THE STABLE IODINE ISSUE AND HOW EUROPE IS DEALING WITH IT

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***Abstract* – There has been a considerable debate whether stable iodine tablets should be pre-distributed or kept at the vicinity of nuclear sites. This work reports on the approach followed by a number of European countries dealing with the iodine prophylaxis issue.**

Introduction

Following an accidental release of radioactivity into the environment, a number of protective actions will be considered, being the main objective to avoid public exposure to ionizing radiation. These protective actions are: sheltering, stable iodine and evacuation, and they will be recommended depending upon the severity of the accident. From all these countermeasures, the distribution of stable iodine, which is intended to reduce the accumulation of radio-iodine in the thyroid gland, has been under consideration by many countries and still is subject of debate and controversy.
On the other hand, one of the main problems in off site nuclear emergency management is to persuade people to be prepared for an accident that has a low probability to occur – at least in the western world. In this context, the distribution of stable iodine is still a matter of controversy, since most of the guidelines are based upon the Chernobyl accident, which is – according to many people unlikely to happen in the western world given all the safety regulations – and on the other hand it requires a well organized pre-distribution campaign to educate people.
This work reports on some general guidelines issued by a group of experts – often referred to as Art. 31, the World Health Organization Guidelines as well as the approach adopted by a number of European countries – with and without nuclear facilities - to dealing with this matter.

The Art. 31 group of experts

In 1957 Belgium, France, Germany, Italy, Luxemburg and The Netherlands signed the treaty establishing the European Atomic Energy Community (EURATOM). In this treaty, an important chapter under title II “Provisions for the encouragement of progress in the field of nuclear energy”, concerns health and safety. Within the health and safety chapter, Article 30 establishes the need to lay down the basic standards to protect the health of workers and the general public against the risks of ionizing radiation, whilst Article 31 establishes that these basic standards are to be worked out by the Commission after obtaining the opinion of a group of people appointed by the Scientific and Technical Committee among experts from the Member States.
In 1982 the Article 31 group of experts produced a set of recommendations, which has been revised in 1997 [1]. The revised document is intended to give

guidance on the introduction of emergency countermeasures and it also reviews the principles of intervention and recommends generic intervention levels for the emergency countermeasures: sheltering, evacuation and iodine prophylaxis.
It is expected that competent national authorities will translate these guidelines into emergency response plans.
According to these guidelines and taking into account the short time available for intervention, national authorities should consider the most effective way to make stable iodine available to population groups and the renewal of stocks at regular intervals. The European Generic Intervention level in terms of avertable dose for iodine prophylaxis is recommended between a few tens to a few hundreds mSv (equivalent dose), which coincide with the values adopted by the International Commission on Radiological Protection [2] (50 – 500 mSv).

The World Health Organization Guidelines

With respect to stable iodine, the WHO Guidelines 1999 update [3], can be summarized as follow:

- Logistics of when and how stable iodine should be stored, distributed and administered depend on a number of local factors
- Stable iodine tables should be kept at or near nuclear sites or
- Pre-distributed in an area within 5 km from the nuclear site
- KI produces less side effects than KIO_3
- Who should take stable iodine: neonates, infants and children, adults and emergency workers
- General public may purchase stable iodine tablets
- Instruction on use and distribution left to competent authorities

Stable iodine within the European Union

The table below summarizes the approach followed by a number of countries within the European Union and with/without nuclear power plants.

Country	EPZ*			NPP**
	0-5 km	5-10 km	10-20 km	
Belgium	Pre-distributed [(a)]	Pick-up	Stocks	Yes
Denmark	Neither pre-distribution nor stocks[§]			No
Finland	Pre-distributed	Available throughout the country		Yes
France	Pre-distributed	Pick-up	Stocks	Yes
Germany	Pre-distributed in future	Local stocks or pre-distributed	Pick-up	Yes
Luxemburg	Pre-distribution in the future [(b)]		Pick-up	No
Spain	Local stocks at police stations, hospitals and pharmacies			Yes
Sweden	Pre-distribution up to 15 km plus national stock			Yes
The Netherlands	Pick-up possible, stock at local fire department and national			Yes
United Kingdom	Supplies should be held at or near nuclear sites			Yes

* Emergency planning zone
** Nuclear power plant in the territory
[a] pre-distribution based on the exchange of coupons delivered at home. The coupon exchange method allows to keep a better statistics of the distribution process.
[b] pre-distribution intended for pregnant women and children
§ Model calculations in a conservative fashion do not exceed IAEA Intervention level

The pick-up method enables people to go to the local pharmacy and get stable iodine tablets through purchase or free of charge.

Conclusions and final remarks

In general, most nations do follow the WHO guidelines. Some countries have chosen to pre-distribute stable iodine tablets, others to keep local stocks at schools, fire department and police stations. As recommended, the pre-distribution is at the vicinity of nuclear power plants up to distance of 10-15 km. In order to assess the pros and cons of pre-distributing stable iodine tablets, France decided to simulate its distribution during an exercise. The problem was that people near the site were asked to remain indoors, while emergency workers were visiting on a door-to-door basis distributing dummy tablets. As a direct consequence France opted for the coupon method. Preliminary results of the pre-distribution campaign conducted in Belgium indicate that, ca. 58% of those leaving in the vicinity of a nuclear site did go to the pharmacy and exchange their coupon in stable iodine tablets. A similar percentage has been observed in France. According to a UK working group [4], preventive distribution of stable iodine tablets has the following disadvantages:

- Incomplete distribution
- Population mobility
- Loss of tablets
- Difficult to store
- Inadvertent ingestion

People's mobility represents a problem to ensure that population groups living near nuclear sites do have stable iodine tablets, and it is therefore necessary to repeat the pre-distribution campaign on a regular basis. The same UK working group concluded that:

- it is unlikely that pre-distribution will be advantageous provided an effective distribution plan exists taking into account the effectiveness of the countermeasure with respect to the intake time (3 h)
- Preventive distribution needed at local schools, workplaces, medical centers, pharmacies, and evacuation centers.
- Stable iodine may not be available for purchase (side effects and contraindications).

While cost-benefit studies in Sweden showed that the probability for doses over 100 mGy to children is so small outside the 15 km EPZ, that there is no planning for using iodine tablets in the rest of Sweden. Moreover, in Sweden they

separate the intervention level for PLANNING/PURCHASING and the intervention level for USING IN AN ACCIDENT WHEN TABLETS ARE AVALIABLE. The intervention level for PLANNING and PURCHASING and PREDISTRIBUTION is 100 mGy for children. The Intervention level for USING IF TABLES ALREADY ARE AVAILIABLE AND PREDISTRIBUTED is lower and linked to alarm levels.

Another important issue is the pre-distribution vs distribution during a nuclear emergency and the debate elements are: Should the legislation be modified? Stable Iodine is a pharmaceutical product, which may not be distributed by emergency workers (Germany – Belgium), and purchase vs free or covered by social security. Who picks up the tab for the maintenace of national or centralized stockpiles. The utilities? How about durability: 3, 5 or 10 years…

Last but by no means least, there is a constant need to keep people informed and educated: A French lady took one tablet every night…just in case!

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Currently Dr Rojas-Palma is the leader of a European project on Data Assimilation for Off-site Nuclear Emergency Management (DAONEM) and also participates in the steering of a cluster of European Commission funded projects in Off-site Emergency Management. Dr. Rojas-Palma is also European Project Manager and a co-ordinator for a thematic cluster within the European Commission's Nuclear Fission Key Action Program.