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Title: NUCLEAR AND RADIATION SAFETY MANAGEMENT AND ITS RELATIONS WITH METAL SCRAP MONITORING IN GEORGIA

Region specifications:
The South Caucasus region has one of the most complicated transit routes which allows for trafficking between Europe and Asia. As border control installations and infrastructure are, to date, insufficient, illicit trafficking and smuggling of nuclear and radiation materials as well as accidental presence continue to be a considerable problem. The intelligence service, regulatory authority, customs and border guards are working together in their fight against the threat of smuggling and potential use of nuclear and radiation hazardous materials for criminal purposes.

Nuclear and radiation installations – benefits and threats:
As Georgia is currently in a phase of growth, there is a substantial increase in technologies involving radioactive sources and materials. Georgia's transit role in the South Caucasus also creates a need to increase capabilities of different institutions involved in fighting against illicit trafficking of nuclear and radioactive materials – police, border guard, customs, intelligence etc. The adoption of international standards and rules must be enforced at a national level but also, good trans-boundary agreements are essential.

National and international legislations on Nuclear and Radiation Safety:
The Georgian law on Nuclear and Radiation Safety was enacted on 30 October 1998. By law, the Nuclear and Radiation Safety Service of the Ministry of Environmental Protection and Natural Resources of Georgia is designated as the nuclear and radiation regulatory authority.

The Radiation Safety Norms (RSN) is a standardizing legislation document based on BSS of the IAEA which was adopted and approved by government in 2000.

The implementation process of the National Plan on Nuclear and Radiation Emergency Preparedness and Response was initiated in 2003. The adoption of the plan was set to aid authorities and decision-makers in defining their obligations and functions until the end of 2006.

Georgia has been a member State of the International Atomic Energy Agency since 1996. The process of becoming of a member of IAEA Conventions has already started. Georgia collaborates with the IAEA in the frameworks of Conventions on Non-proliferation of Nuclear Weapon, Early notification and Assistance, Safeguards and Additional Protocols.

Main components of country Nuclear and Radiation Safety:

All existing regulations are in accordance to international law, requirements, recommendations and Basic Safety Standards of IAEA. The problem related to storage of radioactive material was solved in August 2005 when such storage was enforced. The key role in implementing construction work was fulfilled by the DOE of USA. All construction was under the control of specialists of DOE, NRC and IAEA. Besides, establishment of cadastre and categorization of radioactive materials and installations, supported by NRC and Sandia laboratories, is underway and will be finished next year.

Stationary radiation monitoring equipment was installed in some customs' check points and marine ports under the cooperation projects supported by IAEA and DOE of USA. Radiation monitoring is currently not available in airports.

The licensing and inspection of radiation installations on a regular basis is the responsibility of the Regulatory Authority. Besides, concerning legal activities fulfilled by national as well as foreign organizations, once every three months an expert committee on import-export and production of hazardous materials and military ammunition of the National Security Council discuss licensing regime implementation for such activities and conclusions are sent to ministers and the President's administration.

The adoption of a National Plan on Emergency Preparedness and Response is in its final stage. As Radiation Emergency Preparedness and Response Plan is a part of this general plan, it will be adopted after. In the above-mentioned documents, all roles and responsibilities are described for organizations involved in emergency preparedness.

Considerable Gap – Scrap Metal Monitoring

Lack of regulations:

Law on **"Transportation, import, export and re-export of recycling materials"** endorsed in 1998. According to law, transportation, import, export and re-export of metal scrap containing radioactive and chemical hazardous materials are prohibited. State Border Guard of the Ministry of Interior and Customs' Department of the Ministry of Finances are designated as executors of this law.

GAP 1: Internal movement and recycling – Till the year 2004 recycling of metal scrap needed licensing. Licenses were issued by the Ministry of Finance based on permissions issued by the Trade-Industry Chamber of Georgia. This licensing procedure was abolished at the end of 2004.

The document covering protection against radioactive contamination of metal scrap is the signed contract settled between the supplier of scrap and the buyer.

Result: Metal Scrap Collectors/ Suppliers work without relevant licenses;

GAP 2: There is no license – there are no procedures, instructions, guidance on monitoring and detecting of radioactivity in scrap as well as decision-making in prohibition/permission;

GAP 3: NO monitoring equipment available in place (recycling facility, supplier enterprise);

GAP 4: NO surveillance procedures exist due to termination of licensing.

RESULTS –RADIATION INCIDENTS:

During the past 15 years the main threat from uncontrolled radioactive sources has risen.

1989 – Cs 137 – Tbilisi, Co 60 – Kutaisi (no information about victims);

1992 – Ra 226 - Akhali Afoni (2 overexposed, one is dead);
1993 – Cs 137 - Zestafoni (no information about victims);
1996 – Co 60 - Kutaisi (2 overexposed, both are dead);
1997 - Cs 137, Co 60, Ra 226 – Lilo (11 overexposed);
1998 – Cs 137 – village Matkhoji, Sr 90 – villages Khaishi and Laburtskhila (several overexposed among local population);
End of 2001 – Early 2002 – Sr 90 – village Lia (3 overexposed – 2 dead).

Last events:
February 2004.
A Cs137 source was discovered in a vehicle transporting scrap metal from Georgia to Turkey Turkish customs' officers discovered high levels of radiation from the vehicle and sent it back to Georgia. However, rather than inform Georgian customs the information was sent to the IAEA ITDB and subsequently reached Georgia via IAEA's channels. As information initially was incomplete, during approximately 24 hours all relevant agencies in Georgia worked in alarm mode as there was no information about the vehicle identities, type, ownership, route etc.

December 2004
A Cs 137 source with container (dose rate on the surface of container about 60μsv/h) was discovered in metal scrap at the border check point in Sarp – Georgia-Turkish border crossing.

Conclusions:
1. Quality control of the metal scrap monitoring on contamination/presence with radiation and nuclear materials is primarily based on proper national legislations;
2. It is essential to harmonize National procedures and guidelines with foreign (especially neighbouring countries) on assessment, discovery and evaluation of radioactivity in metal scrap as well as following procedures due to obligations on decontamination, disposition, transportation etc.
3. Training and equipping personnel on different levels is the next priority;
4. Equipment used in Georgia as well as in different countries should follow similar standards in order to increase inter-operability;
5. The National Radiation Incident Notification and Response Centers should be bound with strict international obligations on notification of each event to relevant centers (the notification scheme should be implemented and adopted at an international level) as well as to neighbouring countries, however involved in the incident.

What Georgia needs?
1. Improvement and enhancement of legal basis – licensing is the weakest point;
2. Training and equipping on different levels – some stationary monitors are established at border crossings and customs check points but nothing exists at recycling and scrap collecting facilities – this is the weakest point;
3. Establishment and adoption of instructions, procedures and guidelines harmonized with international ones;
4. Enhancement of notification and response infrastructure.

Annex - Radiation Monitoring Operations Fulfilled in Georgia up to now

At the end of the "Cold War" the crisis started in the military production sector of the former USSR. Former partners dissolved contracts. The Russian Army became the owner of former Soviet military bases on the territories of former Soviet Republics.

In Georgia, in addition to severe inflation, economic and energy shortages, the country faced the utilization of outdated military ammunition and equipment left after the soviet army withdrawal, cleanup of territories of Soviet Army bases, which included discovering, collecting and recovering orphan sources etc. Also, hazardous materials such as chemicals, biological agents and radioactive waste produced during normal cycling of industrial and medical facilities raised additional problems. That is why radiological incidents mainly connected to orphan sources of ionizing radiation took place during the years 1996-2002.

The first radiological incident declared took place in the year 1996 in Kutaisi, western Georgia, in the railway station. Several individuals opened the container of Co-60 source and, receiving extremely high doses, died shortly after the incident. In the year 1999 military servants received different doses of ionizing radiation from the Cs-137 calibration sources in the football field of Lilo military base, near Tbilisi. The most "famous" incidents were connected to sources of Sr-90 with activity of 35 000 Ci each installed in the so-called Radioisotope Thermo Electro Generators (RITEG-s). The sources were discovered in the mountainous part of western Georgia, Svaneti. During the years 2000-2002 six such sources were found and recovered. Several individuals were overexposed, two of them died. Besides the incidents mentioned above, many more but less important radiological incidents took place in Georgia. To date over 250 orphan sources with activity more than 1 Ci have been discovered and recovered by the Nuclear and Radiation Safety Service of the Ministry of Environment Protection and Natural Resources of Georgia.

During the years 2002-2003 operations to search for orphan source were undertaken in the regions of Georgia with complicated landscape – Svaneti, Samtskhe-Javakheti, Ajara and Kakheti. The operations were supported by the IAEA, and the governments of USA, France, India, Turkey and Georgia. Operations were separated based on priorities and probabilities of high activity source discovery. Svaneti was considered as an initial region for such operation as RITEGs were discovered there. From the Georgian side, the technical implementation of the operation was fulfilled by the Nuclear and Radiation Safety Service of the Ministry of Environment Protection and Natural Resources, Department for Emergency Situations and Civil Defence of the Ministry of Internal Affairs, Counter-Terrorist Centre of the Ministry of State Security, Institute of Physics of the Academy of Sciences.

The search was divided in two parts: one part carried out the operation on foot, exploring step-by step the complicated landscape and using up-to-date handheld radiation monitoring equipment. Another part worked with jeep type vehicles equipped with highly sensitive monitors, ARCS based (USA) and AGSS based (India), capable to discover radioactivity from a distance of up to 80 meters from the road. The pedestrian group was composed mainly of specially trained personnel of the Department for Emergency Situations and Civil Defence of the Ministry of Internal Affairs and worked in the regions that were impossible to explore by cars.

Georgian specialists prepared physical maps (approved by the IAEA) in advance for identification of prearranged routes of operation according to priorities. The specialists were equipped with the following radiation monitoring devices: DG-5 (France, IAEA) – 16 pieces; Ludlum-9 (USA) – 5 pieces; Ludlum-19 (USA) – 4 pieces; Portable detectors (Turkey) – 20 pieces; several GPSs, 10 Radio transceivers for groups as well as command post, up to 100 TLDs.

The initial training of groups was carried out by specialists from Germany, USA, France, India and Turkey. Each participant completed a whole programme on discovery of hidden orphan sources.
The first phase of the search operation was conducted in June 10-24 in the highest priority region. Svaneti. In this phase, 47 Georgian specialists participated in cooperation with 6 experts from the IAEA. ARCS base and AGSS based groups drove all accessible routes. The pedestrian groups explored mainly forests, mountains and gorges. The territory of Khaishi, Idliani, Lakhani, Ifari, Lakhamura was observed – a total of up to 540 square kilometres.

Basically no abnormalities of radioactivity above background levels were found during this phase. Natural radioactive background levels varied between 15-25 MicroR/h, which is normal for this region. In just one place, near the village of Ifari, a rise above background level was observed, where K-40 and Bi-214 as products of U-238 fusion were found in the soil.

The second phase was carried out during August 10-24, 2004. 42 Georgian specialists participated. During the operation the towns and villages of Akhaltsikhe, Akhalkalaki, Borjomi, Akhaldaba, Bakuriani, Tsagveri, Tsemi, Vale, Abastumani, Aspindza Vardzia and other (in total more than 40) were observed. According to the inspection, the natural background levels varied between 10-20 mcR/h which is normal. No abnormal rise of background was found.

On route to Tbilisi the expedition inspected the Kareli region as well as the greater part of the city of Tbilisi. The total area inspected was about 1500 square kilometers. No abnormalities of radiation above background was found.

During the second phase in the military base of Akhaltsikhe 57 radio bulbs and night vision goggles containing Ra-226 with total dose rate about 0.1 R/h were found. In this military base 17 packages of warning installations NP46 containing Ra-226 with dose rate on the surface of about 0.12 mcR/h each were found. Besides, 3 empty boxes contaminated with Ra-226 and tables for cleaning weapons covered with paint containing K-40 were found. The dose rate on the surface of each table was about 95 mcR/h. Also two metal objects that were impossible to identify were found containing Sr-90 with dose rate about 2mR/h each.

In the military stockpile of Akhaltsikhe radiation monitoring equipment DP-63-A type (11 pieces) containing Ra-226 with dose rate more than 0.1 mR/h were found.

One should note that on the territory a lot of houses and other constructions were inspected and it was found that the walls contained K-40 with average dose rate 30-40 mcR/h.

The next (third) phase of search operations was carried out on the territory of Ajara during September 29-November 9, 2002. In this phase 20 specialists from the Nuclear and Radiation Safety Service of the Ministry of Environment Protection and Natural Resources of Georgia and Regional Service for Emergency Situations and Civil Protection participated. Inspection was done in the main towns of Batumi and Kobuleti, and also in the villages of Khulo, Shuakhevi, Kedi, Khelvachauri. The natural background levels varied between 10-20 mcR/h. In high mountainous areas the background reached 30 mcR/h. The Gamma emitter devices safety conditions were inspected on Propane pumping stations in Batumi. In several parts of the territory of Ajara contamination spots were found, caused by the impact of the Chernobyl accident. Above such spots the dose rate reached 60-90 mcR/h.

The fourth phase of search operations was conducted in Kakheti (eastern Georgia) during October 2002. 20 specialists from the Nuclear and Radiation Safety Service of the Ministry of Environment Protection and Natural Resources of Georgia, Regional Service for Emergency Situations and Civil Protection and Counter-terrorist Center of the Ministry of State Security participated. The towns of Telavi, Gurjaani, Signagi, Kvareli, Lagodekhi, Dedoplistskaro and more than 40 villages were inspected.

On the territory of the military base in Telavi, boxes contaminated with Ra-226 were found. The dose rate on the surface was about 60 mcR/h each. In this base, a contamination spot 1 square metre was found on the floor of the stockpile with a dose rate of 40 mcR/h. On the territory of the helicopter base in Telavi, devices taken down and collected from dismantled helicopters were stored in detached building with a total dose rate 2 mR/h (average dose rate for each one was about 0.2 mR/h). On the territory of the Air force base in Dedoplistskaro the standard calibrating sources containing Cs-137 were stored in a guarded building due to safety measures.

The next (fifth) phase was conducted in the region of Shida Kartli during the 3rd quarter of 2003. Unfortunately all the equipment supplied by the IAEA was moved back at that time and inspection was carried out using the equipment of the Nuclear and Radiation Safety Service of the Ministry of Environment Protection and Natural Resources of Georgia including the mobile radio spectroscopy laboratory granted by the German Government. 16 specialists participated in the phase. The average background levels varied between 10-20 mcR/h. In the village of Osiauri, in Khashuri district, a standard calibrating container with two Cs-137 sources (dose rate 17 and 30 R/h) was found on the territory of a military fuel stockpile base. The container was transferred to the office of the Military Prosecutor for further investigation. In the town of Gori three containers with three Cs-137 sources operated as a part of level-measuring devices were discovered on the territory of a propane pumping station. According to the technical specifications, the dose rate at the beginning of the operation was 200R/h each. As removal of sources was considered impossible, a deep cave was dug, the containers were buried and covered with a thick layer of concrete. The dose rate on the concrete surface was 20 mcR/h. The place was marked and local staff instructed accordingly.

In the town of Rustavi on the territory of a Chemical Fibre facility, 28 pieces of such containers with Cs-137 sources were located. Unlike the case mentioned above, the owner of the facility disposed all sources together in a detached building and on a guarded part of the facility. At the entrance of the building the dose rate was about 12 mcR/h. Two pieces of the same containers with Cs-137 sources were found on the territory of an abandoned propane pumping station in Iagluja, district Marneuli. After negotiation with local government, the sources were moved to guarded territory. In the hangar of Marneuli Air Force base devices were found containing Ra-226 with dose rate on the surface of 120 mcR/h. Staff was instructed on handling and storage of devices.

At present the last phase of orphan source search operation is underway in the Pankisi gorge. Since the gorge is partially populated by Chechen refugees, the inspection was fulfilled during a limited timeframe and on a strictly defined area. The territories of the villages of Pankisi, Duisi, Akhmeta and nearby area of Georgia-Chechnia border were observed and inspected. Due to information disseminated by the Russian Security Services in connection with the presence of Chechen rebels and terrorist bases in the Pankisi gorge, the places inhabited by Chechen refugees were inspected especially. The average background level varied around 15-25 mcR/h.

Thus, during all phases of the orphan source search operation nearly all the territory of Georgia was observed and inspected. The part of the territory not covered during the operation – regions of Imereti, Guria and partially Samegrelo have been observed during previous Aero Gamma Monitoring in the year 2000.

For all territories observed, a map of radionuclide distribution was created.

Last operation is scheduled in July 2006.