

## METHODOLOGY FOR SAFETY AND SECURITY OF RADIOACTIVE SOURCES AND MATERIALS - THE ISRAELI APPROACH

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### 1. Abstract

*About 10 Radioactive incidents occurred in ISRAEL during 1996-1997. Some of them were theft or lost of Radioactive equipment or sources, some happened because misuse of Radioactive equipment and some of other reasons. Part of them could be eliminated if a better methodological attitude to the subject existed. A new methodology for notification, registration and licensing is described. Hopefully this methodology will increase defense in depth and the Safety and Security of Radioactive sources and materials. Information on the inventory of Radioactive sources and materials is essential. Where they are situated, what is the supply rate or all history from berth to grave. Persons involved are important: Who are the Radiation Safety Officers (RSO), what is their training and updating programs. As much as possible information on the site and places where those Radioactive sources and materials are used. Procedures for security of sources and materials is part of site information, beside safety precautions. Users are obliged to inform on any changes and to ask for confirmation to those changes. The same is when high activity sources are moved across the country .*

### 2. Licensing

As the Competent Authority responsible for the Radiation Safety of the Public and Environment, Radiation Safety Division of the Ministry of The Environment is responsible for licensing the use of Radioactive sources and materials in Israel. Applicants are obliged to provide all necessary information and to take all needed steps to maximize protection. Guidelines for applicants are based on the BSS-115[1] recommendations for public and environment Radiation Protection that were adopted by RSD<sup>2</sup>. Since there are other competent authorities (Ministries of Labor, Health & Israeli Atomic Energy Commission) that deal with Radiation protection, there is a need for coordination. Participants in this coordination forum are aware to the comments given to the Israeli competent authorities by IAEA committee that investigated the Sor-Van Accident.[2]

### 3. Coordination

- (a) Competent authorities coordinate activities in a "Professional Coordination committee.
- (b) Ministry of Labor oblige a yearly safety inspection at all institutes using dangerous materials, Radioactive included. Reports of all inspections are distributed also to RSD. The reports are written in a unified format. RSD had an important roll in preparing this unified format. Attachment 1 is an example of the summery of the inspection[3].

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<sup>2</sup> RSD - Radiation Safety Division Of the Ministry of the Environment

- (c) Ministry of Transportation is responsible for regulations for the safe transport of dangerous materials, including Radioactive. RSD got the power, behalf of Ministry of Transportation, to implement those regulations.
- (d) Ministry of health provide RSD justification for the medical aspects of Radioactive materials usage.
- (e) Atomic Energy Commission is coordinated in all cases where high risk is expected.

#### 4. Inspection

Inspection is maybe the best way to implement and enforce regulation and safety culture. Table I represents data on number of inspections done by RSD's inspector Between the years 1992 to 1997. Obviously, when a new inspector commenced inspections bearing in mind the new methodology and the need of improving defense in depth, there was 60% increase in inspections. Comparing to accumulated inspections done by RSD and all other inspectors, we can judge that RSD is doing about 60% of inspections. But it is impossible for Chief Radiation Safety Inspector of RSD to check personally and annually all Israeli institutes (over 500) for a long time. So a special inspection program planned. All institutes were divided to groups according with their Risk level. [4] According to this program, the inspector will visit only institutes of risk level "A". Information on other institutes will be provided as described in Para.2.2(b).

**Table I**

Year	1992	1993	1994	1995	1996	1997
Accumulated inspections	No data	No data	369	322	568	481
RSD's Inspections	163	147	138	106	312	268

#### 5. Questioner for the applicant

Table II is the main questioner (given here in a short form) applicant has to answer when asking for a license.[5]. When the applicant face this questions, he have to give attention to different faces of safety and security:

**Table II: Questioner for applicant**

Site selection - safety and environmental impact assessment, regional mapping.
Practice in operation.
Reasons for practice; Justification.
Applicant's safety and Radiation Protection Organization.
Names, positions, qualifications, responsibility of Radiation Safety Officer and operators.
Description of work and process.
Project: Map, drawing, layout.
Quantification of Radionuclids, types and usage, chemical and physical form.
Description of any apparatus containing sealed sources.
Description of available monitoring equipment.
Description of storage facilities, for materials, sources and waste. Access control.
Description of waste management system.
A formal method of assessment of risks and safety analysis for all installations.
Defense in depth for all high Radiation facilities such as medical beam therapy, accelerators and similar. Also where complex wet, or other, operations are executed.

Special design and procedures for use of unsealed sources, including waste.
Manual for Radiation protection: Exposure control, dosimetry evaluation, environmental contamination, etc.
Training and updating program.
Administrative control, records, calibration, source accountability.
Movement of sources.
Physical security
Emergency response.
Special procedures for field usage of sources.
External adviser evaluation of Radiation Protection Quality assurance.

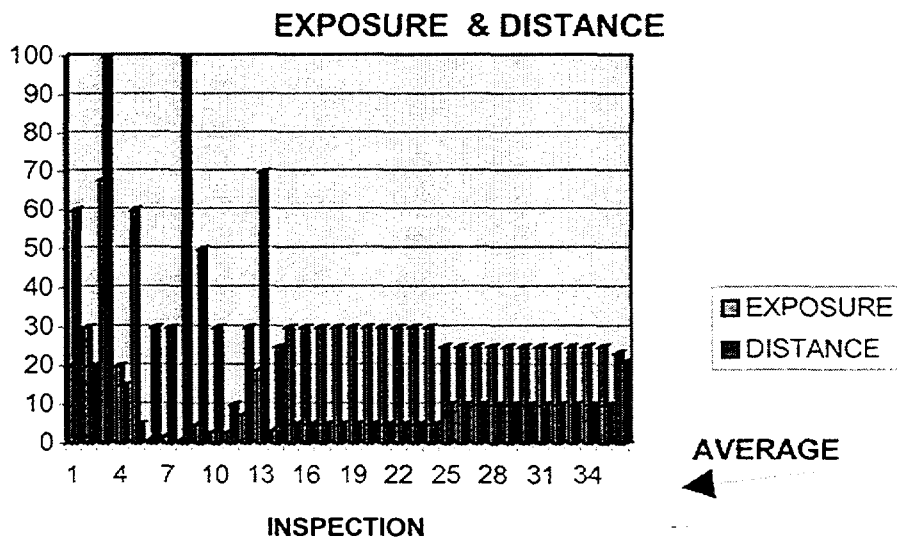
**6. A methodology for license issuing**

Attachment 2 describes the new methodology used by RSD to process any license request[6]. We still have difficulties implementing it. The applicants were not used to such approach and it take time to teach them to provide us the information in a way that will help us to process their applications quickly.

**7. Radiography control**

One of the most dangerous activities with Radioactive sources is industrial Radiography out of site, or what we define as “Radiography filming in the field”. The literature is full with examples of over exposure due to wrong work procedures or sources lost. In Israel we obliged the companies executing field Radiography to **notify** us before any activity that should be done out of there facilities. Figure 2 give some idea on dose levels measured during inspections made thank to those **notifications**. Figure 3 is a short form of informing RSD on Radiography in thin field

**Figure 2: Accumulated dose ( $\mu\text{Sv}$ ) at public area (distance in meters) per inspected Radiography filming:**



**Figure 3: Announcement form**

Company Name	Working Area	Endurance of Work	Repeatence?
Time of Beginning:	Technicians Names:	Source & Activity:	Other Equipment
Date:	1.	1.	1.
Hour:	2.	2.	2.
A map or sketch or explanation how to arrive to filming site:			

### 8. Supply of Radioactive materials

Suppliers of Radioactive Materials has to inform RSD periodically on materials supplied, their activities and destinations. Table II exhibit example of monthly report of one of the suppliers:  $^{99m}\text{Tc}$  supply in January to June 1997:

**Table II  $^{99m}\text{Tc}$  Supply of a certain supplier from 1.97 to 6.97**

Month	No of Institutes	No of Generators	Monthly Activity(TBq)
January	32	258	8.62
February	32	226	6.77
March	33	246	7.66
April	33	221	6.29
May	35	258	8.16
June	34	248	7.21

### 9. Training

Only one School for Radiation Protection exists in Israel. During the last years it carried out about 30 courses and trained 300 people annually. The courses cover all aspects of Radiation Protection and their length is 24 to 48 hours each. A new demand for training is prepared. According to it, three levels of training will be: 30 hours, 80 hours and 120 hours. We think this way we will improve RSO's performances.

### 10. References

- [1] International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, Safety Series No.115, IAEA, Vienna,1996.
- [2] The Radiological Accident in Soreq, IAEA, Vienna, 1993.
- [3] Grof, I., Shlezinger, T., Ben-Shlomo, A., Barshad, M., Garty, e., Regulations for the Inspector and Checklist for Environmental and Workplace Inspection at Installations and Laboratories Using Radioactive Materials or Devices Emitting Ionized Radiation, E., Soreq NRC, 1996.
- [4] Recommendations for the Safe Use and Regulation of Radiation Sources in Industry, Medicine, Research and Teaching,IAEA, Vienna, 1990.
- [5] Rozental, J.J., Approval of Location, Radiation Safety Division, Ministry of The Environment, Government of ISRAEL, 1996.
- [6] Abel J. Gonzalez., The New International Basic Safety Standards for Protection against Ionizing Radiation and fore the Safety of Radiation Sources, World Congress on Medical Physics and Biomedical Engineering, 21/26 August 1994, Rio de Janeiro, Brazil.

**Attachment 1**

**Summary Report For Ionized Radiation Installation**

Address of Institution:

Inspection Date:

License No.:

Rso's Name:

Deputy Rso's Name:

Telephone and fax:

Type of Institute:(hospital, etc.)

Type of Sources:(sealed, x-ray, etc.)

Type of Inspection:(Coordinated in advance, unexpectedly, etc.)

**Inspection Details**

Item	Proper	Deficient	Irrelevant	Not Inspected	Comments
Licenses					
Procedures, normal and emergency					
Equipment: Proper, calibration					
Radiation & contamination levels					
Personal and area monitoring					
Leak & smear tests					
Shielding and control					
Medical exams					
Source control and report					
Access control					
Training					
RSO					
Vehicles					
Sources storage					
Waste arrangements					
Improvement comparing to last inspection?					
Other					
Recommendations to Competent Authorities:					
Signature and Declaration					

**Attachment 2: Processing a license request**

