuant to the “1965 Nuclear Installations Act”, as amended, any person who uses a site for any treatment of irradiated matter without required licence, or contravenes the licence conditions, is guilty of an offence and is liable:

- on summary conviction, to a fine not exceeding the prescribed sum, or to imprisonment for maximum three months, or to both;

- on conviction on indictment, to a fine, or to imprisonment for maximum five years, or to both.

Furthermore, any licensee who does not constitute financial security as required is guilty of an offence and is liable:

- on summary conviction, to a fine not exceeding the prescribed sum, or to imprisonment for maximum three months, or to both;
- on conviction on indictment, to a fine, or to imprisonment for maximum two years, or to both.

The “1993 Radioactive substances Act” provides that anyone who:

- uses radioactive material or mobile radioactive apparatus without registration, or
- disposes or accumulates radioactive waste without authorisation

is guilty of an offence and liable, on summary conviction, to a fine not exceeding £20 000 or to imprisonment for maximum six months, or both; and, on conviction on indictment, to a fine or to imprisonment for maximum five years, or both.

UNITED STATES

The “Public Law 97-351 of 18 October 1982” implements the Convention on the Physical Protection of Nuclear Material by amending title 18 of the US Code. An offence is committed by anyone who:

- without authorisation, intentionally receives, possesses, uses or threatens to use, transfers, alters, disposes of, or disperses any nuclear material and thereby knowingly causes or knows that circumstances exist which are likely to cause the death of or serious bodily injury to any person or substantial damage to property;
- with intent to deprive another of nuclear material, knowingly takes and carries away nuclear material of another without authorisation; or makes an unauthorised use, disposition or transfer, of nuclear material belonging to another; or uses fraud or threat to obtain nuclear material belonging to another;
- attempts or is a party to a conspiracy to commit such offences.

Such offences are punished by a fine not exceeding $250 000 and by imprisonment for any term of years or for life, or for maximum twenty years according to the cases,

The “Atomic Energy Act of 1954”[2], as amended, provides for penalties in the case of the violation of its provisions and of its implementing regulations. An offence is committed by anyone who:

- transfers or receives in interstate commerce, transfers, delivers, acquires, owns, possesses, receives possession of or titles to, or imports into or exports from the United States any special nuclear material without authorisation;
- transfers or receives in interstate or foreign commerce, manufactures, produces, transfers, acquires, possesses, imports, or exports any atomic weapon;
- transfers or receives in interstate commerce, manufactures, produces, transfers, acquires, possesses, uses, imports or exports any utilisation or production facility without licence.

These offences are punished by a fine not exceeding $10 000 or by imprisonment for maximum ten years, or both.

Anyone who violates any regulation governing the possession and use of special nuclear material, source material, and by-product material, the design, location and operation of facilities, in particular regulations on nuclear safety and radiation protection is subject to a fine not exceeding $5 000 or to imprisonment for maximum two years, or both.

Pursuant to the “1974 Transportation Safety Act”, anyone who knowingly doesn’t comply with safety aspects governing transport and shipment of hazardous materials is subject to a civil penalty not exceeding $10 000 for each violation.

[2] The Atomic Energy Act is included in Title 42 of the US Code.

ANNEX 8 DETECTION OF RADIOACTIVE MATERIAL AT BORDERS

1. Introduction

In spite of the fact that the area of detection of ionising radiation is a since long established field of research, and that a large number of techniques have been developed for a number of applications, no single technique or standard has been adopted internationally in the area of border control of radioactive material. One reason is that this problem has been recognised internationally only for a few years.

Today there are however a number of ongoing international efforts in this area. As an example, one of the goals for IAEA: s program for combating Illicit Trafficking that started in 1995, is to produce a technical manual on the topic of detection of radioactive materials at borders. In a pilot study called ITRAP, performed by the Austrian Research Centre in co-operation with IAEA, a large number of detector systems are being tested, and one of the goals of the study is to develop specifications for systems to be used in counteracting Illicit Trafficking. Furthermore, the problem of detection is recognised as a part of a model action plan for forensic analysis that is being prepared by the Nuclear Smuggling International Technical Working Group (ITWG).

The concept of *detection* of a smuggling attempt of radioactive material includes more than only the registration of a signal above the background level in a radiation detector. Different experts have defined it in different ways. One definition mentions three phases in the process: 1) measurement, 2) evaluation of the result (whether it is a false alarm or not), and 3) identification of the radioactive material.

In a broader context there are several more tasks that should be performed in the case of a smuggling attempt of a piece of nuclear material. A complete forensic analysis, as presented by the ITWG, consists of detection (including the investigation if it is a false alarm or not*), hazard evaluation*, preservation *of evidence*, *categorisation*, and *identification* of the material. All tasks but the last one could or should be performed at the border itself. Identification of the material (deduction of intended use, origin, smuggling route and last legal owner) involves more complicated analysis techniques, and can only be performed in specialised laboratories. This paper is constrained to a brief description of the different detection techniques that are, or could be, used at a border crossing.

2. Ionising radiation relevant for detectors at border crossings

Nuclear and other radioactive material emits ionising radiation of several types: alpha and beta particles as well as heavier charged particles, neutrons and gamma rays. Only neutrons and gamma rays have a range long enough to allow detection by the relatively simple and robust techniques that can be used

at border control. Radioactive sources, like Co-60 or Cs-137, that have been found at many occasions at border crossings has high specific gamma activity, and can be found relatively much more easy than samples of uranium and plutonium, which has much longer half-lives, and decays more by emission of alpha-particles than gamma rays. One way to discover nuclear material through passive detection could be by detection of the neutrons that are emitted by spontaneous fission by these heavy elements. This is especially true for plutonium, which emits many orders of magnitudes more neutrons than does uranium per unit weight. Weapons grade uranium (WgU) consisting of 1% U-234, 93.3% U-235 and 5.5% U-238 will emit 1.11 neutrons/kilogram and second, while weapons grade plutonium (WgPu), assumed to consist of 0.005% Pu-238, 93.3% Pu-239, 6.0% Pu-240, 0.44% Pu-241 and 0.015% Pu-242), will emit 55 000 neutrons/s/kg. It follows that it is difficult to detect weapons grade uranium by passive methods. The material has low specific activity for both neutrons and gamma rays, and can easily be shielded by someone with basic knowledge in radiation and nuclear physics. Plutonium, however, could in some cases be detected, but it should be noted that to shield off the neutrons from a plutonium sample is only a slightly more complicated problem compared to shielding a uranium sample.

Another way to disclose WgU and WgPu would be to use so called active detection techniques that are discussed below.

3. Detectors

The task of detecting nuclear radiation at border controls is very different from monitoring radioactivity at sites where such radiation is occurring on a regular basis, such as nuclear power plants and scientific institutions. At a border control, thousands of measurements are to be performed each day, and the detection time is very short (on the order of one second). Furthermore, it is very important to have as few false alarms as possible.

Depending on mobility and type of detection, one can distinguish between several groups of detectors that are or could be used for border monitoring of nuclear and other radioactive material. One way to categorise the subject is described as follows:

3.1 Mobile detector systems

For cost and simplicity reasons this is the largest and most common group of detectors at border controls. In this category one can find small gamma-ray detectors for personal use, as well as slightly larger hand-held dosimeters. There exist a large number of hand held dosimeters on the market that can be used in a border control. An example of a smaller (not hand held) detector is the so-called ”Radiation Pager”, that is being used by the customs in USA. This detector has the size of a packet of cigarettes and shows the dose rate as an integer number between 1 and 9, where 1 corresponds to 70 nanoSv /h, 3 to 600 nanoSv /H and 9 indicates a dose rate above 38000 nanoSv /h.

3.2 Fixed systems

A number of so called portal monitors, which detect gamma and/or neutron radiation from large objects like people, cars and trains, exist on the market. Such systems are commonly used at for instance steel plants, scrap yards and nuclear power plants. The systems are based on plastic scintillator detectors that can be made to cover large areas and volumes. Sometimes He-3 tubes are used for neutron detection.

The following parameters will determine the sensitivity of a portal monitor:

1) The number of false alarms that can be accepted
2) The intensity of the radiation
3) The background
4) The geometry of the detector
5) The measurement time
6) The shielding from the vehicle or the body.

Due to the large number of vehicles and people passing through a border control, the time available for measurements is in this case much shorter than for any of the other applications mentioned above (on the order of one second). In the framework of the work performed in connection to the technical detection manual mentioned in the introduction, the following minimum requirements for fixed installed systems detecting vehicles (except trains) at border crossings have been suggested:

Alarm Level for gamma radiation:

Increase of the dose rate at the reference point of the detector from a background level of 0.2 µSv/h by a dose rate of 0.1 µSv/h in a time interval of 1 second. This requirement has to be fulfilled over a continuous energy range for incident gamma rays from 60 keV to 1.5 MeV (tested with ^{241}Am, ^{137}Cs and ^{60}Co. Reference point: Most sensitive location at the detector system.).

Alarm level for neutron radiation:

A neutron flux density emitted from 300 g weapons Plutonium (6% ^{240}Pu + 94% ^{239}Pu ~20,000 n/s) for a duration of 5 seconds at 2 m distance from the reference point of the detector, gamma radiation shielded to less than 0.1% (will be tested, maybe 1%), should trigger alarm. (Tested with a gamma shielded 0.01 µg Cf-252 source).

Search region:

Geometrical region in which the minimum of requirements for alarm level are fulfilled:

- Pedestrian monitor: vertical: 0 to 180 cm; horizontal: up to 1.5 m.
- Vehicle: vertical: 0 to 3 m; horizontal: up to 4m.

Detection probability:

Probability to detect radioactive material causing the dose rate specified under alarm level: 99.9% i.e. 1 failure in 1000. (Test: Not more than 10 failures in at least 10,000 tests).

False alarm rate:
Rate of alarms, which are not caused by a radioactive source:
One false alarm in 10,000

Instrument Availability:
99% i.e. less than 4 days out of operation per year.

Background level:
All tests are performed at a Background level of at least 0.2 µSv/h.

3.3 Portable isotope identification

The previously mentioned detector systems all perform a quantitative measurement of neutrons or gamma rays. In order to identify the nuclide or nuclides that is the source of the radiation an energy spectrum of the gamma radiation has to be recorded. To use neutron energies to distinguish different isotopes could, at least in some cases, in principle be possible, but in practice it is very difficult.

A few commercial hand held systems for nuclide identification has been developed in Germany, Russia and United States. The systems are all based on a NaI crystal for gamma detection, which means that they are robust and easy to use, but that the energy resolution is limited. To be able to perform accurate nuclide identification these detectors needs software that analyses the spectrum and compares the intensity ratio in different energy regions. One system (the ”Ranger”, developed at Los Alamos National Laboratory) also contains a small He-3 tube that detects neutrons. In a future version this detector will use the information given by the detected neutrons in combination with the gamma ray spectrum for nuclide identification.

The best detector for this purpose would be a so-called HPGe detector, which has an order of magnitude better energy resolution as compared to a NaI crystal. Such detectors require advanced cooling systems, and are still too expensive to be used for routine measurements at border controls. There exist, however, battery driven prototypes that could be an interesting alternative when serial production is started.

3.4 Systems using active techniques

This group is the least developed and most complicated category of detector system. But it is the only kind of detectors that in a more certain way could reveal attempts to smuggle for instance shielded uranium. The object under investigation is radiated with neutrons from a neutron source or a neutron generator. The neutrons, which have energies in the range 7 to 14 MeV will penetrate fairly large and dense objects, and give rise to gamma rays and neutrons emitted from nuclear reactions in the material that constitutes the object under study. Some of these reactions will result in gamma radiation with specific energies, characteristic of the elemental composition of the object. Such systems are expensive and complicated to use, but one could think of having a mobile system that could be used in special situations.

4. Summary

The area of detection of radioactive material at border crossings is still under development. Several national programs have been initiated in order to increase the detection capability at border crossings, and the international experience in the field is steadily increasing. It can be expected that an international standard in the area will be established within the next few years. The most difficult detection problem that remains to be resolved is how to detect shielded uranium.

ANNEX 9 QUOTATIONS FROM A PAPER BY DR. BOWEN

In a paper posted to Jane's Intelligence Review on 28 October 1999, Dr. Wyn Bowen of War Studies at King's College, London, gives an excellent review of the issue of open sources and national security, in particular concerning the use of open sources for monitoring proliferation threats. The following are quotations from that paper:

General

Several events in the past 18 months have drawn attention to the potential contribution of open-source collection and analysis in the field of national security. In May China's State Council sought to discredit accusations of Chinese nuclear espionage at US government facilities by claiming the information Beijing is accused of stealing has long been available in open sources. Twelve months earlier, it was reported that an anti-Indian newsletter had drawn attention to preparatory activity at the Pokharan test site prior to the Indian nuclear tests of May 1998. More recently, the NATO bombing of the Chinese Embassy in Belgrade raised the question of whether its location could have been determined through open sources.

Type of Open Source Information (OSINF)

OSINF can be defined as publicly available information that comes in print, electronic or oral format. It can be distributed to the mass public (through the media) or to a much narrower customer base (networking with personal contacts). OSINF is not subject to proprietary constraints (other than copyright), it does not contain classified data and it is not acquired clandestinely. In contrast, clandestine collection involves the acquisition of information that is not publicly available. Classified collection techniques can involve both human resources (espionage) and technical approaches such as satellite surveillance, the former being subject to great secrecy and sensitivity.

OSINF can generally be broken down into three types: primary, secondary and technical. Utilisation of primary sources involves direct contact with individuals. Examples include government officials, librarians, consultants and investigative journalists with relevant expertise.

Secondary sources consist of published literature in electronic or hard-copy format, including newspapers, magazines, transcripts of radio and TV broadcasts, academic journals and government documents. Many secondary sources are available online and can be obtained through databases, specialist web-sites and by utilising Internet search engines. Although secondary sources are easier and less expensive to obtain than primary sources because they consist of published literature, the publication process inevitably means they will be dated. Secondary sources also include 'grey literature'. This term refers to material not readily available through normal publication channels, which as a result is more difficult to identify and acquire than more typical secondary sources. Examples include in-house newsletters, conference proceedings and

scientific/technical literature. Finally, OSINF can be obtained from technical sources such as commercially available satellite imagery.

Monitoring Proliferation

From this brief assessment it appears that open-source collection and analysis is well suited to the diverse array of issues that Western intelligence organisations target in the field of national security. These issues include weapon proliferation, terrorism, transnational organised crime, drug trafficking, crisis forecasting and response, and preparation for interventions in regions neglected by classified collection capabilities. Beyond these issue-specific applications, open sources are particularly useful in constructing country studies.

Relevant periodicals range from weekly and monthly publications with a focus on defence-related news, such as Jane's Defence Weekly and Jane's International Defense Review, to policy-relevant journals such as The Non-proliferation Review (NPR). The peer-reviewed NPR is published three times a year by the Center for Non-proliferation Studies in Monterey, California. Among other things, recent editions have included open-source assessments of Iranian threat perception and arms control policies, chemical weapons in Sudan and biological weapons in the former Soviet Union. Each issue also contains global coverage of international nuclear and missile proliferation developments.

Other relevant periodicals are published less regularly. The Carnegie Endowment for International Peace (CEIP) periodically publishes Tracking Nuclear Proliferation: A Guide in Maps and Charts. This volume provides a valuable open-source assessment of nuclear proliferation hotspots around the world. The International Institute for Strategic Studies (IISS) publishes The Military Balance, an annual publication assessing the military capabilities and defence economics of nearly 170 countries. It also provides analysis on issues such as the international arms trade. Moreover, the Stockholm International Peace Research Institute (SIPRI) publishes the annual SIPRI Yearbook on Armaments, Disarmament and International Security. Relevant topics covered in the 1999 edition include the Indian and Pakistani nuclear tests, chemical and biological weapon development, and major conventional weapon transfers.

The Internet is home to numerous specialist websites. There are numerous examples and the sources included in the table on this page are provided just to give an idea of what is available. The Federation of American Scientists is an excellent mine of open sources on proliferation-related issues, ranging from nuclear weapons to biological hazards. The Centre for Defence and International Security Studies (CDISS) at Lancaster University hosts an abundance of open-source material and analysis on missile proliferation issues. Moreover, the web pages of the Non-Proliferation Programme at the CEIP contain a great deal of open- source analysis on all aspects of proliferation. These, and other specialist sites, often provide links to similar locations on the web as well as news stories of proliferation relevance. Secondary sources can also be accessed on the Internet through List-Servers and by using search engines such as Yahoo and Excite

.
Many online databases can be accessed through subscription via the Web. Most cover multiple topics and not simply proliferation-related issues. For example World News Connection (WNC) is an online service offering a wide variety of translated and English-language news and information. WNC contains thousands of non-US media and other open sources on political, scientific, technical and other issues from numerous countries.

Technical open sources with potential relevance to monitoring proliferation threats could include commercially available satellite imagery. For example, the SPOT Image Corporation has extensive archives of civilian satellite imagery that could possibly be used to monitor the proliferation of nuclear, biological and chemical (NBC) weapons and their means of delivery. However, any analysis of such imagery will require prior knowledge of a target state's NBC and missile programmes, its military-industrial-complex and the location of any deployed weapon systems.

Conclusion

An abundance of open sources is available, which can provide important insight in the field of national security. Open sources will rarely provide the complete answer and are best suited to providing context for classified information. It is imperative in any collection effort that open sources are critically assessed for inaccuracy, bias, irrelevance and disinformation. If this is done on an ongoing and systematic basis, good sources will be quickly identified and exploited and poor sources eliminated.

The expansion of the Internet as a veritable mine of open-source material has significantly exacerbated the problem of information overload. It is worth re-emphasising that although much invaluable material is available on the Internet, there is also an abundance of worthless and regurgitated data. Overload threatens to swamp the end-user with worthless and repetitive information, wastes valuable time and raises costs. This highlights the importance of incorporating subject experts into any systematic open-source collection process.

ANNEX 10 QUOTATION FROM AN ICAO RESOLUTION

The following quotations from the International Civil Aviation Organisation (ICAO) Assembly Resolution A32-11 from September-October 1998 are of particular interest:

> *Recalling* the objectives of the ICAO safety oversight programme, which seeks to ensure that Contracting States are adequately discharging their responsibility for safety oversight over aircraft operations, the licensing and training of personnel, and aircraft airworthiness;
>
> *Recalling* that ultimate responsibility for safety oversight rests with Contracting States, who shall continuously review their respective safety oversight capabilities;
>
> *Considering* the recommendations of the Directors General of Civil Aviation Conference on a Global Strategy for Safety Oversight, relating to the enhancement of the ICAO safety oversight programme, and which called for a universal safety oversight audit programme comprising regular, mandatory, systematic and harmonised safety audits to be carried out by ICAO, and for greater transparency in the release of audit results;
>
> *Recognising* the Assembly's decision on the disposition of cash surpluses contained in Assembly Resolution A32-24; and
>
> *Considering* that, as recommended by the DGCA Conference, the Council of ICAO endorsed the establishment of such a universal safety oversight audit programme;
>
> The Assembly:
>
> 1. *Resolves* that a universal safety oversight audit programme be established, comprising regular, mandatory, systematic and harmonised safety audits, to be carried out by ICAO; that such universal safety oversight audit programme shall apply to all Contracting States; and that greater transparency and increased disclosure be implemented in the release of audit results;
>
> 2. *Directs* the Council to bring into effect, from 1 January 1999, a universal safety oversight audit programme accordingly, including a systematic reporting and monitoring mechanism on the implementation of safety-related Standards and Recommended Practices;
>
> 3. *Urges* all Contracting States to agree to audits to be carried out upon ICAO's initiative, but always with the consent of the State to be audited, by signing a bilateral Memorandum of Understanding with

the Organisation, as the principle of sovereignty should be fully respected;

4. *Urges* all Contracting States to ensure that the results of the audits be used for safety-related purposes only.