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Abstract
In this paper we propose a critical investigation of the founding assumptions for the legitimacy of the (internationally accepted) geological disposal option through a reading of Nietzsche’s second untimely meditation “On the uses and disadvantages of history for life”. In particular, we propose an interpretation of some of the central concepts in this text – History, the present, discourses and attitudes towards the past, etc. – and investigates in particular the effects of the confrontation between the Nietzschean concept of ‘active forgetting’ and present practices in the management of medium- and high-level long-lived radioactive waste (cat. B & C). Furthermore, we argue that this untimely meditation comes at a timely moment, i.e. at a time when modernity’s way of dealing with waste could be undergoing a major transformation. The paper ends with some reflections on our nuclear inheritance and its link with nuclear power of the future (GenIV) inspired by Nietzsche.
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1 Introduction and aim

The general theme of the “Untimely Meditations”, a work of 4 parts written between 1873 and 1876, concerns what Nietzsche describes as the numbing, ailing yet complacent condition of European, especially German, culture.¹ The treatment of this theme can be said to reflect Nietzsche’s most general line of thought: a plea for openness, creativity, vitality, autonomy. “On the Uses and Disadvantages of History for Life”, the second part of the work, applies this plea to the meaning attributed to history. In this essay, which originally illustratively was to be titled “The Historical Disease”, Nietzsche repudiates historicism, a movement that makes the present and future dependent on the past. It was this idea that caught our attention in relation to radioactive waste management (RWM) and permanent deep geological disposal of high-level wastes (HLW).

To be clear from the start, our drawing on “On the Uses and Disadvantages of History for Life” is not aimed to lead to some kind of manual to solve the issue of RWM. We use Nietzsche’s thoughts with the same general aim as he himself developed them: to tap and sound leading visions, values and ideas. A short elaboration on one of the author’s main themes, namely perspectivism, can further explain this approach.

The easiest way to explain perspectivism is a comparison with visual perception. Nietzsche points out that seeing is always one-sided. Firstly in a literal sense, we only see one side of what we observe, but also in a figurative sense, because we never perceive without prejudice. In all perception we make a selection out of a multitude of data, led by our memory, knowledge, personal preferences and so on, and by the natural urge to order things. “No matter how great the greed of my knowledge, I can not get anything else out of things that I didn’t already own”.² Seeing therefore always comes down to omission, simplification, and restriction, as well as addition, structuring and construction. Later we will elaborate upon this idea throughout the concepts of borders and barriers (cf. Section 3). Perspectivism is why Nietzsche defends pluralism: every new perspective can reveal new insights, remedy restrictions, and expose the potential falseness of the initial point of view. Habituation is the biggest threat for seeing but also for knowledge generation in general, it means the “castration of the intellect”.³ Following perspectivism and pluralism, we should not adjust to reality, but adjust reality to us.

Quite rapidly of course this view reveals a ‘moral threat’, one we discovered too when ‘applying’ “On the Uses and Disadvantages of History for Life” to RWM. Values do not escape perspectivism. The only guideline Nietzsche gives is that ‘better’ perspectives are those that clear the way for the highest creativity and freedom. This may have different meanings and consequences for different topics and actors. We will come back to this later.

Through form as well as content Nietzsche leaves his readers a lot of freedom. He does not use definitions, does not defend his statements to objections, writes evocative, switches styles and uses multiple personae not necessarily expressing his personal thoughts. This openness makes it possible for readers to appropriate his texts for the goal they have in mind. Anticipating on our case, from Nietzsche’s reading deep geological disposal can be interpreted both as a way for actively forgetting the past to focus on present and future, as well as an unjustified burdening of future generations by forcing them to remember the past we left them. This inherent flexibility of Nietzsche’s writing makes him both interesting as dangerous for misuse. This is why, once again, our ideas want to convey reflexivity, not to serve as a prescription. We want to investigate what the ‘effect’ of

¹ In this paper, we rely on the publication of the “Unzeitgemässe Betrachtungen” in the Cambridge Texts in the History of Philosophy series (Ed. by D. Breazeale, 1997). Page numbers all refer to this publication.
² “Wie Gross auch die Habsucht meiner Erkenntnis ist: ich kann aus den Dingen nichts Anderes herausnehmen, als was mir schon gehört -...” Nietzsche, F., Die fröhliche Wissenschaft, 242 ‘Suum quique’. Own translation.
applying some of Nietzsche’s central lines of thoughts could be on the current context of RWM. We don’t aim to reach a closed argumentation throughout which a well defined theory can be applied to an easily grasped reality. Rather, we understand ‘effects’ as the potential uprooting of central concepts as they dominate the current RWM debate. We particularly want to investigate the political, ethical, cultural and epistemological consequences Nietzsche’s treatment of history may have for nuclear history, more in particular for the nuclear heritage radioactive wastes inevitably constitute.

2 “On the Uses and Disadvantages of History for Life”

Humanity is existentially characterised by the temporal condition. The human present always stands in relation to past and future. This position creates an openness that is essential to mankind. It distinguishes us from the ‘tensionless’ animals (the cow happily staring into emptiness while ruminating). All action, yes living in general, requires some forgetting. Remembering everything is impossible and undesirable, new memories make place for and modify older ones continuously. Nietzsche states “the unhistorical and the historical are necessary in equal measure for the health of an individual, of a people, and of a culture” (p.63). He elaborates upon the complexity of our relationship to history and time by explaining three ‘discourses’ with regard to history: a monumental, an antiquarian and a critical one. For each type we will make a hypothetical extrapolation to nuclear energy and RWM in our times, obviously with the reservation that, keeping perspectivism and the flexibility in reading Nietzsche as pointed out before in mind, it will always be just one and our interpretation.

2.1 Monumental history: Acting and striving

“If the man who wants to do something great has need of the past at all, he appropriates it by means of monumental history;

People wanting to achieve things in the present but unable to find models, teachers and comforters in their own time, may have a monumental view upon history: a view that great people, ideas and achievements of the past are everlasting and to be cherished, a view against the transitory or replaceable character of things. Nietzsche respects this conception of the past insofar it serves the courage of the present man / people / culture to aim for achieving great things (whether in art, politics, science, social life…), in building upon the idea that what was once possible may thus be possible again. But for history to have this reinforcing power in the present, the uniqueness of the present needs to be respected. Adherents of a monumental history can be stimulated and inspired by the past, but this must not mean wanting to copy or preserve it. Contexts change continuously, different knowledge, motives and instigations lead to different outcomes, different times require different approaches to achieve something great.

What could be the result of applying a monumental attitude to nuclear energy and RWM in our current times? It could stand for something like wanting to continue and apply the belief, spirit and ambition of the pioneers of nuclear technology to RWM. They believed nuclear technology to be a magnificent source of energy and waste would thus be seen as the last challenge to fully grasp and master the nuclear technology cycle. This could imply the continuation and further development of nuclear energy throughout the revival of the ‘breeder economy’ in the GenIV strategy, coupled with partitioning and transmutation (P&T) of wastes. Spent fuel would not be categorised as ultimate waste but as a more challenging potential energy source. If ultimate waste turns out to be inevitable,
the most efficient and technologically outstanding way of disposal would be sought by leaving the beaten track and investigating every potential option until the most outstanding one would be found. A monumental vision on history would breath new life into the paradigm of growth and progress through the power of science and technology, by encouraging rejuvenation and guts within the nuclear world.

2.2 Antiquarian history: Preservation and reverence

he, on the other hand, who likes to persist in the familiar and the revered of old, tends the past as an antiquarian historian;

Adherents to antiquarian history have the following attitude: “By tending with care that which has existed from of old, he wants to preserve for those who shall come onto existence after him the conditions under which he himself came into existence” (p.72-73). Antiquarian history explicitly embraces the persistence of the past, the known, the own. It shuns novelty because dealing with things one has gotten to know and is used to in ways that are most obvious and predictable, gives comfort and confidence. People adherent to antiquarian history are conservative, they like clearly defined structures, roles and functions.

When this antiquarian sense of the past “spreads a simple feeling of pleasure and contentment over the modest, rude, even wretched conditions in which a man or a nation lives” (p.73) it is of value to Nietzsche, but he has serious reservations toward this discourse. The antiquarian sense for history “always possesses an extremely restricted field of vision” (p.74). Traditional approaches may harden in such a fashion that they undermine the search for creative, new and potentially better approaches, simply and often even unconsciously just for the sake of holding on to what is known.

An antiquarian view upon nuclear energy and RWM for our times, could be to turn back decisions made on nuclear phase out, prolonging the lifetime of current reactors and possibly building new GenIII type reactors, as they have proven their performance and utility. Nuclear energy and RWM would remain closely connected with the paradigm of the nation state. Established science-policy interfaces would stay in place. Concepts, approaches and people that have shown their use and competence in the past should not be disrupted by rash and uncertain hypothetical alternatives. Nuclear power would be seen as indispensable in order to carry on living our lives the way we are used to. GenIII reactors produce waste we are familiar with and know how to handle. Permanent deep geological disposal could be seen as a good option as it would not leave that much of a mark in the landscape, and even (near)surface repositories will in due time become markers of familiarity within the environment, just like the cooling towers of NPPs which already have become a theme for landscape painters.

2.3 Critical history: Suffering and seeking deliverance

and only he who is oppressed by a present need, and who wants to throw off this burden at any cost, has need of critical history, that is to say a history that judges and condemns”.

In the light of monumental history potentially leading to bad copying of the past and antiquarian history to stagnation, a third discourse with regard to history is needed. Critical history is about “the strength to break up and dissolve a part of the past ... by bringing it before the tribunal, scrupulously examining it and finally judging it” (p.75-76). If the past hinders present and future, condemnation is justified for the sake of revitalisation.
A critical attitude upon nuclear history in the light of the present could in extremis come down to the judgement that, if years and years of intense research cannot lead to anything less ‘primitive’ than hiding waste under the ground as deep as you can, this inevitably leads to the conclusion that we should not fritter away more time, money and brains on this technology, that maybe should not even have come into commercial existence in the first place. The judgement could thus be that nuclear power hinders a vibrant present and does not fit the great future we have in mind for ourselves. Phase out should start today so that creativity in worthy domains of research that lead to change and action can flourish, and fresh focus can be put upon innovative and better energy sources, like renewables. Permanent deep geological disposal is justified as a means for active forgetting once a phase out has been made irreversible, liberating both the present of and the future of a burdensome legacy of the past.

2.4 Preliminary summary

Although the theme of “On the use and Abuse of History for Life” is history, the emphasis clearly lies upon the present. Nietzsche doesn’t neglect the importance of history all together, he recognises the past is always somehow present in the present: “For since we are the outcome of earlier generations, we are also the outcome of their aberrations, passions and errors” (p.76). But it is essential to find the right balance between the unhistorical and the historical, because “Life is in need of the services of history, but an excess of history is harmful to the living man” (p.67). Nietzsche’s treatment of history is thus not to simply avoid it, but to open up a possibility for the past, present and future to be taken together. In this submission of the past to the ‘living moment’, both our understanding of the past and the present undergo transformations; and only this form of ‘living through’ and not just ‘reading’ the past instructs and invigorates action. Every part of the past is worth to be critically examined by the present in the light of the future, from as many different perspectives as possible. History may never enslave the present and thus the future, we are connected to what came before us but the power to determine this connection lies within the present. It is in the present that past and future collide into a moment of pure possibility and openness; for change, creativity, giving, activity; for living: “Draw about yourself the fence of a great and comprehensive hope, of a hope-filled striving. Form within yourself an image to which the future shall correspond, and forget the superstition that you are epigones. You will have enough to ponder and to invent when you reflect on the life of the future; but do not ask of history that it should show you the How? and the Wherewith? to this life” (p.94).

The text thus underlines the creative capacity of man / people / culture to escape a past that is judged to hinder a healthy, vivid present. Here the concept of ‘active forgetting’ finds its entrance. Whereas animals continuously forget passively, man has the ability also to chose to forget actively. Active forgetting is not just about rejecting or ignoring what you do not like, about criticising for the sake of criticising and discarding what one cannot handle. On the contrary, the past may be condemned but only in order to inspire the present. “Only he who constructs the future has a right to judge the past” (p.94).

Nietzsche does not make a distinction between the abstract influence of the study of the past (theoretical legacy) and the concrete influence of the past itself (material legacy). This asks for reflexivity in the light of our case of HLW and RWM. The distinction is put in between brackets by Nietzsche in favour of the main focus: the creative capacity of human being to ‘overcome’ the past. For our case, this would thus mean the past both as an epistemological as well as a factual framework. The only advise he gives on the manner and possible degree of forgetting, has to do, not with moral concepts like legitimacy and responsibility, but the creative flexibility that life itself allows and demands: “To determine this degree, and therewith the boundary at which the past has to be forgotten if it is not to become the gravedigger of the present, one would have to know exactly how great the plastic power of a man, a people, a culture is: I mean by plastic power the capacity to
develop out of oneself in one’s own way, to transform and incorporate into oneself what is past and foreign, to heal wounds, to replace what has been lost, to recreate broken moulds” (p.64).

In what follows, we will try to epistemologically investigate what this ‘plastic power’ and critical history and perspectivism in general could mean for and how the concepts may be translated to our present times, and more specifically for and to the discourse on RWM.

3 Time diagnosis: Nuclear power and theories of the present

As already pointed out, Nietzsche’s understanding of the uses of history for life explicitly departs from the notion of history as an objective reification of the past and the coupling of this historicism with an unexamined teleology, i.e. the ‘freezing’ of past events and the ‘accomplished factualisation’ of causal relationships between past, present and future. It is exactly this attitude which he vigorously exposed and criticised as the so highly esteemed core of the historical profession in particular and the prevailing culture in general in Germany in the latter half of the 19th century. Hence, Nietzsche’s attempt to cast a fresh look at history is ‘untimely’ in the sense that it comes to an outright rejection of the source of pride of his time as something which is injurious to a truly vibrant culture. The text acts counter his time and thereby also acts on his time for the benefit of a time to come (p. 60). In what sense then can this untimely aspect of the text be said to be relevant for our time also?

In the context of this paper, this ‘application’ of the Nietzschean insights to ‘our present time’ will of necessity be limited to a subset of questions – to wit the question of how to ‘read’ the statement that modernity is currently facing a turning point (which, as we will try to show, are of major interest to the question on the history and the future of nuclear power) and the crucial role of ‘waste’ (and especially radioactive waste) in this transformation. We can but skim along the surface of these questions, hoping to ‘mark’ a territory fit for further explorations. In operating this rapprochement we mainly want to state two points:

- That nuclear power programmes all over the world were structurally enmeshed in just one particular perspective which, following Zygmunt Bauman, we could call ‘solid modernity’ (Section 3.1);
- That, when following Nietzsche’s method of tapping and sounding historical frameworks in the light of pluralism, one of modernity’s key problems – dealing with ‘waste’ – is played out in an exemplary way in the context of RWM (Section 3.2).

As according to many authors modernity is nowadays undergoing a fundamental transformation (although the exact nature of this transformation is still up for debate), we argue that the ‘untimely’ aspects of Nietzsche’s second untimely meditation come exactly ‘at the right time’ for opening up this transformation to a fundamental questioning. In view of the exemplary role of nuclear power and RWM programmes in this process, the questioning effects of this confrontation will be investigated in greater detail in Section 4.

3.1 Modernity at a crossroads – What about nuclear power?

‘High’ or ‘late’ modernity, as analysed by Anthony Giddens, has through an increasing interconnectedness of globalising influences and personal dispositions created a fundamental problem of personal and collective ‘sense-making’ (Giddens, 1991). We have witnessed over the past two decades or so a number of theoretical attempts – such as ‘reflexive modernity’ (Beck), postmodernism (Lyotard), ‘liquid’ modernity (Bauman), ‘late capitalism’, etc. elaborating upon this
problem of ‘sense-making’. Not unlike Nietzsche (but the similarities usually end right there), these theories start from a ‘diagnosis’ of the current moment, by proposing an ‘epochal identity’ across a set of diverse social trends. It is not our intention here to discuss the merits of each of these attempts in any detail. Here, we would merely like to draw the attention towards a hermeneutic ‘tool’ that helps us to read processes of modernisation, in the spirit of Nietzsche’s notions of perspectivism and pluralism as they were explained in Section 1. Shields’ discourse on the importance of ‘borders’ and ‘boundaries’ is interesting in this regard (Shields 2003, 2006). Shields’ fundamental insight is that the various ‘theories of the present’ postulate large-scale changes in the dynamics of ‘borders’ (i.e. territorial or material edges such as fences, state borders etc.) and ‘boundaries’ (i.e. signs which mark borders or edges, also in an abstract sense of marking the limits of more complex fields and classes – e.g. socio-economic distinctions, cultural distinctions of taste, etc.). To understand these dynamics, Shields proposes an ‘ontology’ of borders/boundaries consisting of four ‘registers’ (cf. Fig.1).

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<thead>
<tr>
<th>Ideal Boundary</th>
<th>Virtual</th>
<th>Abstract</th>
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<tbody>
<tr>
<td>Categorical division, dividing effect</td>
<td>Concepts, indicators, cartographic conventions</td>
<td></td>
</tr>
<tr>
<td>Citizenship, identity, sense of (in)security</td>
<td>Representations, theories and concepts of the border</td>
<td></td>
</tr>
<tr>
<td>Actual Boundary</td>
<td>Concrete present</td>
<td>Probable</td>
</tr>
<tr>
<td>Line on a map, marker, signal</td>
<td>Predictable limit</td>
<td></td>
</tr>
<tr>
<td>Actual Border</td>
<td>Fence, gate, bodies, goods, danger</td>
<td>Percentage outcomes, trends, risk</td>
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Fig. 1: Ontology of the border / boundary (Shields 2006, p.227-229)

Borders/boundaries define complex objects which consist of physical infrastructure, technical artefacts, institutionally organised practices as well as cultural meanings. As shown in the figure, they are at once material (i.e. actualised in signs, markers, etc.), abstract (i.e. equipped with a conceptual apparatus on how the border/boundary should be drawn and operated), probable (i.e. they have the possibility to act upon statistical information in the form of risk estimations, trend predictions, etc.) as well as virtual. This last register is crucial and needs some more explanation. Shields (2003) uses the term ‘virtual’ to denote an intangible object that is ‘real but not actual’ and ‘ideal but not abstract’. A virtual object is something which is not present but which nevertheless holds the potential to be actualised in the future.5 This virtual aspect is of seminal importance to an understanding of borders or boundaries: it means they are not merely of interest as ‘lines’ or ‘markers’ as such, but as lines or markers with (real-actualised) effects. To make the dynamics of boundary-drawing in modernisation processes more clear, it is perhaps useful to discuss Zygmunt Bauman’s concept of ‘solid’ modernity which is intrinsically linked with the history of post-WWII nuclear power programmes in industrialised countries.

According to Bauman (2000), the historical phase of ‘solid’ or ‘heavy’ modernity (1945 – roughly 1980/90) crucially depended on an intellectual apparatus of distinctions between foundational categories such as ‘rational’/‘irrational’, ‘society’/‘nature’, ‘modern’/‘traditional’; and on a

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5 The Latin word *virtus* of which virtual originates means virtue, bravery.
fundamental drive to give those distinctions a really lasting solidity, in order to create a world which would be predictable and therefore also manageable in an economic sense. This era obviously didn’t answer Nietzsche’s plea for perspectivism and pluralism. ‘Solid’ modernity is described by Bauman in terms of its organisation in space and time. In a spatial sense, the characteristic gesture of solid modernity is one of enclosure and exclusion: if maximal efficiency is to be achieved, everything which cannot be converted into a functioning part of the system (into the single perspective, speaking in Nietzschean terms) must be ‘included out’. We will return to this issue in Section 3.2, where we discuss the status of ‘waste’ in (theories of) modernity. In a temporal sense, through the notion of ‘progress’ solid modernity was yoked to an open linear timeframe. The linear timeframe became the universal measure of progress, with regard to teleologically defined and causally fixed stages of development (1st World, 2nd World, 3rd World): time is simply a ‘countdown mechanism’ for measuring the speed of movement to higher states of collective existence. Hence, a suppression of history takes place in favour of a ‘programmed’ future. Nothing could be further from Nietzsche’s view on the uses and disadvantages of history for life.

There is a close alignment between the unfolding of post-WWII nuclear power programmes in industrialised countries and the ‘solid’ modernity discourse. First of all, the implementation of these programmes crucially depended on the tight link between ‘progress’ and ‘economic growth’; in the case of energy system planning this equation was further extended to the equation “economic growth = (exponential) growth in energy consumption”. Secondly, in view of nuclear power’s capital structure (the need for high upfront investments) it was also absolutely crucial to ensure the necessary stability in the electricity market environment in order to generate a predictable flow of revenues. Other elements contributing to a ‘stable environment’ have been summarised by Rochlin (1994, p.249) in a comparative analysis on nuclear power programmes in Germany, Sweden, the U.S.A. and France (comments in italics added by us):

1. a political consensus to leave the decisions on energy supply to a technico-scientific ‘elite’ functioning within the framework of a centralised, hierarchical and non-participative control and planning system (for investment decisions and siting choices) (boundary drawing between ‘expert participant’/’non-expert non-participant’);
2. the absence or active marginalisation of expertise going against the official government position (boundary drawing between ‘useful knowledge’/’deviant knowledge’);
3. the lack of institutional mechanisms enabling ‘outsiders’ to participate in the official planning process (boundary drawing between ‘insiders’/’outsiders’);
4. a tight connection between electric utilities and reactor vendors resulting in a standardisation of reactor designs rather than diversity based on a competition between different vendors offering different designs (boundary drawing between ‘standardisation’/’diversity’);
5. the ability to build, operate and control an electricity grid specifically designed to integrate large units such as nuclear power plants (NPPs) (boundary drawing between ‘centralisation’/’decentralisation’).

Furthermore, nuclear power programmes were also inscribed in the logic (or the boundary-drawing or the perspective) of the nation state, offering protection (and in many cases also launching the prospect of a future ‘energy autarky’ based on breeder reactors) from insecurities in the ‘world at large’ (fluctuating prices on international energy markets, scarcity of resources, etc.).

These historical reconstructions are well-rehearsed. However, by stressing mostly two registers of boundary drawing – the ‘actual-reality’ of infrastructures, power plants, energy flows etc., and the ‘ideal-possibility’ of concepts of development, progress, investment planning theories etc. – they tend to miss the crucial dimension of virtuality. In essence, such studies convey the following message: “we now understand the particular constellation of factors that led to the situation being as it is right now; but the situation could have been otherwise had the boundaries been drawn otherwise”. They stress the social agency of ‘boundary-making’ (especially apparent in studies of
the social constructivist slant) but do not inquire what makes this boundaries so effective in the first place. In his investigation of the British nuclear power programme, the sociologist Mark Winskel gives us a first hint of the effective (but not causative) power of virtual concepts such as ‘autonomy’ and ‘(technological) determinism’: “...In the corporatist and technocratic setting of the nationalised British electricity supply industry, the perceived imperatives of nuclear power technology were often allowed priority in policy making, to the extent that an appearance of the technology’s autonomy and determinism was maintained for 30 years. This had its conveniences: technical rationales disguised more contestable institutional and political interests supporting the programme. At the same time, senior politicians and scientists at times displayed a faith in the technology approximating a belief in its autonomy and deterministic power, particularly during geopolitical or industrial crises...” (Winskel 2002, p.339, bold added by us). The implication is that the introduction of a technological ‘mega-project’ such as nuclear power could not have been possible if modernity mainly consisted only of conventional ‘free-floating’ structures. Only in a ‘solid’ context supported by (amongst others) the powers of virtuality can different institutions (research programmes, administrative regulations, political decisions, etc.) intermesh to produce the kind of long-lasting stability needed for the successful implementation of a nuclear power programme.

The importance of the force of virtuality for understanding the dynamics of modernity is therefore rightly stressed by Shields (2006). Paralleling the Nietzschean focus on the nexus between action and understanding, he calls for a new ‘jurisprudence’ to support the move towards reflexive modernity, in the sense that the virtual potential of border- and boundary drawing must be performatively actualised in concrete operations and material artefacts.

Thus, while Shields is mainly concerned with the spatial dimension of borders/boundaries, we see a great potential (and certainly no contradiction) in extending his category of ‘the virtual’ to the temporal dimension of remembering/forgetting. Virtuality is for instance clearly expressed in Nietzsche’s discussion of ‘monumental history’, which has to “...diminish the differences of motives and instigations so as to exhibit the effectus monumentally, that is to say as something exemplary and worthy of imitation, at the expense of the causae, so that [...] one might with only slight exaggeration call it a collection of ‘effects in themselves’, of events which will produce an effect upon all future ages...” (p.70). Approaching theories of modernisation from a Nietzschean perspective on history could prove to provide valuable new insights in processes of social change, in the sense that it becomes possible to reposit the nuances of social change in a wider context of the dynamic interplay between different ‘registers’, including the virtuality of past events (i.e. in the words of Shields, travelling along old boundaries in the hope of recovering some of the life-enhancing force of events that happened in the crossing). In Section 4, we will give a first impression of how this perspective could lead to a renewed questioning of RWM practices, which in our opinion cannot be dissociated from a questioning on the future of nuclear power.

### 3.2 The modern fate of waste

In Section 3.1, we exposed the view that inherent to ‘solid’ modernity is the association of practices of spatial division (the drawing of borders) with practices of cultural significance (the drawing of boundaries). Take the borders of nation states as an example. Culturally, modern borders were once established as geographical and historical forms of inclusion and exclusion which operate the following correlations: the local with ‘insiders’, ‘presence’, and the ‘known’; the distant with ‘outsiders’, ‘absence’ and the ‘foreign’. Crucially, this was also the case for waste. Waste, by its modern definition, is any material (solid, liquid or gaseous) that has been or will be discarded as being of no further use. This qualification of putting something outside the category of usefulness clearly draws upon the force of virtuality. In a modern culture (at least in the liberal-democrat version) that has the ‘pursuit of the greatest utility for the greatest number of free people’ as one of its key creeds, ‘waste’ represents the inherently chaotic ‘residue category’ of the useless. Paradoxically, drawing this demarcation line so stringently, requires the need to circumscribe and
maintain a space specifically for what lies beyond the line of exclusion. Hence again the conjunction of cultural boundaries and spatial borders: the practices of waste displacement are well exposed in the environmental politics literature, where the phenomenon is called ‘distancing’ (e.g. by dilution, dispersion, export of wastes to Third World countries, etc.). A considerable and sustained effort had to go into maintaining and patrolling this ‘ultimate frontier’ (the ‘end’ in a ‘world of means’), fuelled by the (virtual) force of a belief in progress. Perhaps not surprisingly, with the (virtual) force of progress declining or at least changing over the last few decades, the problem of the handling of wastes resurfaces as one of the defining characteristics of the ‘new’ modernity, with some even going as far as to project a future where waste will no longer exist.

The fate of waste in modernity is played out in an exemplary way in the nuclear fuel cycle. When nuclear energy was introduced, waste was never expected to become the problem it has turned out to be today. Top-level scientists that mastered the fission process would surely come up with a solution for the ‘external by-product’ of this highly advanced technique. With regard to the ‘disutility’ of nuclear power, attention was in the early years focussed on radiation protection and dual use. Thus a history in which nuclear waste was treated as an issue more or less isolated from nuclear applications as such developed. Although research still looks for a ‘real’ solution to discard nuclear waste, it has become clear that considerable amounts of waste are here to stay and this for a very long period in time. For a number of reasons, nuclear waste tends to be more ‘visible’ than other forms of waste. Paradoxically, these reasons have a lot to do with ‘invisibility’: the ‘invisibility’ of its risk (the literal invisibility of radiation, but also the ‘invisibility’ following the timescale of effects), the ‘invisibility’ of the organisations responsible for its management (leading to a well-publicised lack of trust in these organisations), as well as the ‘invisibility’ of the proposed technical solutions.

These factors led to a successful banning of the export of nuclear waste (following well-publicised activist campaigns) and a failure of ‘distancing’ strategies: every nation has to deal with its ‘own’ nuclear waste. Thus, while revisiting the boundary-drawing around waste in general holds the potential for a critique going to the heart of modernity, this potential is more acutely realised in the case of nuclear power: what is at stake in the nuclear waste disposal debate could be nothing less than the future of nuclear power itself!

4 On the uses and disadvantages of history for RWM: food for thought

With modernity, and nuclear power programmes in its wake, undergoing a transformation, ‘solving’ the question of HLW has become a pressing issue in most industrialised countries operating NPPs. What emerges from our discussion in Section 3 is an image of nuclear power programmes (and RWM programmes in particular) as deeply enmeshed in the foundational boundary-drawing moments of ‘solid’ modernity. However, old borders/boundaries seem to become unable to hold the HLW in its designated place: as something which we would have liked to forget (because it distracts the mind from the ‘progress’ imperative) yet we could not forget entirely (because of the failure of ‘distancing’ strategies) and therefore had to be put in a ‘containment zone’ awaiting further decisive treatment. International consensus on permanent deep geological disposal as the best available ‘decisive treatment’ is growing.

No GenIV strategy will ever make the HLW disappear completely, and the option of ‘perennial storage’ traditionally presented for consideration in strategic RWM assessments only serves as a foil

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6 In the ‘cradle-to-cradle’ concept, McDonough and Braungart (2002) propose a fundamental redesign of ‘things’ so that ‘waste’ represents only a temporary stage in the cycle of production, consumption and reproduction (“waste equals food!”). They offer us no less than the promise of a guilt-free consumption!
for the merits of deep geological disposal: no society can give active safety guarantees for thousands of years to come. Let us therefore be clear about the fact that as things stand, somewhere, sometime, HLW will be buried in the deep underground to be forgotten. But although research programmes have been running for decades, even those countries most advanced in finding a ‘solution’ (e.g. Finland, Sweden) are still facing a another decade-long process of research, licensing, environmental impact reporting, and public and political debates before finally constructing, operating and sealing the repository. The difficulties met during the process of reaching the implementation of an actual disposal site prove the crucial yet neglected role as well as the transitory character of contemporary border and boundary-drawing activities. In view of the finality of a disposal site, the questions raised by Nietzsche – how (according to which modality – monumental, antiquarian or critical) and when (in terms of the ‘plasticity’ achieved by a culture) the boundary between remembering and forgetting should be drawn – become of major importance. And on whose authority?

It comes as no surprise that Nietzsche does not offer a ready-made answer. What we can observe however, is that our time is not willing to tap into the virtual force of the monumental nor the antiquarian discourse anymore (cf. Section 2), at least not without serious reservations: scientific experts are no longer trusted without reserve, proponents of nuclear power are very careful not to repeat the historic mistake of ‘overselling’ the nuclear option and therefore present it modestly as “one option – albeit a necessary one – amongst others”, and in any case, every attempt is made to officially separate political decisions on the future of nuclear power from decisions on RWM. It thus seems that the third way of critical history is coming to the foreground: the content as well as the process of drawing up borders and boundaries are very slowly and implicitly but yet steadily brought before the tribunal.

Permanent deep geological disposal once again explicitly build upon ‘solid’ modernity’s distinctive and deterministic concepts of enclosure, exclusion and uselessness of waste, as the option comes down to passive safety for ultimate waste. Referring to Fig. 1, the boundary safe/unsafe is drawn by tapping into the register of an ideal-possible concept of safety, as embodied in a very complex apparatus of radiation protection standards, knowledge about half-lives of isotopes, modelling of migration pathways, etc. However ‘modern’ the set-up of this research, it cannot with absolute certainty guarantee that future generations will not be harmed by the HLW (think e.g. of hardly predictable intrusion scenarios). What we can say is that we have done everything within our possibilities (of scientific knowledge and technological know-how) to make the repository as safe as possible. The safety discourse thus in fact takes the form of a ‘promise made in the light of reasonable expectancy’, which at least partly overlaps with the firm solidity and predictability solid modernity requires. However, the difference between ‘making a promise’ and ‘knowing for sure’ should be underlined, because speaking in the register of (keeping) a promise necessarily draws upon the virtual existence of a transgenerational ‘community of interpretators’ – i.e. a community capable of verifying that the promise has been kept ‘in good faith’ (Ost, 1997). The contradictory safety character of HLW management defies heavy modern borders and boundaries: its radioactive character prompts more or less life long active monitoring and surveillance, yet its life span makes guaranteeing the fulfilment of this demand impossible.

The debate on retrievability is exemplary in this regard: in the light of ‘reasonable expectations’ instead of ‘guarantees’ defenders of retrievability seems to demand flexibility with regard to the other modern concepts of enclosure, exclusion and uselessness of waste too. In doing this the whole modern building that constructed the concept of permanent deep geological disposal in the first place is threatened to fall apart. Passive safety is indeed not only the end goal of permanent deep geological disposal, but also its point of departure. Leaving open the possibility of being at something is never a constructive contribution to a concept of safety defined by keeping away from it. But when the borders and barriers of passive safety based on the guaranteed and permanent separating and isolating character of a multi-barrier system, as well as the characterisation of HLW being ultimate waste (future generations may find ways of use for it
unknown to our generation) are being questioned, the solidity of permanent deep geological disposal as the best option stagger.

In dealing with this paradox, it seems that we have now entered an epoch where the only genuine ‘ethical’ imperative seems to be to broaden the range of narratives under the umbrella of what is formally called transdisciplinary, participatory decision making. Although in principle answering to Nietzsche’s plea for pluralism in the light of perspectivism, we are inclined to warn for the danger of the debate to turn into a pragmatic simplification of merely multiplying opinions. When ‘contextual expertise’ – i.e. knowledge of local circumstances, habits, culture etc. – becomes the most highly valued piece of expertise in the domain of RWM, and public support the most important touchstone, this may hold a treat of letting unscrutinised public values overtake equally unscrutinised scientific values. Decision making based solely on the pragmatic wisdom of “good is whatever works” taking into account the reassuring power of the ‘context’, essentially collides with what Nietzsche understands under critical history, namely the strength, courage and genuine self-reflexive attitude of bringing prevailing ideas, visions and approaches before the tribunal, scrupulously examining them and finally judging them in the light of a ‘great and comprehensive hope for the future’ (p.94).
References


