

Current Situation for Management of Disused Sealed Radioactive Sources in Japan - 13025

Keiji Kusama, Yoichi Miyamoto

Japan Radioisotope Association, Radiopharmaceutical and Radioisotope Supply Business Promotion
Department

ABSTRACT

As for the Sealed Radioactive Source currently used in Japan, many of them are imported from overseas. The U.S., Canada, Germany, the Netherlands, Belgium and Czech Republic are the main exporting States. Many of disused sealed radioactive sources are being returned to exporting States. The sealed radioactive sources which cannot be returned to exporting States are appropriately kept in the domestic storage facility. So, there are not main problem on the long term management of disused sealed radioactive sources in Japan. However, there are some difficulties on repatriate. One is reservation of a means of transport. The sea mail which conveys radioactive sources owing to reduction of movement of international cargo is decreasing in number. And there is a denial of shipment. Other one is that the manufacturer has already resigned from the work and cannot return disused sealed radioactive sources, or a manufacturer cannot specify and disused sources cannot be returned. The disused sealed radioactive source which cannot be repatriated is a little in term of radioactivity. As for the establishment of national measure of final disposal facility for disused sealed radioactive sources, in Japan, it is not yet installed with difficulty. Since there are many countries for which installation of a final disposal facility for disused sealed radioactive sources is difficult, the source manufacture country should respond positively to return the source which was manufactured and sold in the past.

INTRODUCTION

The management in the life cycle of sealed radioactive source is considered internationally not only for the safety but for the security. Concern is increasing management in this final stage in many States. As for the sealed radioactive source currently used in Japan, many of them are imported from overseas. Many of disused sources are being returned to the exporting States. This presentation shows Current situation for Management of Disused Sealed Radioactive Sources in Japan

Regulatory Authority, Regulation and Status of Radioactive Material Distribution in Japan

Radioactive material is used in various fields and two or more regulatory authorities have regulated it according to the use field. In medical use, the Ministry of Health, Labour and Welfare has regulated it, in veterinary medical use, the Ministry of Agriculture, Forestry, and Fisheries has regulated it, and, as for a nuclear power plant and a nuclear fuel, the nuclear regulation authority has regulated nuclear materials. Based on Laws Concerning the Prevention from Radiation Hazards due to Radioisotopes and Others (Radiation Protection Law) , the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has regulated the sealed radioactive source and the unsealed radioactive material. There may also be a thing used as double regulations, there may be a point used as complicated regulation for users,

and deliberations of two or more regulatory authorities may be required in the policy decision of regulation. From April, 2013, the Nuclear Regulation Authority(NRA) which is the independent governmental body has charge of what the Ministry of Education, Culture, Sports, Science and Technology has regulated.

The Radiation protection Law have adopted the recommendation of ICRP and IAEA BSS[1] and the Code of Conduct on the safety and security of Radioactive Sources (CoC) [2],[3], and have regulated import and export of radioactive sources, acceptance, possess, storage, and disposal. Although the nuclear fuel material, the nuclear power plant, and the research reactor are regulated by only the nuclear regulation authority, it is the feature that sealed radioactive sources are regulated by many regulatory authorities.

Since Japan is an industrialized country, it is asking for various nuclides and radioactivity in the industrial world. Many of them are imported from overseas. The U.S., Canada, Germany, the Netherlands, Belgium and Czech Republic are the main exporting States. Moreover, there is demand of not only the equipment apparatus manufactured overseas but various equipment apparatus according to a domestic request. In Japan, manufacture and processing of the sealed radioactive sources are carried out for some radioactive materials. Ir-192 source for non-destructive tests (10Ci, 370GBq) and Au-198 source for permanent implant source (5mCi, 185MBq) are manufactured. However, domestic manufacture is not carried out by the influence of the accident of the Fukushima Daiichi nuclear power plant.

Licenses based on Radiation protection Law are 6116 places of business as of March 31, 2011. Details are shown in Table I.

Table I. Number of licensees

Class of licensee	Total	Medical use	Education	Research	Industrial	Other
Permit user	2,427	904	345	267	833	78
Report user	3,689	47	186	226	2,318	912
Total number of user	6,116	951	531	493	3,151	990

Licenses based on pharmaceuticals Law are 1275 places of business as of March 31, 2011.

There are 1,300 or more IAEA Category 1-3 sources currently used in Japan. Details are shown in Table II.

Table II Typical applications (category 1-3)

Apparatus	Number of apparatus
Blood/tissue irradiators	103
Teletherapy sources and Multi-beam teletherapy (gamma knife) sources	65
Irradiators used for research	62
Irradiators used for industry	20
Industrial radiography sources	959
Brachytherapy sources — high/medium dose rate	172

Total number	1,381
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Almost all radioactive products in Japan are directly imported or produced by using imported radioactive materials.

For the purpose of reduction of the expense concerning import and a user's convenience, and in order to use it according to regulation appropriately, approximately 99% (in terms of radioactivity; as of 2009) of sealed radioactive sources distributed in Japan are imported and supplied through Japan Radio Isotope Association (JRIA).

Disused Sealed Radioactive Sources and Orphan sources

Substantially, the users of the sealed radioactive sources will return the disused sealed radioactive sources (DSRS) to manufacturers or distributors. JRIA collects the DSRS based on the sales contract between JRIA and the purchasers of the sealed radioactive sources. The collected DSRS are tested in JRIA's facility to check the surface contamination and the radioactivity for the transport safety. JRIA also receives orphan radioactive sources in Japan in accordance with MEXT's administrative instruction if they are found.

JRIA returns collected DSRS, except for the products using very short half-life nuclides, to the radioactive source manufacturers in accordance with international guidelines, including IAEA CoC and the import agreement between JRIA and the source manufacturers.

Repatriation to manufacture country is actually performed for Co-60 of an irradiation sterilization institution, Cs-137 blood irradiation equipment (Canada), Ir-192 remote after loading, etc.

JRIA keeps the collected DSRS in their own storage facility in cases where they can't return them to the radioactive source manufacturers.

Since the manufacture State and the manufacturer are unknown, Ra-226 is one of those whose repatriate is impossible. Ir-192 non-destructive inspection sources and I-125 permanent implant source with short half-lives are kept at JRIA storage facility.

However, generally speaking, such DSRS kept temporary in the storage facility of JRIA have been returned successively to manufacturers, through the discussion among relevant parties if necessary. In Japan, because of the system that JRIA receives DSRS on the sales contract mentioned above, orphan sources are scarcely found. Nevertheless, in such case, they will be picked up and kept safely in storage facility of JRIA. Details are shown in Table III.

Table III Storage of major DSRA in JRIA's facility as of 31, March, 2012

Nuclides	Typical Usage	Management (Return or Storage)	Total Activity	Pieces (approximate number)
Co-60	Irradiator(Sterilization)	Return	2PBq	500
Co-60	Irradiator	Return	3PBq	900
Co-60	Gamma-Knife	Return	400TBq	1,000
I-125	Brachytherapy	Return	4GBq	50,000
Cs-137	Gauge	Return	200TBq	600
Kr-85	Thickness Gauges	Return	3TBq	200

Pm-147	Thickness Gauge	Storage	900GBq	700
Ir-192	Radiography	Storage	30TBq	20,000
Am-241/Be	Neutron Source	Return	4TBq	200

Return : Return to Manufacturers (scheduled)

Storage : Storage at JRIA's storage facility

Long term Management Plan of Disused Sealed Radioactive Source in Japan

A portion of LLW stored at radioactive waste management facilities of commercial nuclear power reactor facilities, which has comparatively low concentration of radionuclides, has been transported to a radioactive waste disposal facility of JNFL and disposed of at near surface disposal facility since 1992.

The amount of the waste emplaced at the disposal facility is 230,000 drums (counted as the equivalent number of 200 LTR drums) as of the end of March 2011.

On the other hand, there is no disposal facility for DSRA in Japan. In the Code of Conduct meeting held in February 2012, they note that each State should establish the final disposal facility, and long-term management strategy for the radioactive sources. Some participant note that there was also a country also for which it is difficult to construct final disposal facility, therefore, there was the State whose return to a manufacture country was a good choice.

Each State has to establish long term management plan and disposal facility for DSRS. However, there is a different situation for each State.

CONCLUSIONS

There are not many problems on the long term management of DSRS in Japan.

There is no disposal facility for DSRS in Japan. However as we explained above, it is not the serious issue which should be resolved soon. This is because i) almost all of DSRS are returned to source manufacturers, ii) JRIA has still enough storage capacity, iii) and the number of DSRS stored in JRIA is settled.

Considering current situation, it is not required to construct the additional storage facility or the disposal facility for DSRS in Japan. Of course, this view depends on the increase rate of stored DSRS and the capacity of the storage facility in future.

We would cooperate with the international society and keep attention to the status of DSRS in Japan for the safety regulation considering security aspects of the radioactive source management.

Now, since import of all the radioactive sources to Japan is a JRIA course, it is comparatively easy to return DSRS to the source manufacturer.

The problems on import and repatriate are decrease in service of the shipping service accompanying reduction of a transportation entrepreneur's transportation, and denial of shipment.

In addition to above, it is important that the manufacturer has already closed the business, return of DSRS do not progress.

It is useful for the promotion of utilization of radiation to accept the radioactive sources sold in the past even if a manufacture country is a case where a manufacturer already stopped and abolishes manufacture of radioactive material equipment apparatus or sealed radioactive sources, and it contributes to the safety of a radioactive source, and improvement of the security.

We will make efforts to return DSRA to manufacturers and exporting States.

REFERENCES

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