



EEB comments on the Draft final BiPRO report on 'Requirements for facilities and acceptance criteria for the disposal of metallic mercury'

The European Environmental Bureau welcomes the opportunity to comment on the Draft final consultant's report on *'Requirements for facilities and acceptance criteria for the disposal of metallic mercury'*, as presented by BiPRO.

While this document is focused on commenting different aspects of the consultant's report we would like to stress that potential time constraints in deciding what is the best way to dispose mercury should not compromise the safety and the potential for exposure of future generations to mercury. We generally believe that, if determined viable, solidifying the liquid mercury before its final storage/sequestration could be the safest solution, as an emerging technology appears promising at this time. Nevertheless, it's clear that more studies are needed to ensure the long term safety aspects for the acceptance and facility requirements and adequate time should be allocated respectively. In the meantime, safe temporary solutions should be given priority in the near term.

Structural/Editorial comments

- a. To our view the review of legislation, policy and best practice (chapter 7) should appear earlier in the report. The flow of the report would seem easier if this chapter appeared before the review of the solidification technologies.
- b. The minimum requirements for the screening analysis need to be identified and justified much earlier (now in chapter 8) in the text and before the review of the immobilization/solidification technologies (chapter 6)-so when these are analysed, a basis against which these could be compared is already known to the reader, for easier assessment. The assessment (chapter 8) will then flow more logically.
- c. Chapter 6 - More details and analysis are needed, for the same characteristics for all immobilization/stabilization technologies presented, as far as possible.
- d. Chapter 6 - the references of the full studies on immobilization/solidification technologies – if possible with their hyperlinks (if these are available on line), need to be included in the report.
- e. Chapters 5 and 7- The US state of the art, research on the possibilities of storage and legislation should be further elaborated. More details need to be included about the leaching limit values for hazardous waste containing mercury

Contextual comments

1. Minimum requirements (chapter 8)
 - a. As mentioned above, these need to be identified and the reasons why these are chosen as minimum requirements needs to be well explained and justified. These are in a way what will define 'what is safe' – therefore the analysis needs to be very thorough.
 - b. If criteria/issues are identified, which are considered important, and for which a minimum cannot be set- these information gaps/questions need to be clearly shown, to see what further research might be necessary, before any final decisions are taken. The reasons why these criteria/issues are important, needs to be justified.
2. Technical minimum requirements (chapter 8)

- a. Further details, as to what is 'protection of groundwater against mercury', etc. and a minimum figure or description on how this would be assessed needs to be provided.
 - b. For the pre-treatment technology, why is 1kg chosen as minimum?
 - c. The other requirements also need to be further discussed.(e.g. is there a way to measure impermeability to gas and liquids – then this should be referenced-explained).
3. Environmental and health minimum requirements (chapter 8)
- a. Leaching of solidified product
 - Why is the leaching value from the 2003/33 is proposed (2 mg/Kg dry substance), and why is this considered safe enough with respect to solidified mercury?
 - It appears that the US is requesting much lower values for mercury containing hazardous solid waste in order that those are accepted in hazardous waste landfills (0,2 mg/l TCLP¹)² – why couldn't we consider this limit value in the EU? Please discuss further.
 - It is not clear for how many hours the leaching test is performed under the prescribed standards in the EU – what is the exposure period and would this be long enough for our needs? For example in the US an exposure of 14 days, rather than the 18 hours of the TCLP was chosen to allow all samples time to reach near-equilibrium before measurements of the release potential of mercury from the treatment residuals³. Wouldn't such a test be relevant in our case for the long term behaviour of the solidified product? Please discuss further.
 - It is clear on the other hand, that leaching of mercury from the stabilised elemental mercury is pH dependent. Are the tests/standards proposed to be used for the leaching relevant to check the usual pH range in landfills of 2-12? Should the samples of solidified mercury be also checked under constant pH conditions? (see also study sited under footnote 2) Please discuss further.
 - b. Volatility of solidified product - the figure chosen needs to clearly appear in the text; why this level is considered safe needs to be justified.
 - c. For liquid mercury in underground storage and mainly in salt mine – the long term behaviour of liquid mercury should be elaborated further. This is a very important issue and needs to be discussed; relevant studies available need to be referenced and potential information gaps addressed – since this could be one of the main criteria whether a way of disposal can be accepted or not.

The long term behaviour of solidified material needs to also be further discussed- since it is originally liquid material which has been chemically treated to gain this new solid form.
 - d. Stability of product under the respective storage facility conditions – Fire risk needs to be discussed, and specific limits- temperature, pH etc need to be provided. Penetration of liquid mercury in salt or other rock and respective requirement should be discussed.

Why should purity be above 99.99% needs to be explained.

¹ Toxicity Characteristic Leaching Procedure (USA) http://www.epa.gov/waste/hazard/testmethods/faq/faq_tclp.htm

² ENVIRONMENTAL PROTECTION AGENCY [FRL-7445-4; RCRA-2002-0029] Land Disposal Restrictions: Treatment Standards for Mercury-Bearing Hazardous Waste; Notice of Data Availability - Federal Register / Vol. 68, No. 19 / Wednesday, January 29, 2003 / Notices

³ Ditto

4. Economic requirements (chapter 8) – could also include cost of risk (exposure, incidents, etc) by using one or the other method – this needs to be discussed further and considered in the analysis.

5. Chapter 4 – under conclusions or the respective sections it would be useful to summarise in a table some characteristics and limit values which are relevant for mercury (some characteristics, EU quality standards, emission limits for air, water etc)

6. Chapter 5

- a. The risks related with storage in salt mines vis a vis the water intrusion, as well as risk of collapsing etc need to be further discussed.
- b. Conclusions about the salt rock are not well elaborated - they should also talk about the missing information, the questions still around them etc. Similarly conclusions about the hard rock formations are not representative of the analysis; no reference is made on putting solidified material in hard rock – again more elaboration is needed.
- c. Containment – more details may be needed for Teflon (p.98)
- d. Also some more comments may be useful on what is the effect of impurities (p.101) for the container and/or the storage.

7. Chapter 6 - All immobilization/solidification technologies need to be further described and elaborated. Characteristics and data relevant to the requirements we are looking at (as above) need to be clearly shown and be comparable as far as possible in terms of units and conditions, to allow a first assessment when the reader goes through this chapter.

8. Chapter 8 - when assessment takes place the following should be considered:

- a. Time constraints on whether and when a technology is available should not compromise safety and the potential for exposure of future generations to mercury.
- b. As mentioned earlier – the fact that no study exists at the moment on the behaviour of liquid mercury in salt mines – should be considered when conclusions are drawn.
- c. What is ‘adequate’ and/or ‘regular’ [linings and slopes, monitoring, measures for spillage etc] needs to be better defined and justified. These appear across the chapter but without specifying what those conditions are.
- d. Monitoring should be continuous rather than ‘adequate’ (option 2)
- e. Ventilation should be further discussed; since it could actually contaminate the rest of the storage area. (option 2)

9. Chapter 9 - comparative assessment:

This chapter could be used for information and/or summary purposes, so it is important to have clear information here.

- a. For better understanding, the numbers 1 to 5 for economic and environmental shall be explained in the table, e.g. 5 points economic impact might be expected to be < 1.000 €/tonne; 1 point > 20.000 €/tonne . If no reliable price range can be given, at least the relation of the points should be clear.

For environmental assessment examples for each category should be given as well.

- b. Weighting factor for economic assessment appears rather high – the general weighting system proposed should further be discussed and justified.

- c. Under Table 2 , when explaining the scoring, on page 227 – table should refer to *Environmental impact* instead of *Economic impact*.
- d. Table 9-3 (p. 230): Some numbers are not the same as above, e.g. option 5I-1I is said to has 1 point envi. safety in the text and table 9-2, but has 3 points in table 9-3.

We would appreciate if our comments and concerns above are addressed before the report is completed. Furthermore we would very much welcome receiving the draft proposals for the acceptance criteria and facility requirements for mercury disposal - as early as possible to allow time for consultation before final decisions are taken.

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