

**A critique of**

**CRITERIA FOR SITING OF  
DISPOSAL FACILITY FOR WASTE  
CONTAINING NATURALLY  
OCCURRING RADIOACTIVE  
MATERIAL (NORM)**

**as issued by AELB, Malaysia**

**by**

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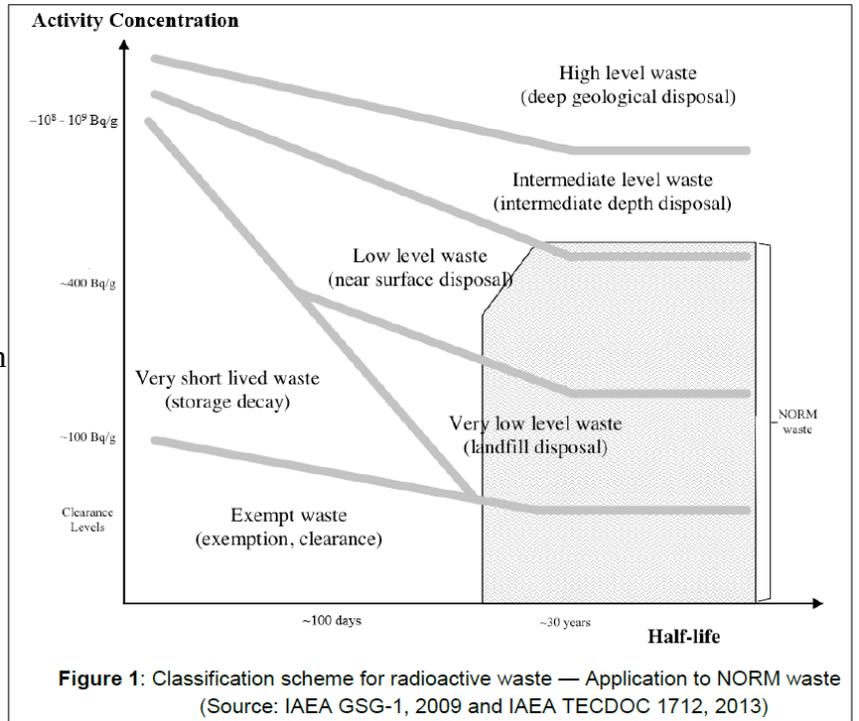
**February 16, 2021**

# 1 The hazards: by Definition and in Reality

First of all: all hazard needs a name. If you are industry-friendly, preferably one that plays the hazards down, something with „very low“ in the name. To clearly signal: what you are speaking about is not worth speaking about, it is only a „very little“ bit hazardous, but not really.

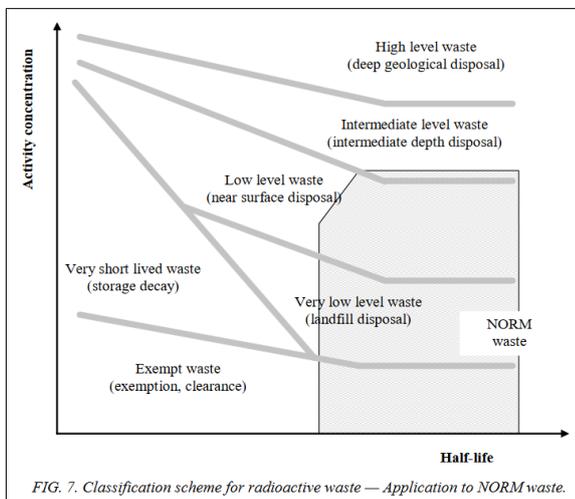
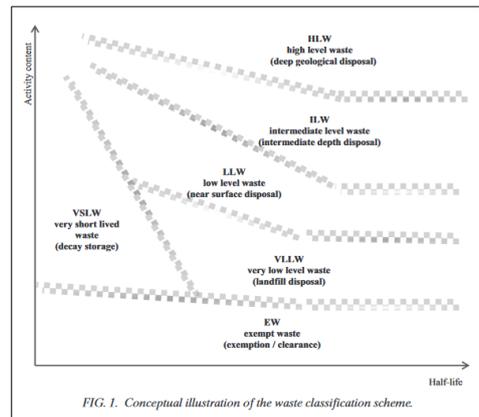
AELB uses the graph to the right to illustrate that. It signals:

1. NORM waste is not really dangerous, because its activity concentration is at maximum 500 Bq/g, while the real high-level waste is around one million more concentrated ( $10^9$  Bq/g divided by 500 Bq/g = 2 million).
2. It is not very long-lived: it's half-life time is slightly longer than 30 years (the sharp end of the gray rectangle signals that, along with the given rough numbers).



AELB names as source for this graph the two documents issued by the IAEA in Vienna. As there is nothing added like „derived from“ or „modified“, we would expect that the two documents are exactly reproduced from those two named sources.

But, surprise: If we look into the original publications both graphs look a little bit different. In the first source, no gray rectangle can be seen. And another serious difference can immediately be seen: There are no numbers given on both axes. Obviously, AELB has added these numbers on both axes, without notifying the reader about their falsification of the original.



In the second cited source, the TECDOC,

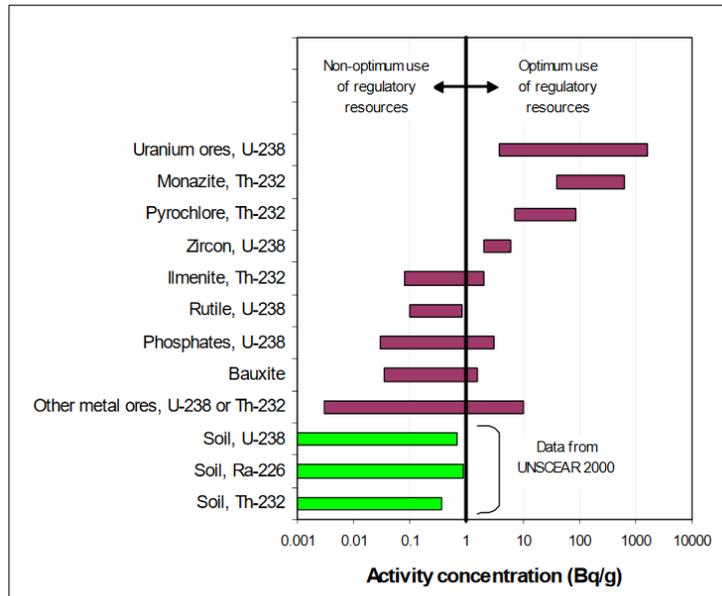
we find a rectangle. So AELB has taken this as its real source. But: also this graph doesn't have any numbers on the axes like AELB's „reproduction“.

This extraordinary change has to be evaluated as being an unscientific lie: The originals were not copied, as their citation lets expect, they are manipulated by AELB. Countries that need these kind of manipulations to convince their own public of their policy are commonly termed as „rogue state“.

Now, are those added numbers at least correct?

The activity concentrations of a large variety of NORM wastes are listed in the second named source, the TECDOC:

1. Its Table 1 on page 10 lists minima and maxima of scales. These are surface contaminations on equipment, such as pipes or valves. For the oil and gas industry Table 1 lists 0.1 Bq/g activity concentration as minimum and 15,000 Bq/g as maximum. The maximum is by a factor of  $15,000 / 500 = 300$  above AELB's upper activity concentration of NORM wastes. Again: a serious lie from AELB.
2. Its Table 2 on page 12 lists activity concentrations in sediments and sluges in the NORM-waste generating industry. The maximum listed in this table is 10,000 Bq/g in the Rare Earth extraction industry. This is by factor of 200 above AELB's upper activity concentration. And: AELB should be aware of this because they nuclearly regulated those kind of facilities in the past (Mitsubishi) and currently (Lynas). They know exactly how high those concentrations are, so why do they play those down by a factor of 200? Again a clear lie, and willingly, as they know it much better.
3. Chapter 3.3 on pages 15ff shows the following graph (reproduced here in its original form) that lists activity concentrations of natural materials. Uranium ores and Monazite exceed 1,000 Bq/g.



The cited sources demonstrate that AELB's 400 Bq/g activity concentration, as listed in their falsified IAEA graphs, is clearly intended to downplay the role of NORM. None of the cited sources name 400 Bq/g, not even a range from 301 to 499 Bq/g. It remains solely with AELB on where they got the 400 Bq/g from. If you plan to falsify something, you should do it in a much more clever way.

The same applies for the other axis, representing the half-life time. AELB lists 100 days as well as 30 years. Relevant radionuclides in NORM waste are:

NORM material or waste	Dose-Dominant radio-nuclide(s)	Half-life time (years)	Derived enclosure time period (years)
Oil- and gas scales	Ra-226	1,600	10,000
Sludges from Rare Earth extraction	Ra-228, Th-232	Th-232: 14,000,000,000	(unlimited)
Uranium ore + tailings	Rn-222, Ra-226, U-238	U-238: 4,500,000,000	(unlimited)
Monazite ore + tailings	Ra-228, Th-232	Th-232: 14,000,000,000	(unlimited)

None of these wastes has something to do with half-life times of 100 days or 30 years, all of them have widely longer half-life times. The right side of the rectangle in AELB's graph therefore is at 140 billion years (10 times Thorium-232), and not at 1,000 years as the graph visually implies.

In the last column I added an enclosure period. With materials or wastes that exceed existing protection levels today (as is the case for Lynas's WLP waste, a Thorium sludge), and therefore require regulatory control today (as specified in IAEA's regulatory framework), this hazards does only decay in a 10,000-year long period, with dominant radionuclide Radium-226 like in the scales of the Oil- and Gas Industry, or never at all, with the dominant radionuclide being Thorium-232 like in Lynas's WLP sludge.

The other way around: why should people in the future be less protected than today's people are? As the hazards are not relevantly decaying with time: applying the same protection principles in all the future requires the same level of protection as applied today. Only ordinary practical limits can be put on today's side of the protection balances: we are practically not able to guarantee for protection levels so far in the future. That is the dilemma you'll get in if you destroy natural protection mechanisms, as those existed at Mount Weld (Australia) before Lynas took the shovel and dug the ore from its origin and maltreated it with concentrated sulfuric acid. Those natural protection mechanisms held back the Thorium from travelling, so Lynas has taken over the responsibility to establish likewise protection mechanisms as they existed before their shovelling and maltreating started.

The whole concept of naming the WLP sludges a „Very Low Level Waste“ is based on a false interpretation: it makes no sense to compare it with other wastes from the Nuclear Industry (which sometimes – not all - are indeed rather short-lived and require isolation times of around 300 years to completely get rid of the hazards). In NORM this is completely inappropriate and rodden: there are no short-lived NORM wastes, and it makes no sense to isolate them for 300 years (they are exactly as hazardous as today after that short period). NORM wastes therefore require a special regime: they are to be isolated for as long as technically practical. Siting, planning and any protection measures have to respect the future people's right to live in an environment that AELB has done the necessary measures for. But AELB seems not aware about that all, as they are carelessly playing down the long-term risks and advocate for the lowest possible protection standards.

The VLLW term in reality should be spoken out as „Very Long-Lived Waste“. That is what NORM waste makes very different from all other radioactive waste classes.