A.-M. Thunberg  
KASAM, Swedish National Council for Nuclear Waste,  
Stockholm, Sweden

Abstract

At the outset, a short summary is given of how the ethical discussion developed historically, all from the so-called double KASAM principle of 1987 — safety in operation, combined with reparability, with controls not necessary, but not impossible — until the phase of focusing on retrievability as a result of a deepened ethical discussion. The ethical development is seen schematically according to two phases. The concept of retrievability functions as a symbol for the shift from the first to the second phase.

- Intergenerational equity is interpreted as an obligation to maximize the safety of future generations, whilst imposing a minimum of risks, burdens and costs. The basic disposal concept is an intrinsically definitive and non-retrievable one.
- The second phase carries over from the first its principle of the total responsibility of our generation, but interprets the principle of intergenerational equity as also including equal opportunities. This leads to the following conclusion: What is at stake is a precarious act of balance, with a preserved equal weight for the two principles in each decision and every measure.

Finally, some questions for future treatment are put, and the author draws the following conclusions. We can hardly advance further than to manufacture an interactive waste management system, allowing us to involve present and future generations in an open, flexible, and non-preconstrained decision making process. In such a process, retrievability presents itself as an inescapable dimension. But at the same time we cannot guarantee future generations freedom to act without providing for them a repository which is designed to be finally closed.

Let me begin my presentation by making my theme more explicit, in quoting the philosopher Sven Ove Hanson from his contribution “Twelve Theses on Nuclear Waste and Politics” to a Swedish inter-disciplinary seminar in 1987 on “Ethical Action in the Face of Uncertainty”, arranged by KASAM and what was then called the National Board on Spent Nuclear Fuel. Hanson writes:

An ethical discussion should not only be regarded as a humanistic seasoning for a ready-made technological dish. Expressed in technical terminology, ethics must contribute to the specification of the basic requirements.


The increased attention which the possibility of retrieving spent nuclear fuel placed in geological repositories has attracted during the latest few years could easily be interpreted as a fulfilment of the wish which this once radical statement expresses. In the extensive material which has become available in a few years time concerning retrievability, there are also quotations which give the increased impact of ethical aspects and principles credit for having
placed retrievability far up on the agenda. Yet, at the same time there are signs which indicate that the focus on retrievability is due to political considerations, and functions as "the political price to pay" for obtaining public acceptance (e.g., P.J. Richardson, *Development of Retrievability Plans*, DRAFT, Swedish National Co-ordinator for Nuclear Waste Disposal, March 1999, p. 25). In such a perspective there is a risk that retrievability becomes separated from the wider scope of motives and from the complex context where it only represents one aspect.

Not least against this background I have found it important for my contribution to insert indications of how the ethical deliberations around nuclear waste management was developed historically. This is necessary in order to give retrievability its right proportions, and to indicate the difficult ethical dilemmas we are confronted with.

Here a preliminary general observation is important. It may be formed as a thesis in the following way: Ethical insight is never developed in a void, but in an interplay with different areas of knowledge and competence. Since KASAM, internationally, nowadays often is given credit to being the first instance which brought the wider ethical perspective into the discussion — where retrievability is one aspect — I may be allowed to mention that KASAM underlined this strongly already in its first report on Nuclear Waste — the Scope of Knowledge of 1986 (Kunskapsläget på kärnavfallsområdet, 1986). This report contained a section entitled "Final deposit — not only a technical, scientific and economic problem". We read in that report: "Against this background (i.e., that every evaluation should be related to and build upon information and knowledge from different areas) KASAM wishes to encourage an increased understanding of the importance of ethical values in this interplay" (p.10). When these values were further specified as to their concrete implications in this case at the inter-disciplinary seminar in 1987, this occurred against the background of a broad knowledge survey from different relevant areas.

In the documentation from this seminar we also find, for the first time, an extension of the original basic concept of management of nuclear waste (= a final and sealed repository) to imply what we term today retrievability, though without yet using the term. However, we find words like reversible or accessible repository, and also the possibility for coming generations of taking control. The motives behind this are double. First of all, respect for a possible need of reparability. Secondly, advances in knowledge may be such that coming generations will have the capacity to improve the safety of the repository and/or allow them to use the waste as a resource. We have no right to deprive future generations of these options (Ethical Aspects of Nuclear Waste, SKN report 29, KASAM/SKN, April 1988, p. 14 f).

On purpose, I used the word extension, not substitution. Consequently, it is also important to remind us of the double conclusion of the seminar: "A repository should be constructed in such a way that it makes controls and corrective measures unnecessary, while at the same time not making controls and corrective measures impossible. In other words, our generation should not put the entire responsibility for maintenance of repositories on coming generations — however, neither should we deny coming generations the possibility of taking control". Thus, there is a two-edged objective: Safety in operation combined with reparability, with controls not necessary but not impossible. This double conclusion must be strongly underlined, and I will return to it.
At that time, in 1986 and 1987, KASAM's conclusions were far from accepted, even though the philosophical morality ideas from which they were nurtured were available since decades. What was new, however, was that this way of thinking was applied to the question of nuclear waste, and that time was ripe for a constructive interplay between this thinking and other factors like knowledge and technology development and social processes. Today, when we can establish that the question of retrievability successively has come into focus in our discussions, we know that this is the result of a concerted process. This process is a complex one, and contains in itself an interplay between different factors, mutually corrective and interdependent. Three of these factors may be pointed out.

(a) A more deepgoing and widened ethical discussion, based on a growing awareness of the consequences, for man and the environment, of an unforeseeable future of human activity. All from KASAM's first ethical outline in 1986, the problem of intergenerational equity, i.e. our responsibility for a fair distribution of opportunities between now living and future generations, played a very important role. Not least internationally, our discussions have been inspired from e.g. the World Commission on Environment and Development Report *Our Common Future*, with sustainable development as its key notion. Owing to a number of factors, radioactive waste has been among the first, if not the very first, of environmental problems to come under wide scrutiny.

(b) A growing need has been felt for a democratically rooted basis of the necessary decisions, as far as choice of systems and places are concerned. Not least due to the pressure from affected citizens on the local level, the question of nuclear waste has turned out to be, not only — as was presupposed in the beginning — a problem of technical skill and scientific knowledge, but to an equal degree and on all levels an ethical question (cf. the quotation from 1987 I started with). Thus, also all engaged citizens have an indispensible competence to contribute. Besides, those uncertainties which are unavoidable in connection with the responsibility for long term consequences, have turned into a key question the problem of how we, with preserved credibility, may make binding decisions for coming generations.

(c) Decisive have also been the experiences of continued research and development, leading to proposals for implementation through an incremental process over several decades, or a stepwise development of a repository. The experiences of developing a defense and protection system have, in other words, confirmed the, fundamentally, self-evident prerequisites of all technical development, i.e. it happens stepwise with due time for testing, evaluation of results, accumulation of new knowledge, improvements of construction facilities, etc. They have also confirmed the gradual character of the process, typical of all decisions, in order to secure the democratic process of decision making, where all people concerned are invited to contribute their own competence.

This indicates the context where the ethical perspective stands out. Against that background I will now concentrate my attention on the first factor, i.e. the more deep going reflexion concerned with the problem of intergenerational equity. The reason for this, is that our obligation towards future generations, from the very beginning, defined our interpretation of our own generation's responsibility for the management of nuclear waste, and has then remained a superior principle. The decisive question, however, is how we understand what this obligation means. Here we may speak about two phases of development — where my personal judgment of the situation is that we are at present in the middle of a shift from a first to a second phase. The concept of retrievability seems to me to function as a coordinating symbol of this shift.
At the very beginning — let us call it a first phase — we interpreted our responsibility as an obligation to manage the radioactive waste "in such a way that will not impose undue burdens on future generations" (the IAEA principle no. 5). "The burden on future generations shall be limited by implementing, at an appropriate time, a safe disposal option which does not rely on long term institutional control or remedial actions as a necessary safety factor". Or, in still another alternative formulation: "Our generation, that has had the benefit of nuclear power, must also take the full responsibility for the radioactive waste, and not leave an undue burden to coming generations". The task of our generation was to maximize the safety of future generations, whilst imposing a minimum of future burdens.

Retrievability is, of course, not excluded, but is not a part of the basic concept of waste disposal. The latter is an intrinsically definitive and non-retrievable concept, and has as its goal to favour security/safety without surveillance. Such a goal is alone regarded as compatible with the understanding of intergenerational equity — as being, in the first place, a question of equitable intergenerational distribution of risks, burdens and costs.

This goal has been decisive for the system concepts of disposal, as well as for the principles of radioactive waste management and radiation protection. When, today, we discuss a stepwise development of the repository, where retrievability is possible under an experimental period of development, the basic motivation is to test the long term tenability and safety of the system concept. Retrievability is, more or less, a temporal prerequisite for a safe further system development, and is limited to the pre-closure period. In regard to future safety a reversible process during the construction period has a value of its own. As such it can also raise the level of confidence in the system.

A second phase may be characterized in the following way. It carries over from the first phase — and this must be as strongly underlined as possible — the principle of the total responsibility of our own generation. This cannot be postponed to a distant future. Every measure we take and every decision we make must include in itself — based on the present day level of knowledge — a regard for the long term effects and consequences. Yet, there is a decisive difference: the understanding of what intergenerational equity implies is widened, and the earlier concentration on equitable intergenerational distribution of risks, burdens and costs is transcended.

Of an equal dignity as that principle is the principle which KASAM was the first to clearly express in documents from 1986 and 1987: "It is of equal worth that we guarantee coming generations the same right to integrity, ethical freedom and responsibility that we ourselves enjoy" (Ethical Aspects of Nuclear Waste, SKN Report 29, p 13). The principle which this quotation expresses was later called the equal opportunities principle. It does not focus exclusively on foreseeable risks, but takes also into account resources and benefits. This assumes that considerations will be taken to future generations' options and freedom of action.

Risks and benefits cannot be completely separated. Nor can a strict time limit be drawn between generations in regard to managing the risks and benefits that make up the legacy. The latter is always a blend of risks and benefits and, in this inseparable blend, it transfers possibilities for development to future generations. In other words, the principle emphasizes an equal distribution of resources, and the freedom for future generations to make their own decisions with regard to utilisations of resources and their own value judgments about safety. However, the principle will hardly allow us to draw any far-reaching conclusions about
retrievability. Yet, it is obvious that it puts an increasing focus upon the possibility of retrieving the waste in the future, as a necessary issue to study and to take into account.

Sometimes one has talked about the two principles, now mentioned, as opposing ethical principles. I hope to have made clear that such a contrast between them is untenable. Already the knowledge available to us today about the far-reaching consequences of our actions inform us that such is the case. Today, if we would stay passive, abstain from decisions, and thus also abstain from that total responsibility which the first principle implies, we would certainly endanger the freedom of action of coming generations. At the same time, every one of our own steps implies that we, in a certain sense, both restrict this freedom and increase it through those resources which our allocation of research and development in fact supply. This doubleness characterizes all human activity in relation to our obligation to promote intergenerational equity.

The fundamental conclusion we now can draw is the following one: What is at stake is a precarious act of balance with a preserved equal weight for both principles in each decision we make and each measure we take. On the one side, this implies long term considerations on the basis of the present day status of knowledge, as far as security is concerned, including full sustainability of the chosen solution regarding the management of high level radioactive waste. On the other side, it actualises demands of sufficient openness, in order to give future generations workable options for their own actions.

Is it, then, possible to differentiate this general fundamental conclusion in more concrete requirements? I am fully convinced that this is possible, though only under one condition: an interplay between different areas of knowledge and competence, similar to the concerted process which brought about that the question of retrievability once came into focus. In that process, the ethicist possesses no other merit than, possibly, being able to demonstrate and to lay bare ethical dilemmas and conflicts between competing value judgments, when we are confronted by a need to choose our way of action. That choice cannot take place in contradiction to available knowledge. At the same time, it may force us to search for new knowledge and technical alternatives of development. For this reason, I choose here, finally, to formulate a number of questions, extracted from that obligation of responsibility which the above mentioned two ethical principles seem to clearly indicate.

(a) Should we not acknowledge that there is an unavoidable lack of balance in the dispersion of nuclear power utility benefits, such as energy, and the responsibility for the management of the high level radioactive waste that is produced? The long time span perspective — and attached to that at least partial uncertainty about the long term effects — seems to imply that the responsibility aspect extends far beyond the utility aspect, as we interpret the latter today.

(b) And will not this, in turn, lead to the conclusion that we, in our own responsibility measures, must also include future generations as acting subjects? But if so, this requires a completely new set of ideas about the role of future generations as participating in the procedure of responsibility — without our own refraining from our responsibility for coming generations.

(c) But how can we, then, visualise such a participation? Are those conceptions used in today’s debate, such as “rolling present”, “a chain of generation” or “institutional control”, fruitful as a link, or transfer, of responsibility, knowledge and resources for development between generations? If so, what is, then, the requirement of institutional structures?
Is the concept of a repository system, presupposing a stepwise and reversible process, and thereby including retrievability during the operating phase, compatible with the responsibility we may take today to guarantee future generations equal opportunities? Or is there another way for us to handle the act of balance between the two principles, than to regard it as our own generation's responsibility to work for the optimal solution, i.e. a solution which also provides conditions for effective closure of the repository? At the same time, we must do this with the openness which a stepwise process demands, when measured with today's level of knowledge — yet without pretending to know for sure whether it really is that optimal solution. The price we seem to have to pay is to act under the premises of uncertainty, while not being able to use this uncertainty as an excuse for not acting at all.

My own conclusion, after having once again re-considered the matter, is that we can hardly advance further than to manufacture an interactive waste management system, allowing us to involve present and future generations in an open, flexible, and non-preconstrained decision making process. In such a process, retrievability presents itself as an inescapable dimension — taken into consideration both the human being as a responsible subject, including the time scale relevant for society as well as for man, and the character of knowledge, especially in relation to long term effects. But — and that is now my final question — is it not also an inescapable dimension in such an open process that we provide for a repository which is designed to be finally closed? My own answer to that question is that it is our obligation towards future generations to give them also this possibility in order to really guarantee them reasonable freedom to act.

QUESTIONS (Q), COMMENTS (C) & ANSWERS (A) AFTER THE PRESENTATION

Q: Why do you think that our generation has such a deep of concern for future generations? Has that always been the case, and can we expect that in the future as well? Does it matter to us, what we believe about the intentions of the future generations in relation to the nuclear waste or if they have good or evil intentions?

A: All generations have been concerned about future generations. But as a result of our knowledge about the long time consequences and the risk for time-bombs or catastrophes, because of our actions today, the concern has been growing, and must continue to grow. It is not just a “popular trend” but quite necessary, in order not to endanger the future of the coming generations.

As an answer to your second question I will refer to the philosopher John Rawls’ concept of the “veil of ignorance”. Because we cannot have any knowledge about future generations, we have to think that they will be like us. We do not have the right to assume something worse about future generations than about ourselves and we should rely on them in the same way as we rely on our own generation.

C & Q: The discussion on ethical values is very interesting, in particular because there is not only one absolute ethical approach to a system. A Christian, a Muslim or a Buddhist society have different ethical values. There are many possibilities to judge on ethical values. Even within one society, ethical values will change with time. How do we know what future generations really do want or what their ethical values are? We cannot really judge on that. And that makes it so difficult to deal with ethical values. I agree with your conclusion that we should give reasonable freedom to future generations to act on the closure of the repository.
Future generations may not be in agreement with what we today think would be good for them. They could, for instance, have the opinion that it would have been much better if the present-day generation would have closed the repository. And that, with their technology, they would have had the opportunity to go back into the repository area, if they believe that the waste of our generation is a resource for them. I think there are two competing ethics, both are ethically valuable, both have their merits and disadvantages. Therefore it is very much a matter of a kind of democratic decision within today’s generation.

You also said that we should not make binding decisions for future generations, and I think that this is a very critical point. In terms of energy generation we are doing this and we are violating your requirements all the time. If we burn oil to produce electricity, this is a binding situation for future generations. This is irreversible. Can we — if we apply your ethical plea — still continue to burn fossil fuels, or is this not the first thing we should stop?

A: You are right that there are different ethics and that there are conflicts between values. Whatever choice we make, we are bound in some way or another. But in every choice we make, we have to include an effort to estimate long term consequences. If the consequences in the far future seem to be irreversible, then we must be very careful about what to do. The difficulty is that we do it under uncertainty. Because of that, we must have the democratic discussion too. That is the reason why I mentioned these three factors, which are included in a concerted process: the ethical values, the democratic discussion which interprets ethical values and give contributions to ethical values and the development of knowledge and technology. These three must be used together. We can never be quite sure. That is why I finished my presentation with some questions and not by trying to answer.