

Lead					
This assessment relates to inorganic forms of lead and the impact of the lead ion available in contact with water.					
	Yes / No / Insufficient data / Borderline / assume yes or no?	Value	Reference	Comments	
Is substance persistent, bioaccumulative and toxic?					
Persistence					
Passes ready biodegradation test	N/A			Test not applicable for metals/inorganics	
Passes inherent biodegradation test	N/A			Test not applicable for metals/inorganics	
<i>If answer to either question is YES, substance is not persistent</i>					
<i>If answer to both questions is NO, additional data on half life is required</i>					
Half life marine water ≥ 60 days	N/A			Degradation testing not applicable for metals/inorganics	
Half life fresh or estuarine water ≥ 40 days	N/A			Degradation testing not applicable for metals/inorganics	
Half life marine sediment ≥ 180 days	N/A			Degradation testing not applicable for metals/inorganics	
Half life fresh or estuarine sediment ≥ 120 days	N/A			Degradation testing not applicable for metals/inorganics	
Half life in soil ≥ 120 days	N/A			Degradation testing not applicable for metals/inorganics	
<i>If answer to any question is YES, substance is persistent</i>					
<i>If answer to all questions is NO, substance is not persistent</i>					
Is sufficient data available? (if not assume substance is persistent)					
Is substance persistent?	Yes			The persistence criteria are not directly applicable to metals/inorganics and were developed principally for organic substances. Metals and inorganics such as lead are inherently persistent and subject to transformation rather than degradation. Lead will therefore not degrade but will be transformed depending on the local conditions.	
Bioaccumulation					
Bioconcentration factor (BCF) for aquatic species (wet weight) ≥ 2000	Yes	5 to 8000	ESR (2008)/WHO/EFSA	BCF values for a range of organisms including crustaceans, molluscs, insects and fish were reported in the voluntary risk assessment. These indicated BCF values in the range of 5 - 8000. In addition information on human health indicates that lead accumulates in the bones following long term exposure with half lives reported in the order of 10 - 30years. Based on the available information considered to meet the criteria.	
Does field data show evidence for biomagnification?	No		ESR (2008)	Assessment of the available data for the voluntary risk assessment indicated lead does not biomagnify	
<i>If answer to either question is YES, substance is bioaccumulative</i>					
If no BCF data, is log K _{ow} ≥ 4.5?		Log K _{ow} values are not applicable to metals		Log Kow values are not considered reliable estimates of the bioaccumulation potential of inorganic substances such as lead.	
<i>If answer is YES, substance is bioaccumulative</i>					
Does the weight of evidence from the following criteria indicate bioaccumulation unlikely?	Not considered due to the above data				
Substance is chronically non-toxic in mammals					
Molecular size ≥ 4.3nm					
Molecular weight ≥ 1100g/mol					
Octanol solubility ≤ 0.002mmol/l					
<i>If weight of evidence indicates bioaccumulation unlikely (i.e. YES answers) substance is not bioaccumulative</i>					
<i>If weight of evidence indicates bioaccumulation a possibility (i.e. NO answers), BCF data should be obtained</i>					
Is sufficient data available? (if not assume substance bioaccumulates)	Yes				
Is substance bioaccumulative?	Yes				
Toxicity					
Is the lowest chronic NOEC for freshwater or marine organisms ≤ 0.01mg/l	Yes	0.0017mg/l	EU EQS dossier	Lymnaea stagnalis EC10 1.7µg/l Chronic effect concentrations of <10µg/l were reported for other species including Hyallela azteca and Pseudokirchneriella subcapitata	
Is there substantial evidence of long term toxicity (STOT RE1 or STOT RE2)	Yes	STOT RE2	CLP database	A number of lead compounds have been classified under CLP and have been determined as STOT RE2.	
Is substance carcinogenic (Carc 1A,1B), mutagenic (Muta 1A, 1B) or toxic for reproduction (Repr 1A, 1B, 2)	Yes	Repr 1A	CLP database	A number of lead compounds have been classified under CLP and have been determined as Repr 1A.	
<i>If answer to any question is YES, substance is toxic</i>					
<i>If answer to all questions is NO, substance is not toxic</i>					
Is sufficient data available? (if not assume substance is toxic)	Yes				
Is substance toxic?	Yes			Meets criteria for chronic aquatic toxicity and human toxicity through STOT RE2 and Repr 1A	
IS SUBSTANCE PERSISTENT, BIOACCUMULATIVE AND TOXIC?					
Yes					
Does substance pose an equivalent level of concern?					
Very persistent and very bioaccumulative?					
Half life in marine, fresh or estuarine water ≥ 60 days		Degradation testing not applicable for metals/inorganics		The persistence criteria are not directly applicable to metals/inorganics and were developed principally for organic substances. Metals and inorganics such as lead are inherently persistent and subject to transformation rather than degradation. Lead will therefore not degrade but will be transformed depending on the local conditions.	
Half life in marine, fresh or estuarine sediment ≥ 180 days		Degradation testing not applicable for metals/inorganics			
Half life in soil ≥ 180 days		Degradation testing not applicable for metals/inorganics			
<i>If answer to any question is YES, substance is very persistent</i>					
Is bioconcentration factor ≥ 5000	Yes	5 to 8000	ESR (2008)/WHO/EFSA	BCF values for a range of organisms including crustaceans, molluscs, insects and fish were reported in the voluntary risk assessment. These indicated BCF values in the range of 5 - 8000. In addition information on human health indicates that lead accumulates in the bones following long term exposure with half lives reported in the order of 10 - 30years. Based on the available information considered to meet the criteria.	
<i>If answer is yes, substance is very bioaccumulative</i>					
Is substance very persistent and very bioaccumulative?	Yes				
Does substance pose a specific risk to groundwater?					
Does groundwater monitoring data show half life in groundwater ≥ 1 year	Not assessed				
Do ≥ 5% of groundwater samples show levels of the substance greater than the LOQ?	Not assessed				
Do ≥ 15% of sites have at least one sample where the substance is detected above the LOQ?	Not assessed				
<i>If answer to any question is YES, substance is persistent in groundwater</i>					
Is substance persistent in groundwater?	Not assessed				
<i>If substance is persistent in groundwater, bioaccumulative AND toxic, substance is hazardous</i>					
Does substance pose a specific risk to groundwater?	Not assessed				
Is substance very toxic?					
Is substance a known endocrine disruptor (category 1)?					
Is substance mutagenic (Muta 1A, 1B,2) or have no determinable threshold for adverse effects on human health?	Yes	No determinable threshold determinable	WHO/EFSA	Reviews undertaken by both WHO and EFSA report that there is no known level of lead exposure that is considered safe	
<i>If answer to any question is YES, substance is very toxic and hazardous</i>					
Is sufficient data available? (if not assume substance is very toxic)	Yes				
Is substance very toxic?	Yes			WHO and EFSA have noted that there is no known level of lead exposure that is considered safe	
Is substance hazardous to groundwater?					
Is substance hazardous, if so, state on what basis	Yes			WHO and EFSA have noted that there is no known level of lead exposure that is considered safe	
# equivalent risk phrases: T,R23/24/25, T+,R26/27/28 (does not include Xn, R20, Xn,R21, Xn,R22)					
* equivalent risk phrases T,R39/23/24/25, T+,R26/27/28, T,R48/23/24/25 (does not include R33, R67, Xi, R37, Xn,R48/20/21/22, Xn,R68/20/21/22)					
^ equivalent risk phrases carcinogenic Carc. Cat. 1, Carc. Cat. 2, T,R45, T,R49, mutagenic Muta. Cat. 1, Muta. Cat. 2, Muta. Cat. 3, T,R46, T,R68, toxic for reproduction Repr. Cat. 1, Repr. Cat. 2, R60, R61 (does not include Carc. Cat. 3, Xn,R40, Repr. Cat. 3, Xn,R62, Xn,R63)					
Does substance have breakdown products of concern?	No				
REFERENCES					
ECHA CLP database					
ECHA (2008) http://echa.europa.eu/web/guest/voluntary-risk-assessment-reports-lead-and-lead-compounds					
WHO (2015) http://www.who.int/mediacentre/factsheets/fs379/en/					
EFSA (2013) http://www.efsa.europa.eu/sites/default/files/scientific_output_files/main_documents/1570.pdf					
EU EQS Dossier (2012)					