



toxfree



# CASE STUDY

## TREATMENT OF MERCURY COMPOUNDS WITH DOLOCRETE®

Mercury is a naturally occurring heavy metal that can exist in many different chemical forms in the environment.

Mercury is released through both natural geological and industrial processes. Industrial activity and past practices now account for the majority of mercury emissions and environmental contamination. The chemical properties of mercury allow transmission between air, water and land. Increasing environmental awareness has identified mercury and its compounds as a serious pollutant. Today it is considered a highly toxic substance for humans due to its toxic and bio accumulative properties. Mercury poisoning can cause central nervous system, kidney and liver damage in humans. The proven Dolocrete® treatment process delivers outstanding performance for the Chemical Immobilisation & Stabilisation of mercury and its associated compounds.

### Mercury Brine Sludge

Toxfree has previously obtained a Specific Immobilisation Approval from the NSW Department of Environment and Conservation (formerly EPA) for the treatment of mercury brine sludges from an industrial process. This waste contained an average of 15,300 mg/kg of mercury, well in excess of the NSW EPA threshold of 200 mg/kg for a hazardous waste. Using the Dolocrete® Process, the mercury waste was treated with a minimal bulk-out of 25%, to yield a stable treated material with a TCLP leachate of <0.01 mg/L. This result is well below the EPA regulatory requirement of 0.2 mg/L.



Table 1 - Mercury waste data (before and after treatment)

	Before Treatment	After Treatment	
	Total Concentration	Leachable Concentration	Regulatory Requirement
	SCC (mg/kg)	TCLP (mg/L)	TCLP (mg/L)
<b>Mercury</b>	15,300	<0.01	0.2



Using Multiple Extraction Procedure (MEP) analysis, the treated material demonstrated long-term stability indicating that the mercury was captured in the mineral matrix and was not subject to selective dissolution (Table 2).

Table 2: Mercury Waste Multiple Extraction Procedure (after treatment)

	MEP 1	MEP 2	MEP 3	MEP 4	MEP 5	MEP 6	MEP 7	MEP 8	MEP 9	MEP 10	MEP 11	MEP 12
<b>Mercury</b>	0.04	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.24	0.13	0.23	0.11

Furthermore, the bulk treated material showed good physical strength, with an Unconfined Compressive Strength (UCS) of 1.5MPa.

### Mercury Filter Cake and Mercury Iodide

Toxfree was approached by the management of a Zinc Smelter with a view to providing a treatment solution for Mercury Filter Cake generated and stored on the site. In order to demonstrate the efficacy of the Dolocrete® Technology to the client and regulators, Toxfree undertook a complex suite of bench scale treatment evaluations. The TCLP results achieved clearly demonstrate the complete stabilisation the mercury, confirming the suitability of the Dolocrete® process for the treatment of mercury wastes.

In another application, a disused Zinc and Lead smelter in Newcastle requested to have Mercuric Iodide treated using the Dolocrete® Technology.

Table 3: Mercury waste data (before and after treatment)

	Before Treatment	After Treatment	
	Total Concentration	Leachable Concentration	Regulatory Requirement
	SCC (mg/kg)	TCLP (mg/L)	TCLP (mg/L)
<b>Mercury Filter Cake</b>	95,900	<0.01	0.2
<b>Mercury Iodide</b>	11,600	<0.01	

