SAFE MANAGEMENT OF NON-NUCLEAR RADIOACTIVE WASTE
A NEW NATIONAL SYSTEM FOR THE MANAGEMENT OF NON-NUCLEAR RADIOACTIVE WASTE IN SWEDEN

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ABSTRACT

The Swedish Government in May 2002 set up a non-standing committee for non-nuclear radioactive waste. The objective was to elaborate proposals for a national system for the management of all types of non-nuclear radioactive wastes with special consideration of inter alia the polluter pays principle and the responsibility of the producers. The committee had to deliver its proposals to the Government by 1st December 2003.

Funds for future costs for the management and final storage of waste from nuclear power is collected in a state-governed funding system. The power sector pays a flat fee per kilowatt-hour nuclear power. For non-nuclear radioactive waste, however, there are no means today to secure the funding. If a company goes bankrupt and leaves radioactive waste behind it might be up to the taxpayers to pay for its safe management. This is because the holder of the waste is responsible for its disposal. The costs appear at the time of disposal and it is usually the last owner/holder of a radioactive product that has to pay. Sometimes the costs come as a surprise and the owner might not have the money available. Thus the waste might be kept longer than warranted or end up as orphan waste.

To solve this dilemma and other weaknesses in the Swedish system the committee proposes a funding system paralleling the system for nuclear waste. The cost for the waste should be paid up front, i.e. when a customer buys a product using a radioactive source the cost for the future waste management should be included in the price. In this way the consumer will not have to pay for this the day he disposes of the product by returning it to the original producer or leaving it to some waste treatment organization. It should be the responsibility of the producer (manufacturer, importer) to guarantee the funding for the handling of waste by making advance payments to the state fund.

The committee divides non-nuclear radioactive waste into three main categories: waste from products, waste from industrial activities and other wastes.

Waste from products includes household products as well as products used in research, industry and hospitals etc. For this category it is easy to identify a producer who imports or manufactures the product and puts it on the Swedish market. Such activities need a license from the Swedish Radiation Protection Authority (SSI) according to the Swedish Radiation Protection Ordinance.

Waste from industrial activities includes TENORM and biofuel ashes from combustion plants. Most of these processes are anyway licensed under the Environmental Code and funding for the management of the radioactive waste emanating from such practices can be settled in the licensing procedure along with specific conditions on the generation and handling of the waste.

Other Waste includes waste with no known owner, e.g. orphan sources and radioactive waste discovered in scrap metal. This category is a minor contributor of waste compared to the other two main groups and the necessary surplus of the funding system may well cover the costs also for the management of this waste.

Government will send the proposals from the committee for review by different organizations and stakeholders. Their comments will be considered before making a decision on presenting a bill to parliament.

INTRODUCTION

The following text is based on a summary of the report SOU 2003:122 from the Committee on Non-nuclear Radioactive Waste submitted to the Swedish Government in December 2003.

Directives

The Swedish Government on 23rd May 2002 decided to set up a non-standing committee on Non-nuclear Radioactive Waste. According to the directives of the committee, the objective was to analyze and propose a national system for the handling and final disposal of non-nuclear radioactive waste. The system must involve a well functioning solution with regard to organization, the environment, finance and legislation. Furthermore, the committee must submit a proposal for the financing and for how responsibility should be divided among the parties concerned, as well as for the constitutional amendments that are required. The committee is a so-called one-person committee and the Government appointed Svante Bodin from the Ministry of Environment to be the special investigator. The committee adopted the name the IKA Committee (IKA – a Swedish abbreviation for non-nuclear radioactive waste i.e. radioactive waste unrelated to nuclear technology). In the directive, the Swedish Radiation Protection Authority (SSI) was given the task of assisting in the committee, to the extent that was demanded. The proposal had to be submitted to the Government by 1st December 2003, at the latest.

Schedule and Realization

The committee commenced its work on 1st June 2002. SSI made a committee secretary available to the inquiry and the committee rapidly set an advisory inquiry group to work. The group consisted of representatives from the Ministry of the Environment, the Swedish National Environmental Protection Authority, the Swedish Nuclear Power Inspectorate, the Swedish Radiation Protection Authority, the Swedish Rescue Services Agency, the Confederation of Swedish Enterprise and the Swedish Nuclear Fuel and Waste Management Company (SKB).

Comprehensive Aims And Principal Starting Points

A natural starting point is the environmental goal of Safe Radiation Environments (Säker strålmiljö) (bill 2000/01:130 Swedish environmental aims – objectives and strategy measures). The Swedish Parliament fully supports this proposition that, among other things, states that:

- By 2010, the content in the environment of radioactive substances that are released by every enterprise must be so low that public health and biological diversity are protected. The additional individual dosage to the public must fall below 0·01 mSv/person/year from each separate enterprise.

To this, the government added a clarification that:

- Radiation doses are to be kept within bounds as Low As Reasonably Achievable (ALARA).
- The highest total annual effective radiation dose, that a member of the public may be exposed to from an enterprise involving radiation, must not exceed 1 millisievert (mSv) per person during a one-year period.

In many cases, these aims and principals establish the absolute dose limits for people and the environment. The IAEA "Joint convention on the safety of spent fuel management and on the safety of radioactive waste management" establishes the fundamental principal that the handling of radioactive waste must not be put onto the shoulders of future generations.

When it comes to a system for the handling and final disposal of IKA, the principal starting points for being able to meet the above stated aims for overall protection against radiation, as well as the aims and starting points for an environmentally adapted waste handling, can be summarized as follows:

1. With regard to waste, the following should apply:
    - All radioactive waste, except for that classified as cleared, should be collected and taken care of ("100% requirement").
    - The amount of waste should be minimized and any danger due to waste is to be successively reduced.
    - The ALARA principal for radiation doses must be put into practice.
    - The handling of IKA must fulfill the demands for protection against radiation, in accordance with the overall radiation protection aim and norms for
        a. the workers handling the waste
        b. the public and the environment
        c. minimizing the discharges and risks for accidents
    - Properties other than the ionizing radiation of waste must be taken into consideration, e.g. biological and chemical properties.

2. The national waste system should fulfil the following demands:
    - The waste system must be organizationally, environmentally, financially and legally well functioning
    - A defined producer responsibility must apply, as far as possible
    - The handling of radioactive waste must not impose undue burdens on future generations.

Product Waste Industrial Waste And Other Waste

In line with the proposal by the committee, all radioactive waste may, in principal, be handled according to the following three alternatives. This makes it possible to create a coherent system for effectively handling all non-nuclear radioactive waste, when it comes to responsibility and financing.

Product Waste

Such waste that arises through the private or industrial use/consumption of products, that are offered for sale on the market by producers, manufacturers, suppliers, importers or agents, are henceforth referred to as product waste.

In this category are included both products that require authorization for handling in all aspects, e.g. strong sealed radiation sources, and mass-consumption items, such as single-unit smoke detectors (with a battery), where only the manufacturer/importer are required to have authorization for handling.

Industrial Waste

Radioactive substances appear naturally in nature. These substances can become concentrated in certain industrial operations that handle large amounts of naturally occurring substances. Any such waste is called industrial waste.

Other Waste

This concerns waste that is neither product waste nor industrial waste. It can include certain production waste, older waste or abandoned waste without any legally responsible owner. Other waste constitutes a very small part of the total amount of IKA.

PROPOSALS FROM THE COMMITTEE

Producer Responsibility

I propose that:

- all producers of products, with radioactive substances as components or products in the form of radiation sources, must be imposed with a producer responsibility for the waste that arises when the product or the radioactive component is discarded or scrapped (product waste). By producer, is meant the one that produces, imports into the country or releases products on the market that give rise to radioactive waste. This responsibility must include an obligation for taking back the products after completion of use and for being in charge of the final handling of the waste.
- producer responsibility should include a fee that would go to a special state fund for meeting the total costs of handling any arising radioactive waste, including final disposal if it is dealt with in Sweden.
- when it comes to waste to be taken back by a supplier for final disposal in the country of origin, a bank guarantee or the equivalent should be insisted on.
- the fee must meet a reasonable share of the total costs of the historic waste for which no financial producer responsibility was previously in force.
- a State fund be established for collecting and administering the fees that producers pay for the handling of non-nuclear radioactive waste (The IKA Fund), together with making payments under the authorization of the Swedish Radiation Protection Authority (SSI).
- the Fund should be tied in with the existing Nuclear Waste Fund and share the same administrative body.
- SSI should be given a wider role when it comes to producer responsibility
  - for checking authorization and keeping a register of producers
  - for establishing and debiting fees
  - for receiving compensation demands and approving disbursements
  - for issuing instructions concerning handling and financing of IKA waste
  - for checking and monitoring the waste handling system
- a special advisory committee with representatives from the side of the producers and authorities should be attached to SSI for following up and scrutinizing SSI activities within this area. The committee should also be able to make decisions on recommendations concerning the activities.
- the new system of producer responsibility for non-nuclear radioactive waste should come into effect on 13th August 2005, concurrently with the new regulations that intend to implement the EU Directive 2002/96/EG, concerning waste from electrical or electronic products.

Industrial Waste

I propose that:

- radioactive industrial waste, i.e. radioactive waste that arises through enrichment of naturally occurring radioactivity or through the handling of biomass containing fall-out from nuclear weaponry tests or nuclear technology accidents, e.g. combustion of bio fuels, must be handled according to the Environmental Act (1998:808) regulations, regarding ecologically harmful activities.
- operations that can be thought of as giving rise to radioactive industrial waste should, in the first place, be tested for authorization, according to the Environmental Act, and this must be preceded by a description of the environmental consequences regarding radiation risks and the genesis of industrial waste.
- operations that give rise to industrial waste but which have not been tested for authorization, according to the Environmental Act, must be regulated through the application of the Radiation Protection Legislation.
- it must be possible for permits for ecologically harmful operations to include conditions about preventive measures that aim at avoiding or restricting radioactive waste arising, as well as conditions for how waste is to be managed and taken care of or to include a delegating to the supervisory authority to issue further regulations about the management of the waste.
- in cases where the Environmental Court or a County Administrative Board issues conditions concerning the taking care of radioactive industrial waste that involves demands for financial security, an enterprising party should pay a fee to the IKA Fund to guarantee that the waste can be taken care of correctly on the discontinuation of the operations. This is to be regulated in the legislation concerning the setting up of the IKA Fund.
- the radiation protection legislation be altered, so that industrial waste is covered by the provisions of the legislation, concerning responsibility for radioactive waste through §13 of the Radiation Protection Legislation being made applicable to industrial waste, by the concept of activities involving radiation being expanded by an additional paragraph in §5 of the same legislation.
- SSI should
  - where applicable, issue general instructions for the management and final disposal of certain industrial waste, with the support of the Radiation Protection Act, in accordance with the above mentioned amendments.
  - be granted the right to be able to request a reappraisal of operations that give rise to radioactive industrial waste, according to Ch. 24 in the Environmental Act, and to be identified as the supervisory authority in the regulations (1998:900) regarding supervision.
  - be given the mission of informing about problems with radioactive industrial waste in the respective trade journals and to publish general advice on the management of such waste.
  - confer with the Swedish National Environmental Protection Authority for being responsible for the supervisory and regulatory committee. SSI ought to be included in this committee.

Other Waste

I propose that:

- those, liable for payment to the IKA Fund, deposit a proportionate contribution to the Fund, in order to meet the costs for dealing with any other waste ,where it is not possible to establish a legally responsible party for the waste.
- those operating activities with radiation, which give rise to contaminated matter or induced radiation, must be able to be charged with paying the fee for dealing with the waste to the IKA Fund.
- within their present inventory program and yearly suggestions concerning measures to decontaminate contaminated land and deal with hazardous waste in old industrial plants, the County Administrative Boards should be given the mission to include radioactive waste and radioactive contaminated land. SSI should be given the mission to assist the County Administrative Boards and the Swedish National Environmental Protection Authority with information and expert knowledge in this work. The appropriation for decontaminating and dealing with hazardous waste should, where appropriate, also be available for measures to decontaminate the radioactive waste.

Clearance

I propose that:

- SSI be given the opportunity to make decisions about general exceptions to the Radiation Protection Act, when this is well founded, from the point of view of radiation protection and when it concerns the demands for an effective management of non-nuclear radioactive waste; a so called clearance.
- amendments be made to the Radiation Protection regulations (1988:293) to achieve this goal.

Final Disposal And The Role Of Studsvik In The Waste System

My proposal for final disposal:

At the earliest possible opportunity, the State should commence negotiations with the SKB, regarding a general agreement for the final disposal of non-nuclear radioactive waste, based on the grounds that I discussed with the SKB during the investigation. These imply, among other things, that the SKB undertakes the final disposal of all IKA that requires such final repositories as in any of its existing or future plants and will do this for, principally, cost price. Furthermore they imply that the SKB must be able to receive compensation also for actions taken for the adaptation of the storages and for the reappraisal of the licensing conditions for the repositories when necessary.

My assessment of Studsvik AB (Ltd.)

The negative effects from the Studsvik AB monopoly position on the market for services that concern IKA are going to substantially decrease, if my other proposals for a national system for IKA are realized. The grounds for Studsvik AB, and any other possible players on the market, for not handling certain kinds of radioactive waste, disappear in part or completely. I therefore conclude that there is presently no need for any duty, regulated by law, to take care of IKA. Nevertheless, the Government ought to closely follow the development.

My assessment of security aspects

The security aspects of radioactive waste, through, among others, the agency of the authorities concerned, will be better regulated than today when the HASS Directive and my other proposals in the investigation have been realized. These will contribute to an increased security when all the radiation sources are sufficiently monitored and dealt with. For the time being, I therefore see no need for further measures to be taken in this area. Nevertheless, it is important that the authorities, concerned, continuously carry out risk assessments, where threatening scenarios are properly followed. In certain situations, sharpened security could be called for, when it comes to special vulnerable transportation or to installations that handle strong sources of radiation.

DELIBERATIONS

Clearance

At the request of the inquiry, SSI has examined the possibilities that exist for expanding the use of the concept of clearance, within the framework of the SSI Project/IKA Project.

Today, SSI is unable to issue regulations on clearance (i.e. exceptions to the entire Radiation Protection Act application), except it may only decide about clearance when it comes to individual cases. The exceptions that SSI may prescribe, with support from §3 Radiation Protection regulations, refer to exceptions from §16, first paragraph (demand for 18 year limit), §18 (demand for medical examination) as well as §20 – 1, 2 and 4 (demand for obligation authorization).

Moreover, there are good possibilities for introducing a more operative clearance system in Sweden – without waiving the basic radioactive protection demands or obstructing the environmental goal for a secure radioactive milieu from being reached – that stands in agreement with the EU regulatory framework. Through an operative clearance system, waste can be taken care of in a more efficient manner, within the normal waste system. This also provides a basic component in my proposal for a new national system for the management of non-nuclear radioactive waste.

Further development work in SSI is needed, however, before an operative system for clearance can begin, which will meet the highest demands placed on radiation security. It is taken for granted that a change is made to the Radiation Protection regulations that will permit general decisions about clearance from the Radiation Protection Act's application.

In order for the concept of clearance and the freely classified material to gain legitimacy with the public, it is necessary for SSI to engender credibility and acceptance for the criteria that are developed for clearance. SSI ought therefore to be prepared to provide information about the criteria being laid down and their consequences.

In the directive to the IKA Committee, the Government has called attention to the fact that it wishes to be enlightened about what the possibilities are for producer responsibility in the area of non-nuclear radioactive waste. The surveying, that the committee has allowed SSI to carry out for the different types of radioactive waste, points towards good possibilities for introducing a producer responsibility for a large part of radioactive waste.

This firstly depends on the fact that most of this radioactive waste comes from worn out radiation sources or products that utilize radiation sources as components. It can be stated that all these give rise to radioactive product waste.

Another important factor in this context is that all those, that commercially handle radioactive products, must today have authorization for their operations, according to the Radiation Protection Act. A system has already been set up for registering, granting authorization and monitoring the current commercial producers.

When it concerns IKA, a third factor concerns the goal of gathering and dealing with all radioactive waste. In a communication to the government, SSI has pointed out a list of problems with the current management of the radioactive waste. One point concerns the case when an operator of an enterprise goes bankrupt or closes down operations. Waste from radioactive radiation sources may then lack a person legally responsible who can cover the costs for the management and possible final disposal of the waste. The same thing concerns orphan radiation sources that occur in nature or at other waste service sites. A producer responsibility, that lays the responsibility for the waste management on the producer and not on the owner, has a great potential for being able to substantially reduce the number of cases, where an owner could consider disposing of a hazardous radiation source illegally or in an inappropriate manner. The hazardousness of the radioactive waste and the need for being able to take care of all waste provides motivation for a producer responsibility. A suitably formulated producer responsibility makes it also possible to successively reduce the amounts of waste and diminish the hazardousness of the waste. Generally, there is a direct relationship between the amount of waste that a radioactive product gives rise to and the costs for dealing with the waste. Reduced activity in the product simplifies the management in all aspects, when it comes to taking care of the waste. Reduced activity and short-lived isotopes diminish the demands on final disposal and, therefore, make the waste management cheaper. Even when designing a product, producers have greater opportunities of taking these possibilities into account for making the products cheaper to deal with.

In my opinion, there is, therefore, motivation to develop a system of producer responsibility for radioactive products. Moreover, such a producer responsibility has to be added to the existing Radiation Protection Act regulatory framework.

Producer Responsibility And New EU Legislation

Two EU directives are especially important, when it comes to producer responsibility: the WEEE Directive, already in force, and the HASS Directive concerning High Activity Sealed Sources. Both of these are minimum directives.

The WEEE Directive, which introduces producer responsibility for waste from electrical and electronic products, already includes several product groups that contain radioactive substances or radioactive sources. The directive imposes responsibility on the producers to collect, handle, recycle those materials that can be recycled from the products and to dispose of the remaining waste in an environmentally compatible way. The producers must be able to financially guarantee the waste management of the new products being released on the market. The directive also charges the producers of consumer products to be collectively responsible for the collecting and taking care of historic waste, i.e. the electrical and

electronic waste found in households before 13th August 2005 when the directive's regulations come into force.

With the WEEE Directive, there already exists a producer responsibility for a large amount of products containing radioactive substances. The directive is currently being incorporated into Swedish legislation.

The HASS Directive is now a subject for a second reading in the European parliament and is expected to be adopted within the next six months. Its contents are well known and will probably not be changed to any great degree. The aim of the HASS Directive is to strengthen the monitoring of strong radiation sources, in order to prevent worker and public exposure to ionizing radiation, due to abandoned sources or a bad monitoring of sources. The HASS Directive places a number of demands on the taking care of high activity sealed sources. One concerns financial security for dealing with waste from these radiation sources. Measures must have been taken in advance for dealing with the radiation source, when waste has occurred. Such measures could be to return the sources to the supplier for further management. In the HASS Directive, there are, accordingly, several components that could be included in the Swedish system for producer responsibility for IKA. The HASS Directive will also be binding for the member countries.

The starting point should be to find a system for producer responsibility that can cover all products, from the high activity sealed sources to the single-unit smoke detectors and network smoke detectors and other consumer products for private or commercial use that utilize radioactive substances.

A producer responsibility for radioactive product waste should partly include an obligation for the producer to be responsible for the collecting, management and final disposal of radioactive waste, and partly a liability to leave financial guarantees for the managing and final disposal of the waste. Producer responsibility should also include historic waste, like orphan radiation sources. A producer responsibility that includes these parts can, in Swedish legislation, realize most of the demands in the WEEE and HASS Directives, when it comes to those sections that refer to products that give rise to radioactive waste. In this way, there will be a large congruity between radioactive and non-radioactive waste, regarding producer responsibility.
In my opinion, the producer responsibility model is the system that best meets the demands made on non-nuclear radioactive waste, with regard to product waste. This also has the advantage of leaving considerable room for the market to formulate the systems that can provide for collecting, managing and final disposal, if necessary, in a cost effective manner.

Demands For Financial Solutions

A system with financial guarantees must be created for dealing with radioactive waste, so that needed resources can always be guaranteed. Due to the hazardousness of the waste, there is motivation for not allowing radioactive substances to become orphan or to be illegally utilized for anti-social purposes. Even if companies go bankrupt or change the direction of their operations, the necessary resources must exist for taking care of the radioactive waste.

When it comes to IKA, the demands have to be high. A financial system for IKA ought to meet the following demands:

- have the potential to result in a 100% safekeeping
- secure financing over a long period
- provide high and secure yields on established resources
- allow fees or appropriations that lead to reduced amounts of waste and diminished hazardousness in the waste

- must function well
  - organizationally
  - environmentally
  - financially and
  - legally

The demands will be especially clear, if one considers the case that, in most instances, radioactive waste must be stored, sealed in special rock shelters for many centuries. Suitably sealed storages do not presently exist and will not become a reality for another 30 years or so. The financial resources have to also be secured for long periods. The delay is so long that many companies might have left the market for various reasons, when the costs for final disposal arise.

As a basis for the formulation of my proposal for a financial solution to radioactive waste, a report, carried out by the accounting firm, Öhrlings, has been presented, i.e. The Financing of IKA Waste (final report 2003-0707. This also throws light on some existing solutions for funds that are of interest to my investigation.

Today, there exist four state funds for waste. They are the Nuclear Waste Fund, the Studsvik Fund, the Battery Fund and the Car-Wrecking Fund.

The Nuclear Waste Fund

The Nuclear Waste Fund is a state fund system, created in 1981 to ensure financing of radioactive waste from nuclear power stations. The financing is regulated by legislation (1992:1537) concerning the financing of future expenditure for spent nuclear fuel. In 1996, a special administrative body was established for the fund, when the Nuclear Waste Fund was formed and its board became responsible for management of the fund. Earlier, the resources were placed in an interest bearing account at the Bank of Sweden. The fund has a book value of SEK 29·4bn (approx. €3·2bn) and a market value of SEK 31·3bn (approx. €3·4bn).

The Studsvik Fund
Waste from, among others, the combined power and heating nuclear plant in Ågesta, the research reactor, R1, in Stockholm together with the research reactor, R2, in Studsvik, are regulated by their own legislation (1988:1597). The costs for taking care of this waste are imposed on the owner of the nuclear power stations at a rate of 0·15 öre/kWh (approx. €0·00016 per kWh). These resources are also put into the Nuclear Waste Fund, but in a separate account.

The Battery Fund
The battery Fund is a state funding system to ensure the taking care of environmentally hazardous batteries. The fund is formed on two pieces of legislation, partly on legislation (1990:1332) regarding charges for environmentally hazardous batteries and partly on a regulation (1997:645) regarding batteries. The Swedish National Environmental Protection Authority may announce further regulations for the execution of this regulation. The fund started in 1986. The resources are placed in an account at the National Swedish Debt Office. The total balance for quicksilver batteries is SEK 68·4m (approx. €7·4m), for lead batteries SEK 262m (approx. €28·5m) and for nickel cadmium batteries SEK 243m (approx. €26·4m). The total fund balance amounts to SEK 573m (approx. €62·3m).

Other financial solutions

As set out above, there are several alternative solutions for guaranteeing the financing of radioactive waste. In this context, Öhrlings has also made a lucid study of the pros and cons of a private fund solution.

Along with the state funds for covering the costs of waste, there are also examples of private solutions. These apply to, for example, electronic waste and, in part, quicksilver.

My proposal is a State Fund

On the basis of the discussion going on regarding the possibilities of meeting the demands placed on the financial mechanism for radioactive waste, a state fund is my proposal for guaranteeing resources for managing radioactive product waste.

As will be seen from my proposal concerning industrial waste and other waste (section 2.2 and 2.3 in the extended report), the proposed state fund solution could also be utilized for industrial waste as well as certain other wastes.

Öhrlings were also given the task of analyzing and formulating a basis for a working fund solution for IKA. In the work, they have used the Nuclear Waste Fund as a starting point. When it comes to the administration of paid resources, the association of the IKA Fund with the Nuclear Waste Fund is the only realistic and efficient alternative.

Single-Unit Smoke Detectors And Network Smoke Detectors

As previously mentioned, these products are also included in the WEEE Directive. This means that, irrespective of how the management of radioactive single-unit smoke detectors and network smoke detectors is formulated in the framework of this investigation, these products will in any case come under the WEEE Directive provisions about producer responsibility. With the aid of producer responsibility for radioactive product waste and the establishing of the IKA Fund, certain of the WEEE Directive obligations for these products will be realized in Swedish legislation, through the IKA regulations. In certain regards, under the WEEE Directive, there will be stricter regulations applied to radioactive products than to other products. For the IKA Fund, certain problems arise, especially in relation to the implementation of the WEEE Directive. Optical single-unit smoke detectors and network smoke detectors (not utilizing radioactive substances) will fall under the WEEE Directive, even though they are not included in the producer responsibility for radioactive products and not in the IKA Fund demands on advance payment of fees for the taking care of waste. The Swedish National Environmental Protection Authority is currently investigating exactly how the WEEE Directive will be realized in Swedish legislation.

In relation to the producers of radioactive single-unit smoke detectors and network smoke detectors, the difference is that producers of optical single-unit smoke detectors and network smoke detectors need not make payments to the IKA Fund, but can find other collective solutions, according to the WEEE Directive for the collection, management and final disposal of radioactive single-unit smoke detectors and network smoke detectors. All radioactive single-unit smoke detectors, that can be collected, should nevertheless be collected and dealt with.

Network smoke detectors are mostly used in fixed installations in buildings. This applies to, for example, larger buildings, hotels, hospitals, office blocks and industrial premises. When demolition takes place,

network smoke detectors, among others, could be treated as demolition waste. I have been told that this matter is also being handled by a Swedish National Environmental Protection Authority work-group, working with the realization of the WEEE Directive.

I do not consider that these relationships are in conflict with my proposals. If the Government should find that the realization of the WEEE Directive demands another management of producer responsibility for products in certain fixed installations than my proposal does, I proceed from the fact that the Government will also check whether other such regulations would apply to radioactive network smoke detectors.

Waste Through Enrichment By Naturally Occurring Radioactivity

Industrial Waste

Radioactive substances occur naturally in nature. One example is radium. They can be enriched and concentrated in certain industrial processes, which deal with large amounts of naturally occurring substances. This applies, for example, to water flows in pipes and contaminated oil. Industrial water is filtered in many contexts and these filters can concentrate radioactive substances that occur naturally. This even applies to heat exchangers and municipal drinking-water treatment works. Peat ash and ashes from combustion of bio fuels may contain significant amounts of radioactive substances. Ashes from bio fuels may contain cesium 137.

This waste, usually called NORM (Naturally Occurring Radioactive Material) or TENORM (Technically Enhanced NORM), has to be introduced into the waste-flow under the same criteria as for other radioactive waste. It occurs, in most of the cases, in activities that do not have activities involving radiation as a primary objective, i.e. that are not in operation with radiation, according to the definition in §5 of the Radiation Protection Act. The enriched or concentrated radioactivity is an unwanted by-product, as is other waste or pollution from operations. Waste that occurs, in the manner described in enterprises that are not licensed to operate activities involving radiation, is called industrial waste.

The Environmental Act and Radioactive Industrial Waste

According to ch. 9 §1.3 of the Environmental Act (1998:808), environmentally hazardous operations are considered to be, among others, the use of land, buildings or installations in such a way that inconvenience may occur to the surroundings through ionizing or non-ionizing radiation, among other things. This makes it possible to assess such operations for authorization that give rise to inconvenience, due to radiation from radioactive waste, as an example. In ch. 9 §6.3 it states that it can be forbidden to release or store solid waste or other solid substances, if this can lead to land, water areas or ground water being polluted without authorization. Furthermore, according to ch. 2 §3 of the Environmental Act, all who operate activities must take the protective measures, observe the limitations or practice the precautionary measures necessary for protecting against damage or inconvenience to people's health or the environment. The Environmental Court or a County Administrative Board realizes a permit appraisal for environmentally hazardous operations. According to ch. 22 §25 section 8 of the Environmental Act, a judgement on a permit, where appropriate, contains decisions about the conditions necessary for the management of waste and recycling and re-utilization if the management, recycling or re-utilization can give rise to inconvenience for the external environment. The permit appraisal organ can further commission the supervisory authority to issue detailed conditions for dealing with waste. It is, consequently, fully possible to assess radioactive industrial waste for authorization, according to the Environmental Act.

In ch. 6 of the Environmental Act, there are regulations concerning Accounts of Environmental Consequences (MKB). Accounts of Environmental Consequences have to constitute an important component, when assessing industrial waste, according to the Environmental Act. However, SSI has to

play a proactive role in informing about problems with radioactive industrial waste, aimed both at the permit assessing authorities and the supervisory authorities, as to the lines of business involved.

SSI has to be given an important role in supplying training courses and information about operations that give rise to radioactive industrial waste and radiation matters related to these. In my opinion, it is fully reasonable to systematically assess a number of operations, from the aspect of radioactive waste, according to the Environmental Act. Within the framework of a system for the appraisal of radioactive industrial waste, in accordance with the Environmental Act regulations, wider demands will be placed on SSI.

In a communication to the committee, SSI has mentioned several deficiencies concerning the role of SSI in relation to the Environmental Act.

On the basis of the knowledge that has been collected at SSI and others, a survey on which industrial processes and operations are the most important to attend to, ought to be carried out. This will probably lead to a number of enterprises that possess a permit, according to the Environmental Act, having to be reappraised, with regard to radioactive industrial waste. SSI is not currently included in the circle of authorities that have the right to propose the reappraisal of existing operations. In my opinion, this ought to be changed. I therefore consider that SSI should be given a corresponding right, like the Swedish National Environmental Protection Authority, the Legal, Financial and Administrative Services Agency and the County Administrative Board, to request reappraisal in the Environmental Court, according to regulations in ch. 24 of the Environmental Act.

Reappraisal is a process demanding resources that require large efforts from the authority that requests reappraisal and from other authorities, including the body that grants permits as well as the operator of the activities. A faster and more efficient way than requesting reappraisal could be for the supervisory authority to issue an injunction or a ban. In my opinion, SSI should also test the possibility of utilizing the supervisory authorities in order to reach a correct management of radioactive industrial waste that was not previously regulated. In itself, this could demand further contacts with and information work aimed at the supervisory authorities. However, this could avoid demands on resources when it comes to reappraisals.

SSI has the collective skills, when it comes to radiation protection in the country. It must be the role of SSI to be able to issue general advice and instructions for industrial waste, operative supervision and supervisory guidance in those cases where, according to the Environmental Act, other organs are the supervisory authorities. This could be achieved by adding SSI in the Ordinance (1998:900) regarding supervision, according to the Environmental Act. This implies that the authority would be included in the supervisory and regulatory council of the Swedish National Environmental Protection Authority.

SSI has suggested to the committee how the definition of operations involving radiation, in the Radiation Protection Act, §5, could be expanded to make it possible to issue general advice and instructions in those cases where industrial waste is not appraised, according to the Environmental Act. This would be achieved through an amendment to §13 in the Ordinance (1998:900) to the Environmental Act.

In my opinion, such operations, appraised, according to the Environmental Act, for reasons other than radioactive industrial waste, should be the subject of permit appraisal or reappraisal, as well as when it comes to radioactive industrial waste, if appropriate. In other cases, industrial waste should be regulated, according to the Radiation Protection Act, with support from the amendments that I have just given an account of.

To avoid double appraisal or regulating, in those cases that are tried according to the Environmental Act, a limitation clause should be written in to the Radiation Protection Act. SSI has submitted a proposal for

an amendment, a new paragraph, §23a. According to this amendment and according to the Radiation Protection Act, a permit is not needed for such operations that are included in §5, second section, if authorization is required according to the Environmental Act (1998:808) and nothing else is prescribed in the permit issued, according to the legislation.

The Environmental Act applies, parallel with the Radiation Protection Act. Those that operate activities with radiation are also liable, apart from the provisions in the Radiation Protection Act, to observe and put regulations of the Act into practice. If a conflict between the legislation should arise, i.e. a regulation in the Environmental Act should be inconsistent, in relation to some regulation in the Radiation Protection Act, then the provisions in the Radiation Protection Act take precedence over the Environmental Act. According to the Environmental Act, the permit appraisal authority should pay attention to these relationships during the appraisal itself.

Connection to the Financing System for Product Waste

With the aid of the Environmental Act regulations, it is possible to make demands on operators of activities to allocate resources for after-treatment, by taking care of arising waste. The easiest way of achieving this is for the permit appraisal authority, in the permit, to enlighten the operators of the activities that they are liable to pay a fee for, according to legislation for the financing of non-nuclear radioactive waste. In this way, the IKA Fund could be a general instrument for the financing of radioactive waste that demands financial guarantees for being taken care of and/or for final disposal, if necessary. Even in cases, where industrial waste is regulated through the Radiation Protection Act or through general or specific regulations, with the support of the amendments suggested above, these could be connected to an obligation for paying a fee to the IKA Fund.

Final Repository Capacity

Single-Unit Smoke Detectors and Network Smoke Detectors

It is estimated in households that between 500,000 and 700,000 single-unit smoke detectors, with a radiation source, are left each year for scrap, at least during the past decade. It is thought that network smoke detectors only consist of an historic waste of c.c. 1·3 million network smoke detectors.

The total number of radiation sources from smoke detectors that are annually taken care of, is estimated to lie in the vicinity of 600,000 to 840,000. The annual volume of waste is estimated to be 90 to 110 concrete moulds of 1·7 m^3 each, i.e. c.c. 170 m^3/year.

Sealed Radiation Sources and Other Long-Lived Radioactive Waste

About 200 radiation sources are annually delivered to Studsvik AB for scrapping. It can be assumed they need to be disposed of in a sealed storage for long-lived radioactive substances, in the same way as waste from single-unit smoke detectors. In this case, the volume is small and estimated to be a fifth of a concrete mould. Other waste sent to Studsvik AB from industrial and research operations and which contain radioactive waste, demanding an equivalent kind of final disposal, are estimated to reach an annual volume approximately equal to a quarter of a concrete mould.

Final Repository of Long-Lived Waste

The conclusion is that the annual requirement on space for depositing in final repository for long-lived radioactive substances can be estimated to be c.c. 200 m3 per year, at least for the next decade. The usage of single-unit smoke detectors and network smoke detectors with radiation sources will diminish and be replaced by alternative technology. This explains why the need for final repository will diminish considerably and, in the long term, will likely end up being 2 m3 or less per annum.

Low and Medium Active Waste

Annually, Studsvik AB accepts and burns about 4 tonnes of waste containing relatively short-lived radioactive substances from hospitals, research institutes, pharmaceutical companies and industries. The ashes from this are placed into waste containers and sent to the existing final repository, SFR, at the Forsmark nuclear power plant. This part of the waste-flow functions well and no increase in requirements is expected.

The requirements can be summarized, according to the following table. The amounts are approximate.

Type of waste	**Final repository**	**Historic volume pre 2003**	**Annual volume post 2003**
Single-unit smoke detectors	SFL	7 mill./1,700 m3	700,000/170 m3
Network smoke detectors	SFL	1·3 mill./300 m^3	130,000/30 m3
Radiation sources	SFL	2,000/30 m3	200/0·3 m3
Other	SFL	not known	0·4 m3
SFR waste	SFR	0	2 m3
Ashes from bio fuel	near surface deposit	0	30,000 tonnes

Available Final Repository Capacity

There is presently no final repository for highly active and long-lived waste. The Swedish Nuclear Fuel and Waste Management Co. (SKB) plans, however, to build one, mainly to take care of long-lived radioactive waste from the nuclear technology industry (SFL-5). According to preliminary plans, a completed storage facility could be ready within 30 to 40 years. Until then, all such waste must undergo intermediate storage. IKA can be temporarily stored at Studsvik, where there is a rock shelter for 6,000 m^3 of packaged waste, with a large available capacity. With the information available and with today's know-how, I assess that the space will probably be sufficient for the whole period of 40 to 50 years.

The compilations that the committee has made comparing the needs for final repository capacity for IKA and the capacity of the existing or planned final repositories show that the needs for IKA are small, in relation to the needs for the waste from nuclear power. Thus, IKA can very well be accommodated in the existing and planned capacity. In certain cases, re-licensing is required to make it possible for SKB to accept certain nuclides that, for example, SFR is not currently licensed for.

My assessment is that final disposal for all Swedish IKA will be realized in the existing and planned final repositories for nuclear technology waste.

SKB and Final Disposal

Today, SKB has no direct obligation to accept IKA, but SKB has itself expressed its ambition thus: "We take care of Sweden's used nuclear fuel and radioactive waste so that the environment and people's health are protected in the short and long term."

As stated, the matter of final disposal should not be any great problem in the future, from the aspect of capacity. IKA volumes are significantly less than the volumes of nuclear waste, even if the isotope combination can vary. With the final repository that exists (SFR) and the SKB planned final repository, SFL, it should be able to finally dispose all IKA within the foreseeable future. Under certain circumstances, a commercially practicable alternative could be to use additional space in the planned rock shelter repository for quicksilver.

The committee has had a special discussion with the SKB management on this matter. An important component in the investigation work has been to clarify the needs for final repository and estimate the costs involved. As a basis for this, SKB has undertaken to finally dispose all IKA that can be disposed of

in a SKB final repository, under certain conditions. According to SKB, the principle would be cost price for final disposal and resources from the IKA Fund could be requisitioned to cover the increasing general costs for the licensing or re-licensing that could be demanded, so that it will be possible to finally dispose certain substances and material that were not originally included in the planning. This applies, for example, to the existing SFR for low and medium active waste that was licensed in the 1980s. My opinion is that this is a reasonable demand.

The most expedient way to proceed, for implementing final disposal for IKA within the framework of the SKB final repositories, is a basic agreement between the state and SKB about SKB putting its final repository capacity at the disposal of IKA. The agreement would, among other things, regulate the principles mentioned above and function like some kind of suborder agreement for all those responsible for waste and who need to utilize the final repository capacity.

Forms for Ensuring that Studsvik Accepts Radioactive Waste

Since the middle of the 1990s, the Sate no longer has ownership in Studsvik. The activities at Studsvik consequently now rests on commercial grounds. This circumstance, taken together with the fact that Studsvik AB is today the only organization in Sweden that has the skills and capacity to take care of non-nuclear radioactive waste, has created a situation where a non-state owned company owns the monopoly position on these services. For example, today, Studsvik AB does not provide waste management of network smoke detectors.

Some possible solutions to overcome the situation could be to establish, for example, a state enterprise in the area, introduce state incentive to stimulate or compensate industry, establish funds (to be paid by producers of waste) that guarantee compensation, or legislate or agree to a liability (for Studsvik and other firms in the trade to take care of). The committee has studied these alternatives and has come to the conclusion that legislation for a liability to accept radioactive waste is the most attractive way to ensure that waste will always be taken care of. SSI has produced a proposal for such wording of an Act.

However, in this context, we must pay attention to the changes that should occur on the market for radioactive waste, if the national system that is being proposed in this investigation is to be realized. With the introduction of a producer responsibility and, with this, the connected fund for guaranteeing payment responsibility for IKA, the market picture is altered. Another factor of importance is the commitment to finally dispose all IKA that requires final disposal, as SKB has done.

In my opinion, the effects on the Studvik situation will be many. In its operations, Studsvik no longer needs to absorb risks, when it comes to final disposal. Those responsible for producing waste or other parties can close their own agreements with SKB, if the final disposal part and Studsvik's services can be purchased separately. With that, the Studsvik operations and offered services will be wholly independent and there will be well-defined sections in the waste management chain. My conviction is that the market, with its prerequisites, will solve the problems for Studsvik in its present situation and the problem of Studsvik's monopoly position will mainly disappear. The new market situation could also open up for market participants, other than Studsvik AB. This means that, even if it is possible to legislate for an injunction for handlers of waste to accept radioactive waste, then this solution should not be used in the situation that is expected to arise. The developments on the market should, however be closely followed by the Government and the authorities. If the favorable developments, that I presuppose, do not come to fruition for various reasons, a binding legislation may have to be reconsidered.

SURVEYS

Types Of Waste And Waste-Flows

As a starting point for its considerations, the committee has had the survey of types of waste, waste-flows and development trends that SSI has carried out within the framework of its internal project, i.e. the IKA Project. The entire background material will be published as a special SSI Report (2003:22).

Consumer Items, Smoke Detectors etc.

Calculated as the number of units, the biggest individual type of IKA consists of scrapped radioactive single-unit smoke detectors from households. More than 12 million of them have been imported since the start in 1973. Currently, about 700,000 single-unit smoke detectors are sold annually.

The use of network smoke detectors with radioactive components that are included within fire alarm systems have lessened over the last few years. Nevertheless, about 130,000 network smoke detectors are sold every year. A new technology, without a radiation source, has successively taken over.

Included in this category are products, which are sold as night-seeing aids, in the form of telescopic sights, bearing compasses and bearing binoculars. A deal of radioactive waste also occurs from consumer items from former times, when it was permitted to use clocks with luminous faces and uranium compounds could be used to give a lustre to colors on ceramics and, sometimes, even on crockery and glass.

NORM – TENORM etc.

This type of waste mainly comes from industrial processes that convert naturally occurring radioactive substances (NORM - Normally Occurring Radioactive Material). These have, as a rule, been enriched through the processes. A technical term for this is TENORM (Technically Enhanced Normally Occurring Radioactive Material). Residue waste, such as slag from mining operations, sand filters or the equivalent from water works etc. are, in certain cases, so enriched with natural radioactive substances with long periods of disintegration, that the waste must be taken care of in a special manner.
Combustion of bio fuels and peat gives rise to ashes with increased contents of radioactive cesium, predominantly from fallout after the Chernobyl accident. About 100,000 tonnes of bio fuel ash from wood fuel and 30,000 tonnes of peat ash are produced annually.

Depleted uranium is a residue product that remains, when natural uranium is enriched to form nuclear fuel or nuclear weapons. It is only when the depleted uranium has to be taken care of as waste, that it presents a radiation protection problem. By a rough estimate, there are a few dozen tonnes of it in Sweden. The biggest environmental hazard comes from the chemical toxicity of uranium.

Open and Sealed Radiation Sources

Sealed radiation sources in industry are sometimes returned to the supplier when they are scrapped, but it is often the owners, themselves, who are responsible for the waste being taken care of within the country. About 700 industrial companies have authorization to be in possession of radiation sources. Every year, a varying number (dozens to hundreds) of strong to medium strength radiation sources are sent to Studsvik. IKA from hospitals, research and education rarely consist of open radiation sources, e.g. when the radioactive substance is found in the form of a liquid solution. At a rough estimate, Sweden generates a few dozen kilograms of waste from radioactive chemicals each year, which does not cause any great

waste problem. Solid waste from these operations can be protective clothing, glass jars etc. with small amounts of radioactive substances. The suppliers take most of the sealed radiation sources back as a rule, in some kind of exchange system. For practical reasons, the scrapped sources are always sent abroad to the country they came from, in such cases. The industrial sector returns a few dozen per year and treatment apparatus from the medical service accounts for about 50 per year, from hospitals. However, radiation sources from the medical care sector still occur which, after many years' usage, must be sent to Studsvik to be taken care of. Activities in research, hospitals and education are expected to continue at the present rate.

To sum up, it concerns one to two hundred strong to medium strength radiation sources from industry, hospitals, research and education that need to be finally disposed of in Sweden, every year.

Abandoned radiation sources lack known lawful owners, responsible for their scrapping. In today's circumstances, the one who finds such an orphan source, becomes likewise its owner and, with that, according to the Radiation Protection Act, is responsible for taking care of it. It is important to build an efficient system for reducing risks from abandoned sources, since these can be the cause of grave consequences with financial damages and acute radiation injuries. The International Atomic Energy Agency (IAEA) in Vienna has also warned against terrorists using orphan radioactive waste to make terror bombs, the so-called dirty bombs. In Sweden, abandoned radiation sources are reported to SSI once or twice a year.

The Radiation Protection Act And Other Relevant Legislation

The goal of the Radiation Protection Act (bill 1987/88:88) is to create such circumstances that people, for health and safety reasons, are protected from the damaging effects of radiation. Radiation protection must be formulated in such a way that, as far as possible, it can prevent radiation injuries. It must always be possible to take the necessary protective measures, with support from legislation, since knowledge is increasing about radiation effects and new substances or techniques are developing.

Legislation (SFS 1988:220) must accordingly apply in those cases, where the damaging effect of radiation may occur, e.g. with activities involving radiation, as defined in §5 of the Radiation Protection Act. By activities involving radiation, the following is meant: manufacturing, importing, transporting, selling, transferring, acquiring, possessing and using or, with that, any other comparable position involving radioactive substances, as well as using or, with that, any other comparable position involving technical devices that can produce radiation.

Those that operate activities, involving radiation, must observe and follow the general obligations, as given in §6 to §11 in the Radiation Protection Act. The operator of activities must take measures and observe the precautionary measures necessary to prevent or counteract injuries to people's health and damage to the environment. It is not sufficient to simply follow the conditions and regulations that the authorities have issued. On their own initiatives, the operators of activities must furthermore take all measures necessary to maintain protection from radiation. When it comes to operations involving radiation, the normal obligations, related to permits, apply.

Furthermore, those that operate or have operated activities involving radiation are responsible for the taking care of and, where necessary, finally dispose occurring radioactive waste in a satisfactory manner, from the point of view of radiation protection (§13). Operators of activities who have used technical devices that can produce radiation are obligated to render it harmless when it is no longer in use, if this has specially been prescribed (§14). The owner bears the full responsibility for taking care of the waste.

Legislation Concerning Transport

Radioactive substances constitute a class of hazardous goods and are therefore regulated by legislation for the transport of hazardous goods. Fundamental provisions are in the legislation for transporting hazardous goods (1982:821), whose purpose is to protect people, animals, property or the environment from damage or injury from the hazardous material. There are instructions in the regulations for transporting hazardous material (1982:923) as well as in the regulations issued by the transport authorities. For road transport, which is the dominating means of transport for taking care of radiation sources, the Swedish Rescue Services Agency has been appointed as the transport authority, with the power to issue regulations. When it comes to detailed instructions for transporting radioactive substances, all of them are based on recommendations worked out by the IAEA and published as the "IAEA Safety Standard Series, Regulations for the Safe Transport of Radioactive Material, 1996 Edition No. TS-R-1".

The consignor, i.e. the one taking the hazardous goods to another or, for their own sake, transport such goods, are responsible for submitting the correct information about the hazardous goods, so that they can be handled, packed and transported in a secure manner and in accordance with the applicable regulations.

For operations, where hazardous material is being handled or transported, there must be one or more safety advisers. The driver of a vehicle, transporting hazardous material exceeding certain amounts, must have undergone a special training course and passed an approved test.

Regulations in ADR-S state the function demands for packages, i.e. packages with their radioactive contents.

EU Legislation

The directives, that have a decisive influence of the formulation of the proposal of this investigation, are the European Parliament's and Council's directive 2002/96/EG of 27th January 2003 regarding waste that is composed of or contains electrical or electronic products (the WEEE Directive) and suggestions for the Council's directive (Provisional 2002/0005 [CNS]) regarding the monitoring of sealed radiation sources with high activity (the HASS Directive). The EU has also laid down a basis for, among others, this legislation through a basic radiation protection directive – Basic Safety Standards (BSS) that was issued in 1996.

The WEEE Directive, already in force since January 2003, is central to the IKA Investigation. The WEEE Directive establishes a producer responsibility for several of the radioactive products that are included in the committee's proposal about producer responsibility. This means that the WEEE Directive, itself, prescribes an obligation for producers to collect and take care of waste from electrical or electronic products, in an environmentally defensible manner, together with responsibility for financing the management of the waste. This applies both to waste from new products as well as to so-called historic waste.

The WEEE Directive contains regulations about collecting, handling and recycling waste that is constituted of or contains electrical or electronic products (WEEE). The goal of the directive is to reduce the amounts of waste, by promoting re-using and recycling of the components and materials in the products. It also aims at improving the environmental performance of all the involved parties, as well as the environmental properties of the products.

The directive applies to Waste Electrical and Electronic Equipment (WEEE) from households and from commercial usage in trade, industry, institutions and other sources and which, due to their nature and quality, are equivalent to those that come from households. Appendix IB enumerates the products covered

by the directive, among others, products that can contain radiation sources such as measurement and monitoring instruments in industry, equipment for radiation treatment, single-unit smoke detectors and network smoke detectors. A basic concept in the directive (art. 5) is that there must be a system that facilitates the collecting and that the returning of WEEE must be cost-free for the final user in private households. Appendix II prescribes the material and components that must be given special, selective handling. To these belong, amongst others, components containing radioactive substances. According to the WEEE Directive, producers must establish a system for collecting, taking care of and recycling recyclable material and be responsible for financing the management of the waste, which arises from their own products. Furthermore, the costs for managing the waste from households, from products released on to the market before the directive came into force (pre 13th August 2003), the so-called historic waste, must be borne by one or several systems that all manufacturers on the market must contribute proportionally to, for example, in relationship to their respective market shares on the various product markets, e.g. radioactive products such as single-unit smoke detectors.

Article 8 §4 states that a producer in an EU country, other than Sweden that sells via mail order or Internet is still obligated to finance taking care of its product waste in Sweden.

Obligations, concerning the financing of historic waste from commercial users, can be found under article 9, but are already outplayed. A proposal for a new article 9 was already promulgated on 29th April 2003. This means that producers are only obliged to finance the historic waste, when they sell a new product that has the same function and that replaces the old product. For other cases, the owner is obliged to pay for taking care of the waste.

The directive comes into force in Sweden on 13th August 2005. The national legislation must be effected on 13th August 2004.

According to a draft of the directive from the European Parliament and Council (Provisional 2003/0005 [CNS]), new regulations will apply for monitoring High Activity Sealed Sources (HASS). The goal is to prevent radiation from strong radiation sources, due to inadequate monitoring. With that, the directive has a direction that is very much in line with the starting points that the IKA investigation has. According to the proposal for the directive, there must be a demand for authorization for the possession of sources of radiation and, before a permit is issued, the member countries must ensure that enough resources exist to guarantee a secure waste management, by providing financial security or by another way. The authorities must keep a register of all those with permits with their possession of strong radiation sources and the radiation sources must, according to the proposal, be identified with labels. There are about 500 strong radiation sources in Sweden that will come under the directive.

The European Commission has presented a comprehensive proposal for the nuclear technical area, called Nuclear Package. The proposal, that is presently (Nov. 2003) undergoing advisory discussions, contains, among other things, a directive proposal concerning safety norms for the Union's nuclear technical plants, together with a directive proposal concerning the management of spent nuclear fuel and radioactive waste. By radioactive waste, is meant both waste from nuclear technical plants and from other operations unrelated to nuclear technology. In general, according to the proposal, it concerns minimizing the occurrence of radioactive waste. According to the proposal, the member countries must establish a long-term programme, with a detailed timetable, for the management of spent fuel and radioactive waste.

Other International

The IAEA convention on waste – a convention about safety, when managing spent nuclear fuel, and about safety, when managing radioactive waste, – came into force on 18th June 2001.

The convention on waste was applied to safety, when managing radioactive waste, originating from civilian usage. The convention on waste has three goals that concern IKA. The first goal is to achieve and maintain a high safety level, concerning the management of spent nuclear fuel and radioactive waste over the whole world. The second goal is to ensure that, during all phases of the handling of spent nuclear fuel and radioactive waste, there will be effective protection against possible dangers, so that individuals, society and the environment will be protected from the hazardous effects of ionizing radiation, now and in the future, in such a way that the needs and ambitions of today's generation will be provided for, without jeopardizing the opportunities for future generations to provide for their needs and ambitions. The third and final goal is to prevent accidents with hazardous radiation effects and to limit their damaging effects, if they should however occur.

The committee has studied selected countries in Europe, based partly on the reporting that the countries have done, according to the IAEA convention on waste. The committee has also made field trips to the relevant ministries and authorities in Germany and France. The committee has also met with US representative authorities from an equivalent to the Swedish Nuclear Power Inspectorate, i.e. Nuclear Regulatory Commission (NRC) and their National Environmental Protection Authority, i.e. the Environmental Protection Agency (EPA).

In Europe, the majority of the studied countries apply the principle that the polluter must pay. Two countries, Switzerland and Hungary, do not, however, take the full covering cost for the management. All countries, studied, have some form of organized receiving station for radioactive waste (including sealed radiation sources) that are then conditioned (wrapped) and, in many cases, are also given intermediate storage. With some few exceptions, the waste plants are directly owned or run by the state, with a responsibility and an obligation to accept, condition and store waste. In no other country, that we studied, is the waste management taken care of on purely a commercial basis, except in Sweden.

Organizations And Distribution Of Responsibility

The Swedish Radiation Protection Authority (SSI)

The Swedish Radiation Protection Authority (SSI) was formed in 1965 and has a staff of about 110. This authority is responsible for minimizing the damaging effects of radiation on people, animals and the in Sweden. The responsibility includes both ionizing radiation (e.g. from radioactive substances) and non-ionizing radiation (e.g. from electromagnetic fields). SSI supervises operations that give rise to radioactive waste at nuclear technical plants, hospitals, industries and research activities. SSI has been given the task, on a national level, of planning and organizing preparedness against nuclear technical-related accidents and other serious accidents with radiation. Moreover, the authority carries out certain research into radiation and radiation protection, as well as financing radiation protection-related research at other institutes.

The Swedish Nuclear Power Inspectorate (SKI)

The Swedish Nuclear Power Inspectorate (SKI) was formed in 1974 and has a staff of about 115. The SKI is a supervisory authority for nuclear technology activities in Sweden, i.e. for nuclear power plants, nuclear fuel production and other nuclear technical plants, transportation as well as waste management. The SKI also finances research in the area of nuclear safety. The authority's activities are financed through fees paid by owners of permits.

The Swedish Rescue Services Agency

The Swedish Rescue Services Agency was founded in 1986 and has a staff of about 900. At the Agency's Center for risks and safety training courses, courses are held on protection against accidents, on risks and on safety. The courses are held for individuals, special occupation groups, organizations, companies and for other countries. The Swedish Rescue Services Agency issues instructions and norms for, among other

things, fire protection, transportation of hazardous goods and the safe management of inflammable and explosive materials. One example is the SRVFS 2000:3 regulation about information to the public, if an emergency situation that carries risks of radiation should occur. Even in the regulations for transportation of hazardous materials by road or rail, there are regulations related to radioactive substances.

County Administrative Boards

The County Administrative Boards are supervisory authorities, according to the Environmental Act (1998:808), for environmentally hazardous operations. Operations that include the management or storing of radioactive waste, including spent nuclear fuel, must have permits, according to the Environmental Act. The Government and the Environmental Court make appraisal, according to the Environmental Act. Appraisal for permits, according to the Environmental Act, is also required, when amendments occur, if this means that a significant problem affecting people's health or the environment may arise.

The Swedish Nuclear Fuel and Waste Management Company (SKB)

The SKBF was founded in 1973 by the nuclear power companies. The objective was to take care of the procurement of uranium fuel and the management of nuclear power waste. From 1984, the company name has been SKB (The Swedish Nuclear Fuel and Waste Management Company) The SKB now has the task of taking care of Sweden's spent nuclear fuel and radioactive waste. The ownership of the SKB looks like this:

Sydkraft Kärnkraft AB	12 %
Vattenfall AB	36 %
Forsmarks Kraftgrupp AB	30 %
OKG Aktiebolag	22 %

A staff of just on 20 is employed at the SKB, but the SKB also has a comprehensive collaboration with experts and employees from outside the company. Counting these in, there are about 500 employees taking care of Sweden's radioactive waste. The SKB head office is in Stockholm, with a further seven offices or operating units around the rest of the country. The SKB has begun site investigations in Oskarshamn and Forsmark, where new expansion will take place.

Studsvik AB

Atomic Energy Ltd. was founded in 1947, with the task of developing, building and operating nuclear plants in Sweden. The company came under the supervision of the Department of Trade and was 57% owned by the state. In the 1970s, it changed its name to Studsvik Energy Technology Ltd. Today, the Studsvik Corporation is listed on the stock exchange (introduced in May 2001). Eight million shares are divided among about 8,000 investors. The largest owner is the investment company, Euroventure.

The Corporation consists of seventeen enterprise driven companies in seven countries, with employees amounting to about 1,130. The market for nuclear related services can be divided into a number of segments. The business areas where Studsvik is active are the management of low and medium active waste, operations related services, together with nuclear medicine and other applicable areas such as radiation and reactor services.