NEWSLETTER
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The FNCA 2005 Workshop on Radioactive Waste Management September 27 - October 1, 2005, Kagamino-cho Okayama Japan

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The FNCA 2005 Workshop on Radioactive Waste Management (RWM) was held from September 27 to October 1, 2005 at Kagamino-cho, Okayama, Japan. This Workshop was hosted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, in cooperation with the Kagamino Town Office and Ningyo-Toge Environmental Engineering Center, Japan Atomic Energy Agency (JAEA).

Representatives involved in policy making, regulation, operations and R&D on radioactive waste management attended the Workshop from the nine FNCA countries, i.e., Australia, the People's Republic of China, Indonesia, Japan, the Republic of Korea, Malaysia, the Philippines, Thailand and Viet Nam.

The FNCA 2005 Workshop on RWM began with the opening address by Prof. Toshiso Kosako, FNCA RWM Project Leader of Japan, professor of the University of Tokyo, followed by the welcome address by Ms. Miwako Shimizu, Atomic Energy Division, Research and Development Bureau, MEXT, and also followed by the congratulatory address by Mr. Chikao Yamasaki, mayor of Kagamino-cho.

Following the Opening Session, in Session 1, country reports were presented on progress status of radioactive waste management activities in each FNCA country. On the first day of the Workshop, Poster Session/Mini-Exhibition was also held. In this Session, the projects and R&D regarding RWM were

presented by Japanese participants, and uranium glass products manufactured at Kagamino-cho were displayed by the Kagamino Town Office.

On the second day, in Session 2, sub-meeting (1) was held on "Safety Assessment of Disposal Facility for Low and Intermediate Level Waste (LILW)". The progress reports were presented by 4 countries, and the information exchange on the reports was made.

In Session 3, sub-meeting (2) was held on "Site Investigation and Siting Procedures of Disposal Facility for LILW". The progress reports were presented by 4 countries, and the information exchange on the reports was made.

In Session 4, a roundtable discussion (1) on "Revision on the Consolidated Report on RWM and IAEA Joint Convention" was held. It was recognized that it is useful for the FNCA countries to revise the Consolidated Report and it was agreed to revise the Consolidated Report.

Waste Rock Yard

Uranium Glass Centerpiece

On the third day, technical visit to Ningyo-Toge Environmental Engineering Center, JAEA (Open-Pit Mining Site, Waste Storage Facilities, etc.) was made and visit to a studio of uranium glass product operated by the Kagamino Town Office was also made.

On the fourth day, in Session 5, a roundtable discussion (2) on "Interim Reporting of Decommissioning/ Clearance Task Group Activity" was held to confirm the result of Discussion/Survey Meetings which were held in Indonesia and the Philippines in August 2005. The reports were presented by Indonesia and the Philippines.

In Session 6, a roundtable discussion (3) on "RWM Three-Year Work Plan for 2005-2007" and "a draft of the minutes of the Workshop" was held. Items agreed by the Workshop participants are as follows:

- The FNCA 2006 RWM Workshop will be held in China in October 2006.
- The Discussion/Survey Meetings on Decommissioning/ Clearance will be held in Australia and Malaysia in 2006.
- The sub-meeting themes at the next Workshop are agreed as "Conceptual Design of Near Surface Repository", "Waste Treatment and Conditioning for Disposal" and "Management of Medical Waste". Those themes would be finalized after consultation between the host country of the next Workshop and Japan.
- The Revised Consolidated Report (interim version) will be issued by the end of March 2007 and the final version will be published by the end of March 2008.

In advance of the Workshop, extra technical visits to Kyoto University Research Reactor Institute (Kyoto University Research Reactor (KUR)) and Japan Synchrotron Radiation Research Institute (Spring-8) were made on the way to Kagamino-cho where the Workshop was held.

Ningyo-Toge Environmental Engineering Center, JAEA

Memorial of the first discovery of the uranium ore deposits in Japan

Take-off of the new nuclear R&D organization JAEA

Tomio Kawata
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On October 1, 2005, the former Japan Atomic Energy Research Institute (JAERI) and Japan Nuclear Cycle Development Institute (JNC) were merged and the Japan Atomic Energy Agency (JAEA) was launched as a comprehensive and multidisciplinary research and development organization in the field of nuclear science and technology. The merger was intended to bring basic research and the R&D on specific projects closer together, and thus to contribute more efficiently to the long-term energy security and the settling of the global environmental issues through the peaceful use of atomic energy and the application of nuclear science.

The JAEA's mission covers a broad range of the R&D fields as illustrated in Figure 1. The head office is located in Tokai-mura with the branch head office at Tsuruga and the support office at Tokyo. There are ten R&D centers with various missions located throughout the country.

Among various program directorates founded in the JAEA, there are two directorates which directly deal with the matter related to waste management; Nuclear Cycle Backend Directorate (NCBD) and Geological Isolation Research and Development Directorate (GIRDD).

The mission of the NCBD is to coordinate and bring into forth a plan for rational decommissioning of retired R&D facilities and for safe treatment and disposal of low-level radioactive waste arising from various R&D sites, and to promote R&D to better achieve rational decommissioning and waste management. At present, several decommissioning projects are in progress or under preparation including those for Japan Reprocessing Test Facility (JRTF) at Tokai-mura and for the prototype advanced thermal reactor Fugen at Tsuruga. The NCBD is also playing an important role in assisting government's effort to establish new institutional frameworks for the disposal of such waste as TRU waste or to establish related safety standards.

The mission of the GIRDD is to develop technological basis and enhance reliability of safe geological disposal of high-level radioactive waste (HLW). Two unique research facilities ENTRY and QUALITY are in operation in Tokai. Various bench-scale experiments are in progress in ENTRY to develop and verify models for simulation and performance assessment whereas fundamental data on geochemical behavior of radionuclides under controlled atmosphere are being collected in QUALITY. Construction of two underground research laboratories is in progress, one in Mizunami in crystalline rock formation and the other at Horonobe in sedimentary rock formation. JAEA's R&D program on geological disposal is intended to provide data and information needed to support activities of the implementation body NUMO and preparations by the regulatory body for formulating safety guidelines and standards.

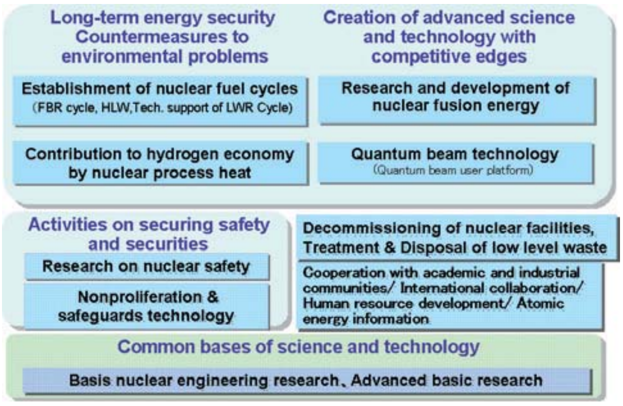


Figure 1 JAEA's Mission

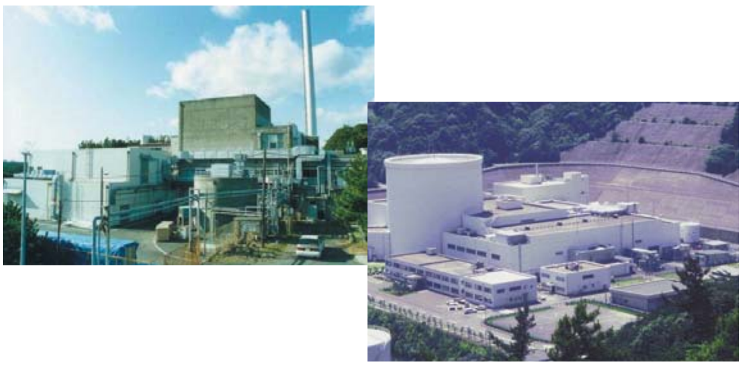


Figure 2 Two major decommissioning projects: JRTF and Fugen

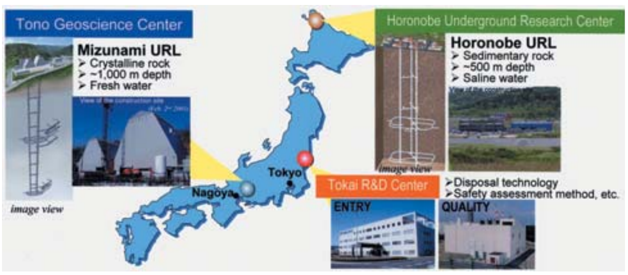
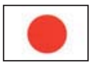


Figure 3 Three R&D Centers for HLW Geological Disposal Technology

The current status of low level radioactive waste management arising from RI facilities, institutes etc.



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In Japan, the radioactive waste arising from facilities using radioisotope including hospital (hereafter, RI waste), research reactor and from other facilities using nuclear sources/materials for research or industrial use, etc. (hereafter, Research Institute waste) is currently treated for storage and kept temporarily at the individual facility generating it, however is not disposed at present.

The Atomic Energy Commission (AEC) issued Basic Policy on Treatment and Disposal of Waste from RI and Research Institute, etc. (May 1998), through the discussion of its Special Committee on Nuclear Back-End Policy. It identifies the necessity of establishing laws and regulations on disposal, the waste-procedure's responsibilities and roles in treatment and disposal, nature of an implementing body and a schedule for implementation. According to this report, together with JAERI (Japan Atomic Energy Research Institute), JNC (Japan Nuclear Cycle Development Institute) and JRIA (Japan Radioisotope Association), which are major producers of RI and Research institutes, etc., established RANDEC (Radioactive Waste Management and Nuclear Facility Decommissioning Technology Center) in December 2000, to promote activity toward realization of an actual disposal business.

The Ministry of Education, Culture, Sports, Science and technology (MEXT) established a Special Committee on the Business of Disposal of Waste from RI and Research Institute, etc., (February 2002), and the special committee discussed promotion of the shallow land disposal business and issued its final report (March 2004). The report said that the establishment of the implementing body of the disposal business for RI and Research waste would be expected until October 2005. However, because of a delay of examination about establishment the implementing body by unification of JAERI and JNC, the MEXT has re-established a Special Committee on the Business of Disposal of Waste from RI and Research Institute, etc., (December, 2005). The special committee will discuss the establishment of the implementing body for RI and Research waste disposal business from the point of the view of fund security of the long term business which is estimated about 19,000 Million yen for 300 years, and local promotion by the disposal business.

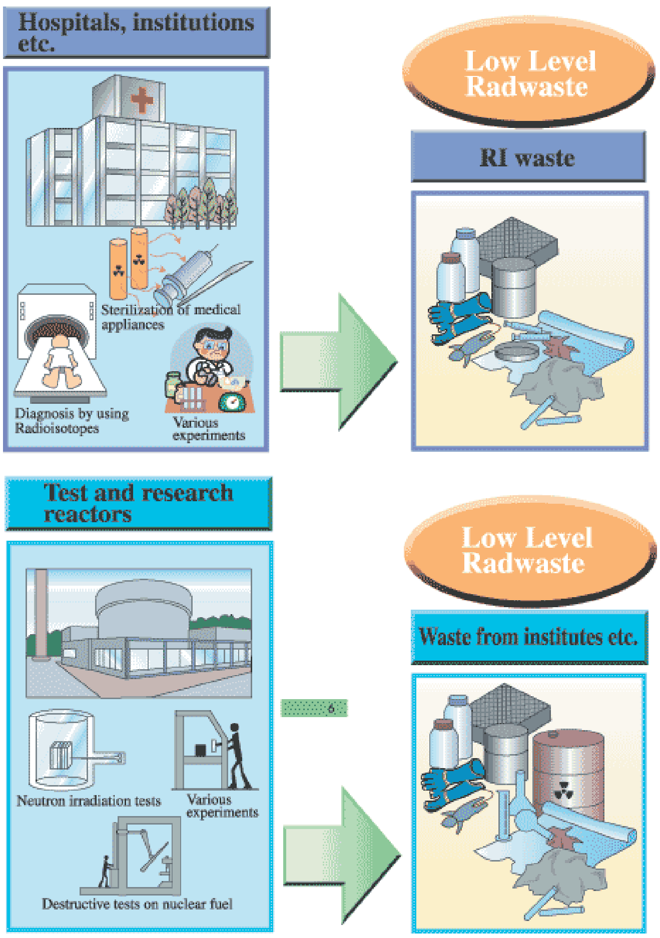

Figure RI and Research waste

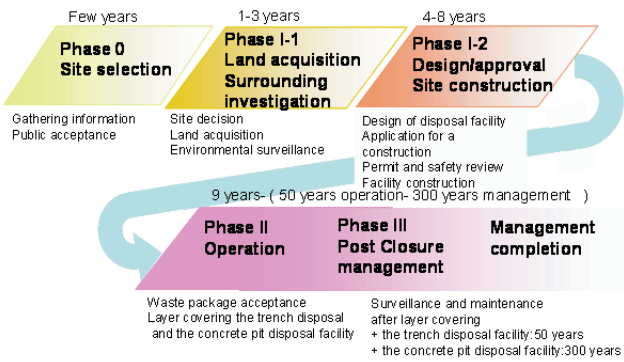

Figure Undertaken plan of the waste disposal

Decommissioning Plan for MINT's TRIGA MARK II Research Reactor

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Malaysia only operates one nuclear research reactor of the type TRIGA MARK II which reached its first criticality on 28 June 1982. The reactor is equipped with five major types of experimental facilities, consisting of the central thimble, a rotary specimen rack, two pneumatic transfer systems, four beam ports and a thermalizing column. Presently, most of the operating hours are spent on irradiation of samples for the neutron activation analysis purpose. Recently the reactor has completed its 23 years of operation and a study on decommissioning plan for the RTP (Reactor TRIGA PUSPATI) and relevant facilities are being carried out by the Institute although the reactor will continue to operate for several years more.

When the reactor was first commissioned in 1982, it was not subjected to licensing procedure. However, in line with the international practice, efforts to license the reactor are presently being carried out. Similarly, the applicability of regulations and licensing process to decommission government's research reactor are not clearly defined in the Atomic Energy Licensing Act 1984 regulated by the Atomic Energy Licensing Board, although under the licensing regulations, it states the requirement of a Class G license for decommissioning nuclear facility.

Basic strategies foreseeable for the reactor decommissioning project include; establishment of an efficient project management team, development of the technologies for application in the project, immediate dismantling after the decision for the decommissioning, decontaminate all the contaminated items, unrestricted use of the site after decommissioning, minimization of the radioactive waste with application of a zero release concept and prioritized safety in the dismantling activities.

Major activities anticipated for the decommissioning of the reactor include, license application, characterization survey, safety analysis report, time scheduling, quality assurance programme, radiation protection plan, safety & environmental impact assessment, plan for management of decommissioning waste and plan for final radiological survey. It is obvious that the most important factor prior to decommissioning lies on the government decision or policy on several critical aspects such as relating to the management of spent fuels. This in turn will be subjected to the commitment with the reactor supplier as well as commitment to being a party of the Joint Conventions.

Safety and environmental assessment is viewed as one of the most critical aspect in the decommissioning plan. The regulatory authority will define the safety criteria or performance objectives need to be achieved from carrying this activity. Likewise for the assessment, several scenarios which will give rise to additional radiation dose to the members of the public and workers need to be evaluated in details. In addition, potentially hazardous toxic and radioactive waste needs to be identified and characterized for the purpose of a thorough safety assessment during decommissioning (including accident analysis, where necessary). The assessment should be conducted to define protective measures, which takes into account the specifications of decommissioning.

It is anticipated that main activities to be carried out during decommissioning process are initial characterisation of the installation, fuel removal, decontamination, dismantling, transporting waste, storage, waste conditioning, disposal and final radiological survey. In initial characterization, radiation and contamination surveys will be conducted to determine the type of radionuclides, maximum and average dose rates and contaminated levels of the inner and outer surfaces of structures or components in the reactor installation. Major types of waste anticipated from this decommissioning project, apart from the fuel elements, are the concrete debris, which are used as biological shield, the piping components, the aluminum swimming pool vessel and the ion exchanger use for cleaning the deionised water (see cross sectional diagrams).

Under the existing purchase and supply agreement, spent fuels elements will be returned to the country of origin for processing. It is anticipated that a total of 129 units of spent fuel element, need to be sent back to the General Atomic of the United States.

Indeed there is a need to develop decontamination techniques for cleaning-up internal and external surfaces of components and systems, structural surfaces and tools used in the decommissioning activity. Dismantling of the facility may include the demolishing of the reactor building, depending on government decision whether to re utilise the building or not. Early estimate of the total waste volume from dismantling activity is approximately 300 M^3, (Table 1). Miscellaneous wastes include ion exchange resin used for cleaning reactor pool water and contaminated items during decontamination works.

Table 1. Estimated Volume of Waste Generated After D&D of TRIGA Reactor Project

	Type of Waste	Volume (M^3)
1.	Concrete	200
2.	Aluminum Tank	8
3.	Stainless steel & Aluminum Piping Heat Exchanger	5
4.	Graphite	3
5.	Lead	3
6.	Fuel Elements (Assuming each fuel element is converted into 0.5 M^3 of conditioned waste)	65
7.	Miscellaneous	10
8.	Tritiated Water	25
	Total estimated volume	319

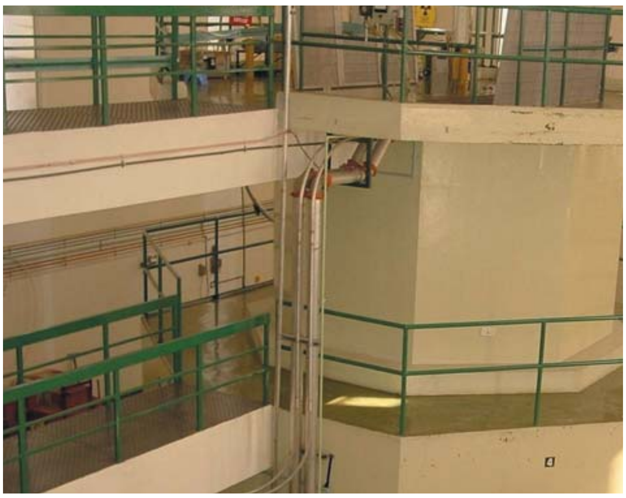

Figure 1 The TRIGA Mark II Research Reactor at MINT

In general, the waste generated from the decommissioning process will be categorized into three groups; firstly the non contaminated waste, which will be sent to municipal disposal site; secondly the solid radioactive waste, which will be packed in drums of 200 litres or other types of package according to the physical properties, and temporarily stored in the storage facility before sending to the repository and finally the radioactive liquid waste which will be treated prior to releasing to the environment.

A final radiological survey will be carried out at the end of the decommissioning project to demonstrate the residual activity complies with the criteria set by the regulatory authority.

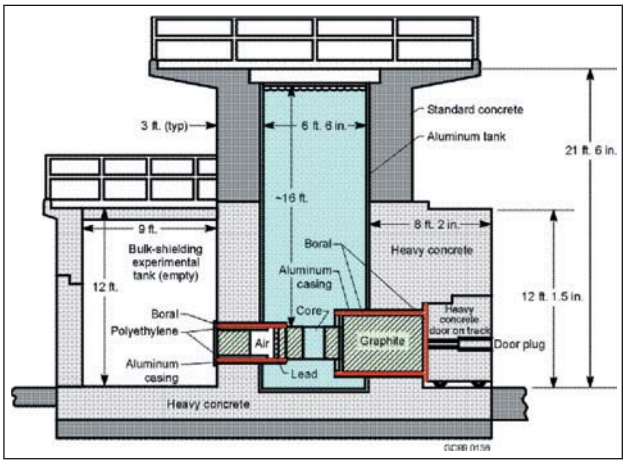

Figure 2 Cross-Section of a typical TRIGA Mark II Reactor

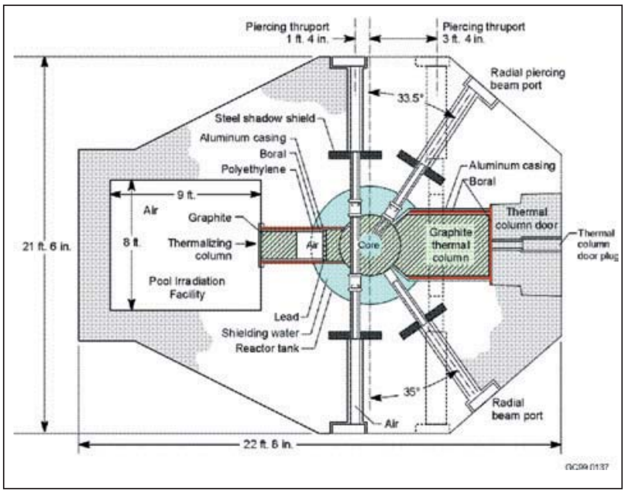

Figure 3 Cross-Section of a typical TRIGA Mark II Reactor

Gyeongju City selected to host the site for a final disposal of LILW in Korea

Jong-Hyun Ha
Project Leader of Korea in FNCA-RWM
Deputy General Manager, R&D Office
Nuclear Environment Technology Institute (NETEC)
Korea Hydro & Nuclear Power Co., Ltd. (KHNP)

On November 3rd of 2005, the Korean government officially announced that a final disposal facility of the low-and intermediate-level radioactive waste(LILW) will be built in Gyeongju City as the city beat out three bidders, i.e., Gunsan, Pohang and Yeongdeok, for the longest pending national project in a referendum on November 2nd of 2005.

Gyeongju, the ancient capital of the Silla Kingdom, won the project with the highest approval rate from among the four candidate communities, in accordance with the regulations on choosing a bidder.

Specifically, 89.5 percent of the voters of Gyeongju supported their city's bid for the project that has drifted for 19 years. It is the first time that the fate of a major national project has been decided by a direct vote. It also enhances the people's participation in the government's administration of the nation.

According to the results of the referendum, Gyeongju reported 70.78 percent turnout of a total electoral roll of 208,607; Gunsan 70.14 percent of 196,980; Pohang 47.22 percent of 374,697 and Yeongdeok 80.21 percent of 307,536. All of the four candidate areas met the minimum requirements of more than one-third voter turnout and the more than 50 percent voting in favor.

The central government is aiming to complete the final disposal facility in the Yangbuk region of Gyeongju City, on the coast of the East Sea, by 2008.

The host city will receive a financial support package of 300 billion won ($285 million) for regional development, as well as a commission estimated to be 5 to 10 billion won a year, depending on the amount of radioactive waste deposited at the site. A proton linear accelerator center is also to be built in the host city. In addition, it would relocate the headquarters of the Korea Hydro & Nuclear Power (KHNP) from Seoul to the host city within 3 years after the permission of construction plan for the facility.

Korea currently has 20 nuclear power plants in operation. By 2015, 6 more nuclear power plants are expected to be completed, but, in the meantime, they have no final disposal facility for LILW yet. The final disposal facility needs to be established by 2008 at the latest, as existing on-site storages have limited storage capacity.

The government assures that high-level radioactive wastes like spent nuclear fuel will not be stored in the selected site. The site will store low-and intermediate-level radioactive wastes such as gloves, clothing, radioactive filters from the nuclear power plants and spent radioisotopes from hospitals, industries and R&D activities.

Bird's-eye view of an Engineered Vault Type Disposal Facility

Managing Regional Radioactive Source Security Risks - An Australian Government Initiative

Lubi Dimitrovski
FNCA RWM Project Leader of Australia
Waste Operations & Technology Development
Nuclear Technology
Australian Nuclear Science & Technology Organisation (ANSTO)

Introduction

Traditionally, the management[1] of radioactive sources has focused on safe control to prevent accidental or unnecessary exposure to users and the public. Security aspects of source management were generally considered fulfilled by controlling sources in a safe manner. However, the terrorist events of recent times have led to serious questioning of whether the standard controls were sufficient, as some radioactive sources could possibly be used in a radiological dispersion device (RDD) by those with malicious intent. There is extensive use of high-activity, dangerous[2] radioactive sources in medicine, industry, mining & exploration, agriculture, education and research & development in all countries. Often there is a lack of well-developed owner or user safety and security arrangements, or of adequate regulatory oversight. A serious incident involving a radioactive source in any one country would have implications in other countries for their regulation and safety and security standards. It has become timely to reconsider the way in which some radioactive sources are managed.

Figure 1 Discused Industrial Gauges in Secure Storage

1 Management means the administrative and operational activities that are involved in the manufacture, supply, receipt, possession, storage, use, transfer, import, export, transport, maintenance, recycling or disposal of radioactive sources.

2 "Dangerous" radioactive sources means those defined as category 1, 2 and 3 in IAEA Safety Guide RS-G-1.9, August 2005.

This has been recognised by Member States of the International Atomic Energy Agency (IAEA) with the development, and Board of Governors' agreement and General Conference endorsement, of the non-binding Code of Conduct on the Safety and Security of Radioactive Sources in 2003 and of related import and export guidelines. There are several technical documents addressing radioactive source security matters, and a new Safety Guide on Categorization of Radioactive Sources (RS-G-1.9, August 2005) which establishes the concept of dangerous sources for security purposes.

In the Australian Government's May 2004 Budget, funding of $4.5 million was provided to the Australian Nuclear Science and Technology Organisation (ANSTO) for three years to implement a project on securing of radioactive sources in the Asia-Pacific region.

Project Objectives and Scope

The objective of ANSTO's Regional Security of Radioactive Sources (RSRS) Project is to minimise the probability and impact of, unauthorized access or damage to, loss, theft or unauthorized transfer of radioactive sources within the region. This is being achieved by:

(a) assisting countries in the region to identify and to secure orphan and poorly controlled radioactive sources; and

(b) improving the security arrangements for radioactive sources through improvements to regulatory infrastructure, user practices and providing advice on physical and equipment upgrades.

Within the region close to Australia, the RSRS Project is primarily focused on South-East Asia, including all ten ASEAN countries, three of whom are currently non-Member States of the IAEA. The Pacific Island countries, particularly Papua New Guinea (PNG), are also within the geographical scope of the project.

Project Planning

The project recognises that there is a range of related international and national activities being implemented in some regional countries. To successfully implement the RSRS Project and fulfil its objectives, close cooperation and collaboration has been sought with:

- Government authorities in all regional countries
- the IAEA, noting the IAEA Action Plan for the Safety and Security of Radioactive Sources (GOV/2003/47- GC(47)/7 Annex 1) and its update for 2006-2009 (GOV/2005/50, August 2005)
- The US National Nuclear Safety Administration (US NNSA)'s International Radiological Threat Reduction (IRTR) Program and related activities.

In 2004, three meetings were held with the US NNSA, IAEA and authorities of several South East Asian countries to plan and identify issues and needs. This resulted in the RSRS 2005 Programme for South-East Asia being so designed to achieve project objectives via the components indicated below. In November 2004, the RSRS Project also contributed to the Asia-Pacific Conference on Nuclear Safeguards and Security, which was convened by the Minister for Foreign Affairs. The pertinent outcome of this conference and adjacent meetings with representatives from South-East Asia and Pacific Island Countries was high-level recognition of the regional radiological security issues and the means (via the RSRS Project) to address them.

RSRS South-East Asia 2005 Program Components

A. Committing to, and Implementing, the IAEA Code of Conduct and its Requirements
B. Improving National Legislation Addressing Source Security
C. Improving Regulatory Requirements Addressing Source Security
D. Improving the Authorization (Licensing) System Addressing Source Security
E. Improving Source Registry Capabilities
F. Developing and Implementing Inspection Programs for Source Security
G. Providing Information Outreach to Public and Coordination with Other Organizations.

Project Implementation

Expert Missions

Much of the work completed in 2005 focused on expert technical missions. In conjunction with the regional in-country counterparts, these expert missions have provided opportunities to assess the specific needs of countries so that project resources can be best utilised and develop apposite cooperation programmes. To date, fifteen expert missions have been conducted in eight countries, including more focused follow-up missions conducted in several of these countries. This work will continue in 2006.

Figure 2 Securing a Vulnerable Source in PNG

Vulnerable Sources

In the course of an expert mission to PNG, a highly active teletherapy source was identified as being vulnerable. Further investigation revealed that while the unit was Canadian in origin, the cobalt-60 source had been replaced in 1993 by ANSTO. This gave a clear mandate for repatriation of the source to Australia, and an extensive operation was completed in December 2005. Considering that PNG is not an IAEA member state, and that the source had come to the end of its useful life, it could have very well remained undiscovered and vulnerable had it not been identified by the RSRS Project. In other countries, the RSRS Project has identified vulnerable sources and is working with authorities in these countries to characterise and better secure these sources.

Regional Training

With the support of experts from the US NNSA and the IAEA, the RSRS Project has conducted two regional technical training courses. The first of these was on

Figure 3 Search & Secure Workshop

searching for and securing orphan radioactive sources in February 2005. This course involved 21 participants from South-East Asia and directly addressed the RSRS Project objective of assisting countries in the region to identify and to secure orphan and poorly controlled radioactive sources. In August 2005, a second course focused on physical protection of radioactive sources, and was attended by 34 participants from eleven regional countries. This training course was the first of its type. Both of these courses received very favourable evaluation, and are a key component in achieving outcomes related to project objective (b) mentioned above.

Extending on from these courses conducted in Australia, the RSRS Project is moving into providing tailored, in-country training for regulators and related national authorities as well as for users of radioactive sources. The first of these courses was conducted in October 2005 in PNG with 24 participants from various areas of government and other organisations such as mining companies. The course provided training on radiation protection and security requirements for radioactive sources through a series of lectures and practical sessions.

Legislative Reviews

In conjunction with the US NNSA, the project has worked closely with several countries to improve their relevant legislation to provide appropriate authority and make requirements for source security. This typically involves peer review services for analysis of existing legislation, standards and codes of practice, or assistance with the development of these documents. This work cuts across many of the RSRS Project Program Components indicated above.

Conclusion

The RSRS Project is meeting its objectives of helping to significantly improve regional capabilities for securely managing radiation sources. Expert missions conducted to help identify country-specific requirements and address these needs. Training courses have been conducted both in Australia and in-country to help improve the radiation protection and security expertise within the region. Most notably, highly-radioactive, vulnerable sources have been identified, with one being secured through repatriation to Australia.

It is envisaged that as the project continues, more focused and specialised assistance will be delivered to regional stakeholders. This can be achieved through more specialised training courses, provision of radiation detection equipment, and assistance with identifying and securing vulnerable sources.

Ultimately, the RSRS Project is assisting countries in ways that other programs can not, as the project can often provide more targeted assistance including to non-IAEA Member States.

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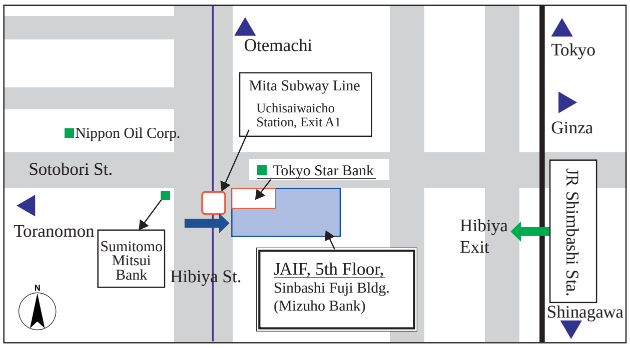
New JAIF Office opened on February 21, 2006.



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