

Comprehensive Training Structure for the Safe Transport of Radioactive Materials in Switzerland

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1. INTRODUCTION

Although Switzerland is world famous as an alpine tourist land, it is also an advanced industrialized country with a gross national product in 1990 of 316×10^9 Swiss Francs. Switzerland has a population of 6.7×10^6 and an area of 41×10^3 km². There are four national languages; French (18.4%), German (65%), Italian (9.8%) and Rätoromanisch (0.8%).

The generation in Switzerland of nuclear electricity commenced in 1969 with the operation of the first plant at Beznau. In 1990, Switzerland had 5 operating nuclear power plants generating a total of 2930 MW, representing 41% of all generated electricity. The policies to date of the nuclear utilities have been associated with reprocessing of the irradiated fuel. Thus Switzerland is involved with the full spectrum of transports of radioactive material, (RAM), relating to operational nuclear power plants. These include unirradiated fuel assemblies, irradiated fuel assemblies, irradiated and unirradiated samples and components, radioactive power plant waste and radioactive reprocessing waste. These fuel cycle transports, combined with the usual array of medical and industrial isotope transports normally associated with an advanced industrialized country, result in some 40,000 to 50,000 packages per year involving up to some 200 PBq of radioactive material.

2. SWISS REGULATIONS FOR RADIOACTIVE MATERIAL TRANSPORTATION

2.1 Dangerous Goods Transport Regulations

For all practical purposes, the national dangerous goods transport regulations currently in force in Switzerland fully implement the IAEA safety series No. 6, "Regulations for the Safe Transport of Radioactive Material". The only exception are the regulations relating to inland waterways (ADNR) which have anyway only rarely been used for RAM transportation. These inland waterway regulations are under revision and on completion will also implement the 1985 IAEA regulations. All regulations which are in force within Switzerland are produced in French and German language versions, apart from ICAO Technical Instructions which are used in English.

2.2 Regulation of Special Nuclear Materials

Switzerland has regulations based on national atomic law which regulates and licenses imports, exports, inland transports and transits of nuclear materials and certain nuclear power plant waste.

2.3 Radiation Protection Regulations

National radiation protection regulations provide for the radiation protection of the public and also those employees involved with radiation sources. These regulations require the licensing of imports and exports of non-nuclear radioactive material and waste. Effective from 1993, a new version of these radiation protection regulations will come into force. Then, all activities relating to the preparation, shipment and intermediate storage of transport packages will become licensable as such. The issue of a licence will depend amongst other things on the employment of personnel that have been trained in nationally recognized training schemes for the safe transport of radioactive materials.

3. NATIONAL TRAINING STRUCTURE

3.1 General

There are currently three institutes in Switzerland officially recognized for organizing training courses associated with the transport of radioactive material. Two are located in the German speaking parts at Würenlingen in the north and Luzern in central Switzerland. The third is located in the French speaking part in Lausanne. Course lecturers are drawn from experts in the competent authorities, institutes of the university system and specialists from industry. Courses are normally restricted to a maximum of 16 fee paying participants. The need for periodical refresher courses is recognized and these are planned to cycle in parallel with major changes in the regulatory requirements.

In September 1990, a three level approach was recommended by the IAEA Technical Committee concerned with training programmes for the safe transport of radioactive material.

Level	Target Audience	Description of Material
1	Policy makers, senior managers	Overview, introduction
2	Managers, responsible persons	Based on the aforementioned introduction, greater depth in selected subject areas
3	Practitioners, hands-on persons (e.g. vehicle drivers)	Even narrower selection of subject areas

The technical committee further recommended that responsibility for running level 1 courses should remain with the IAEA. Accordingly, the structure of the training in Switzerland is based on courses at level 2 and 3. The training material used as a basis for all Swiss courses comprises all or part of the following,

- National regulations for RAM transport
- IAEA safety series No. 6, No. 7, No. 37, No. 80, No. 87
- IAEA safety series No. 9 and
- IAEA Training Course Series No. 1, 2nd Edition.

Material relating to the application of the atomic law and radiation protection regulations is also included. All courses and seminars are given in French and German.

3.2 Level 2 Courses

Level 2 courses commenced in Switzerland in Autumn 1991. Under current national regulations these courses are not mandatory. The same course will however become a legal requirement under the new radiation protection regulations in 1993.

The course lasts for a period of five days, each day comprising eight periods of 45 minutes each. It is currently planned to hold the course annually in French and German. On the introduction of the course as a legal requirement, it is recognized that the course frequency will have to be increased according to demand. Instruction involves lectures, video material, overheads and 35mm transparencies and a range of participating exercises including an outdoor emergency scenario.

The first day of this course concerns basic radiation protection and is optional. Participants producing a certificate from a nationally recognized radiation protection course need not attend.

On the final day of the course, participants take a written 1 hour examination. Successful participants receive a certificate which is recognized by the national Competent Authority for the purposes of the radiation protection regulations as described in 2.3 of this paper. The course curriculum comprises:

- * Basic radiation protection
 - Radioactivity, types of radiation, radioactive sources.
 - Effects of radiation on materials, irradiation dose, shielding.
 - Criticality.
- * The danger of radiation to humans
 - The effects of different types of radiation on humans.
 - Natural and background irradiation of humans in the environment.
 - Radiation protection calculations (external and internal irradiation, the IAEA "Q" system, isotopic mixtures).
- * Radiation protection measurement technology
 - Measurement requirements, principles of measurement technique.
 - Exercises in measuring radiation and contamination levels.
- * Regulatory requirements
 - National and international regulations for RAM transport.
 - The use of the regulations in practice for shipment of RAM.
 - IAEA Schedule system.
- * Licensing procedures
 - Approval procedures in accordance with the dangerous goods transport regulations.
 - Licensing procedures according to the atomic law regulations.
 - Licensing procedures related to the radiation protection regulations.
- * Quality and compliance assurance
 - Quality assurance.
 - Compliance assurance.
- * Customs formalities
 - Import and export of RAM.
 - Customs formalities.

- * Emergency measures
 - Procedures following an accident.
 - Practical emergency exercise.

- * Written examination.

- * Course discussion.

3.3 Level 3 Courses

There is currently only one level 3 course in operation in Switzerland. The course is basically aimed at vehicle drivers. A second level 3 course aimed at (roadside) transport inspectors is scheduled to commence early in 1993. To date, these latter inspectors have attended the driver training courses.

3.3.1 Vehicle Drivers

Since 1984, Switzerland has had a national legal requirement (SDR) concerning the licensing of vehicle drivers involved in dangerous goods transport. The licensing of vehicle drivers has also been a requirement of the "European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)" since that time.

Accordingly, from 1984 suitable training schemes have been regularly held for radioactive material transport drivers. The courses are of two day duration, each day comprising eight 45 minute periods of training. At the end of the course, participants take a one hour written examination. Successful candidates receive a Class 7 Dangerous Goods ADR/SDR drivers license. Only holders of such a license are allowed to drive vehicles carrying radioactive materials within Switzerland or internationally in countries falling under the ADR agreement.

The driver training course is held usually three times annually at Würenlingen and once or twice per year in Luzern and Lausanne.

The curriculum for the driver training course comprises:

- * Introduction
 - Overview of the national dangerous goods per road regulations.
- * Basic radiation protection
 - Radioactive material and radiation emissions.
- * Radiation protection measurement techniques
 - The need for measurements.
 - Types of equipment, exercises in measurement.
- * The danger of radiation to humans
 - The effect of radiation on humans.
- * Radiation protection measures
 - IAEA Schedules.
 - Controls for vehicles and drivers.
 - Limits for excepted packages.
 - Types of package and packaging, transport index.
 - Labelling and placarding, shipping classification.
 - Protective measures by transport of RAM.

Extinguishing a conveyance fire.
Procedures following a transport accident.

- * Written examination
50 questions.

3.3.2 Transport Inspectors

The regulations in Switzerland concerning the transport of dangerous goods by road require that the 26 individual cantons are responsible for roadside inspections of shipments of dangerous goods. In practice, the individual cantons transfer this responsibility to the cantonal police forces. When dangerous goods are transported by the federal railway system, responsibility for the control of individual shipments rests with the railway authorities.

In practice the railway authorities only accept packages for shipment which are certified by the consignor as complying with the dangerous goods transport regulations (RID/RSD).

The railway authorities have their own dangerous goods inspectors.

The situation is similar for transports by air. The airlines require that the consignor declares that the shipment is prepared in accordance with ICAO- and IATA-regulations. The airlines also have their own dangerous goods inspectors for deployment at airports.

To date, the dangerous goods transport inspectors described above have only been able to be trained by attending the driver training courses in 3.3.1, or on internal training courses for dangerous goods in general. Commencing in 1993 there will be a new level 3 course aimed specifically at police, railway and airport inspectors.

Exact details of the course curriculum are not known at the time of writing this paper. The proposed course is however expected to include much of the contents of the driver training course with additionally compliance assurance, licensing procedures and criteria, practical inspecting and controlling exercises together with incident and accident procedures and reporting.

3.4 Periodical Training Seminars

3.4.1 General Information Seminars

The introduction of the 1985 IAEA regulations into national, regional and modal dangerous goods regulations introduced a significant degree of change for the safe transport of radioactive materials. Perhaps of most significance was the clear requirement with regard to quality assurance and compliance assurance for all organizations and authorities involved in the preparation and shipment of packages. Accordingly, the Swiss Competent Authority organized and ran one day national information seminars where representatives from all sides of industry, the competent authorities, police, railway and airline authorities, and environmental protection organizations were invited to attend and be informed about new and current regulations and how they would be individually affected by the new situation. The seminar was held for a German speaking audience of some 250 persons in March 1990 and to a French speaking audience of some 50 persons in September 1991.

Each seminar constitutes a series of 15 to 30 minute contributions from experts addressing the following themes:

- National and international regulations for RAM transport.
- Transport radiation protection model.
- RAM packaging.
- RAM shipment.
- Requirements for nuclear material shipments.

- Import and export of RAM.
- Testing and licensing of dangerous goods packagings.
- Quality and compliance assurance requirements for RAM transports.
- Roadside inspections.
- Responsibilities and insurance requirements by RAM transport.
- Emergency planning.
- Training courses in RAM transport.

All participants were provided with comprehensive documentation to each of the themes addressed.

These national one day seminars are currently planned to be repeated at about five year intervals.

3.4.2 Seminars for the Competent Supervising Authorities.

The 1985 IAEA transport regulations define a clear responsibility for all competent authorities with respect to compliance assurance. In practice in Switzerland there are three different federal supervising authorities with radiation protection responsibilities:

- All nuclear installations are supervised by the Federal Nuclear Safety Inspectorate (HSK) in Würenlingen.
- Radiation protection of the public is supervised by the Federal Office of Health (BAG) in Bern.
- Radiation protection for the employees of organizations using ionizing radiation is supervised by the Federal Accident Insurance Office (SUVA) in Luzern.

The inspectors of these three offices will be in the front line for ensuring compliance of consignors, shippers, transporters and trans-shipment organizations with the requirements of quality assurance in the safe transport of radioactive materials.

It is considered important to ensure a uniformity of approach to this problem by the three different supervising authorities. There is a wide range in size and relevance of organizations involved in RAM transport in Switzerland, and the IAEA advisory material, IAEA safety series No. 37, also requires a graded approach to be applied to the problem. Thus there is a well defined requirement for a coordinated approach to compliance assurance. Commencing in 1992 an annual two day seminar is planned for the supervising inspectors and auditing organizations concerning compliance assurance. This seminar will be repeated until such time as the system of compliance control becomes an established practice.

4. CONCLUDING REMARKS

The introduction of the 1985 IAEA Regulations for the Safe Transport of Radioactive Materials into Swiss national dangerous goods transport regulations has induced significant changes to the national radiation protection regulations.

The combination of these two sets of regulatory requirements has in turn given rise to a major expansion in the national training infrastructure for the safe transport of RAM material.

The established nationally recognized courses for vehicle drivers in accordance with national and regional regulations is now supplemented by an IAEA level 2 course for managers and responsible persons with consignors and shippers.

A new IAEA level 3 course specifically for inspectors carrying out inspections during shipment is planned to commence in 1993.

National one day general information seminars on RAM transportation are now an established part of the training scenario in Switzerland.

Commencing in 1992, annual two day seminars for supervising authority inspectors involved in organizational compliance assurance are planned.

Experience to date for this significantly increased activity in training has been that of enthusiastic cooperation between all parties concerned.

5. REFERENCES

"European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)".

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IAEA safety series No. 37, "Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (1985 Edition), Third Edition (As Amended 1990)", IAEA Vienna, 1990.

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International Air Transport Association (IATA) "Dangerous Goods Regulations".

International Civil Aviation Organization (ICAO) "Technical Instructions for the Safe Transport of Dangerous Goods by Air".

"Internationale und schweizerische Ordnung für die Beförderung gefährlicher Güter mit der Eisenbahn (RID/RSD)".

"Verordnung über die Beförderung gefährlicher Güter auf dem Rhein (ADNR)".

"Verordnung über die Beförderung gefährlicher Güter auf der Strasse (SDR)".