

# A Powerless Classification System? When the Geological Disposal Option (re)defines Radioactive Waste Categories

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## Background



2018

- Political Scientist
- Science and Technology Studies Approach.
- Comparative Analysis



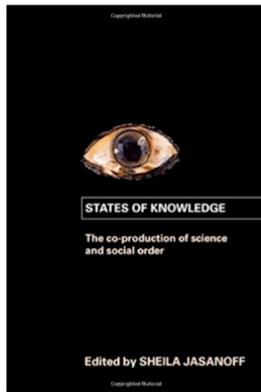
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To quote Donna Haraway: we always have a position from somewhere. It is important to assume and highlight our background. I belong to a discipline calls Science and Technology Studies that analyses the interactions of science and technology with society.

## Outline

1. **STS Theoretically Insights** (Jasanoff 2014 and Bowker and Star 2000)
2. **Characteristics of Every Nuclear Classification System** (Bowker and Star 2000)
3. **Top-down Classification System and their imperfections**
4. **Reversing the dynamic: the management option to redefine the radioactive waste category?**

# 1. STS Theoretically Insights



Two mobilized ideas:

1. The concept of co-production (Jasanoff): (i.e. high-level radioactive waste as it is) and their legitimate representation (high-level radioactive waste as it should be managed) are mutually constituted.

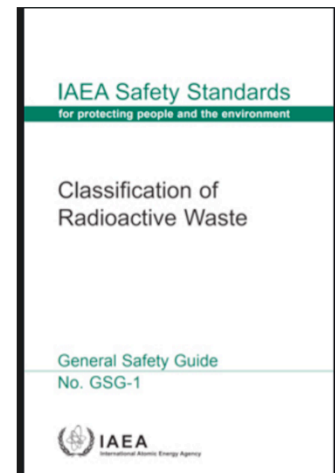
2. The power of naming (Bowker and Star): naming is a powerful action (Bowker and Star, 2000). Although the classification of things is a common activity, it is not a neutral one. Classification systems for radioactive wastes can be considered as instruments that frame the actions of actors and declare what it is (im)possible to do with a radioactive object – or waste

## 2. Characteristics of Every Nuclear Classification System

“The classification of radioactive waste is considered a **prerequisite for the development of a strategy to manage these wastes**” (IAEA, 2009b, p. 19).

They **enable bureaucratic action and cooperation** between different actors “*across different social worlds*” (Bowker and Star 2000: 10). The classification has it done, it coordinates, it includes, and it excludes

They also **affect** the technological **design**, the size of the repository, the **conditioning of the waste** and its management period over time (IAEA, 1994), **the economic and geological** dimensions of a management project (Miller and Wong, 2013) or the **volumes** to be considered.



Several functions of classification system:

- It also organizes collective memory and reveal uncertainties (Douglas 2004).
- It makes visible
- they enable bureaucratic action and cooperation between different actors “*across different social worlds*” (Bowker and Star 2000: 10).
- It improves “*administrative control*” (Porter, 1995, p. 40)

## 2. Top-down Nuclear Classification System to manage

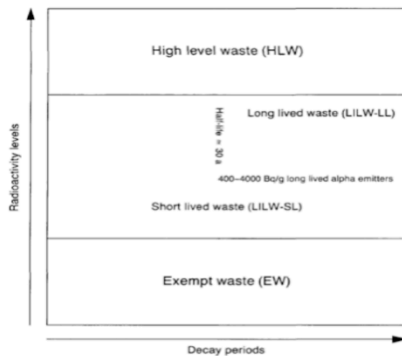


FIG. 1. Revised waste classification system.

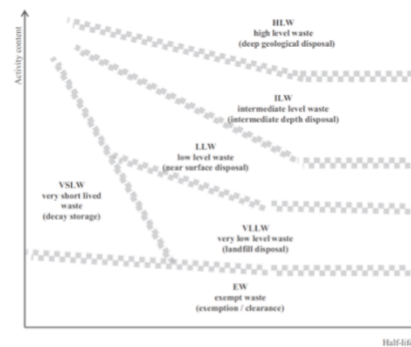


FIG. 1. Conceptual illustration of the waste classification scheme.

Figure 1 — Suggested classifications of IAEA in 1994 and in 2009, source: IAEA.

Categorization influences the type of management of the object. High-level radioactive waste is associated with the geological repository while low-level radioactive waste is associated with surface management solutions. In Canada, Belgium and France, it is the same: HLRW are also associated with the geological disposal option.

## 2. Characteristics of Every Nuclear Classification System

In principle;

- Consistent and operational
- Mutually exclusive
- Total coverage

In practice; **imperfections remain!**



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However, in practice, no classification system in the world meets these three characteristics.

For instance, the STS authors explain that the completeness of the classification system is sometimes deliberately ignored for financial reasons: an anomaly can be detected but not taken into account because it is too expensive—politically or bureaucratically—to be included in the registers of classification (Bowker and Star, 2000, p. 12). This question seems to arise for the case of a certain type of Belgian waste (NORM—Naturally Occurring Radioactive Materials and TE-NORM—Technologically Enhanced Naturally Occurring Radioactive Materials) or American waste (depleted uranium - DU) called “orphan wastes” for which there is no legal classification.

### 3. Top-down Classification System and their imperfections

- The « blurring » categories

*“The boundaries between the classes are not intended to be seen as hard lines, but rather as **transition zones** [emphasis added] whose precise determination will depend on the particular situation in each State” (IAEA, 2009b, p. 20).*

CECI N'EST PAS UN OBJET-FRONTIÈRE !  
Réflexions sur l'origine d'un concept

Susan Leigh Star

S.A.C. | « Revue d'anthropologie des connaissances »  
2010/1 Vol 4, n° 1 | pages 18 à 35

Article disponible en ligne à l'adresse :

<https://www.cairn.info/revue-anthropologie-des-connaissances-2010-1-page-18.htm>

Some objects are “unclassified” or fall into “blurred”, “un-stabilized” categories. This is typically the case in Belgium for the Spent Fuel. It coexists different uses or interpretations of the same object.

### 3. Top-down Classification System: imperfections

- Powerless of classification system

	Belgium	France	Canada
<b>Number of defined categories</b>	3 categories	6 categories	4 categories
<b>Classification according to half-life and level of activity</b>	<ul style="list-style-type: none"> <li>· B (equiv. ILW IAEA 2009)</li> <li>· C (equiv. HLW IAEA 2009)</li> </ul>	<ul style="list-style-type: none"> <li>· MA-VL (equiv. ILW IAEA 2009)</li> <li>· HA-VL (equiv. HLW 2009)</li> </ul>	<ul style="list-style-type: none"> <li>· HLW (equiv. IAEA 2009) including spent fuel</li> </ul>
<b>“ Blurring categories ”</b>	<ul style="list-style-type: none"> <li>· NORM, T-NORM</li> <li>· radium-bearing waste for Future Remediation</li> <li>· Spent Fuel MOX</li> </ul>	<ul style="list-style-type: none"> <li>· NORM</li> <li>· Waste without “ filières ”</li> <li>· residues left over from uranium mines</li> <li>· Spent Fuel MOX</li> </ul>	/
<b>Category combination for management</b>	<ul style="list-style-type: none"> <li>· Categories B and C managed together</li> </ul>	<ul style="list-style-type: none"> <li>· MA-VL and HAVL categories managed together (Cigeo Project)</li> </ul>	<ul style="list-style-type: none"> <li>· HLW: full-fledged project (APM project of NWMO)</li> </ul>

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In Canada, Belgium and France, HLRW are also associated with the geological disposal option.

But uncertainties remain about what will be stored in the geological disposal.

Beyond the blurring categories such as Spent Fuel or MOX spent Fuel, there are also, for instance in France :

- a “flexible” zone in the future Cigeo geological repository project is planned, but what is authorized to be stored or not in this area is still ambiguous.
- Secondly, some engineers advocate for a reclassification of nuclear material with the operationalization of the geological repository project. They want to be sure that technical management solutions are adapted to the characteristics of the object.

Without being able to *name*, to exclude an object from one category to another, those particular objects highlight the imperfection that remains in every top-down radioactive waste classification system

## 4. Reversing the dynamic: the management option to redefine classification system?

- “a disposal site’s waste acceptance criteria are the final words on disposition of wastes at that site and are therefore effectively the final words on waste classification at that location” (Lowenthal, 1997, p. 13)”

Historically, all of radioactive waste classes have been “top-down classes” as “the waste class is based solely on the characteristics of the waste, not on the disposal environment” (Lowenthal, 1997, p. 13). To sum up, classification and management have been at first envisioned as a sequential process: classifying first and managing afterwards.

But waste classification systems are also “bottom-up”: “waste class is based on the characteristics of the particular disposal site and facility and on the behavior of waste disposed here”.

Two challenges remain:

First, what should be done with radioactive wastes in blurred, un-stabilized categories that are classified and named differently by different actors?

The second challenge of nuclear waste classification is directly related to the design of long-term geological repository: Site-specific analysis, the type of host rocks and the type and number of technical and engineering barriers coupled with particular waste add other limits in HLRW waste management.

## 4. Reversing the dynamic: the management option to redefine classification system?

*(...) what is the current definition of low-level waste? It is not the waste of such and such activity, the definition is, it is the waste that can go to the [French] Morvilliers Center. We reverse the mechanics. Ultimately, what is high-level waste? Those wastes that can go to the storage. You reverse the mechanics by a match between the categorization and the reception center (French Regulatory Body interview 2014).*

- **Then, the question is: according to a predefined long-term management solution, which categories should be included or excluded?**

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If Waste classification systems are also “bottom-up”. In other words, if “waste class is based on the characteristics of the particular disposal site and facility and on the behavior of waste disposed here”

Therefore the question is no longer: according to the defined categories, which solution is preferred, **but rather, according to a predefined long-term management solution, which categories should be included or excluded?**

## Conclusions

- Powerless of top down nuclear classification system and its consequences
- Interest for revealing uncertainties and imperfections for
  1. First, shifting the focus of attention away: from HLR categories to geological repository
  2. Opening up the building of nuclear classification system

The consequences of those imperfections in this top-down classification system remain important: long-term management scenarios are multiplying, the geological disposal option is and will be designed according to the volumes, and the types of wastes the national territory has to deal with

Two added-value of revealing imperfections:

First, it seems to shift the focus of attention away from the construction of categories to the construction of the geological repository and the emergence of one or more associated categories. Only the authorization to build the geological repository would make it possible to remove the ambiguities in term of the categories authorized in the deposit.

Second, Second, while designers of long-term repository (and more largely NGOs and civil society) seem to have little to say about a top-down nuclear classification system, they have (unequally) the power to influence the design of the management solution. Therefore, designing the geological disposal repository would allow nuclear experts, engineer designers, NGOs and civil society to have *collectively* an indirect grip on the definition of high-level radioactive waste or, at the very least, on what is or is not allowed to be stored in the future.

Thank you for your attention

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