Dioxin Bioremediation through EM Technology

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Abstract: *In United States of America, like in Japan, dioxin issues must be dealt with, in particular, with landfill leachate related issues. Like Japan, the United States has its share of incinerators; however, many are closed or about to be closed down for polluting the atmosphere and the immediate surroundings. However, due to land space, there are many landfill sites. They are all classified according to toxic, hazardous material to paper products to woods and concrete. All landfill sites are regulated. It must be lined with various materials such as HDPE plastic and installed with drainage pipes to collect the liquid run-offs into ponds for treatment or hauled away for proper waste management. The run-offs are called leachate. This leachate can contain many families of dioxins. There are more than seventy members of the family of chlorinated dioxins. It was found to be a contaminant of the herbicide 2,4,5-T (tricholorophenoxy-acetic acid) some ten years after latter was approved for use; it was then banned by FDA for most purposes. Waste contaminated with dioxin must be disposed of in officially approved landfills. In County of Yolo, the landfill leachate was treated by water treatment facility at City of Davis. Pipes transported it to the facility. Recently, they found dioxins in the leachate. They refused to treat the leachate. The County of Yolo Landfill Facility was in a quandary due to non-treatment of their leachate from the landfill site. It was at this time frame that EM Technologies, Inc. distributor approached them with an innovative bioremediation. They conducted their own bench top test with EM Technologies, Inc.'s testing protocol. With direct assistance from Dr. Teruo Higa, the test began and ended in successful 80% plus bioremediation of dioxins in liquid environment.*

Introduction

When EM Technologies, Inc. representative approached the County of Yolo concerning their landfill site, it was not about bioremediation of dioxin. It was about landfill odor issues and increasing the compaction for the landfill. These two areas were not their concerns at all. Their concerns were dioxin leachate issues. At that time the representative did not have an actual experimental database for dioxin bioremediation. However, when the test results came in for dioxin bioremediation in incinerators in Japan, the County of Yolo Landfill Management took notice of EM Technology. They were eager to work with the product. EM Technologies, Inc. submitted a proposal to do this project. However, the landfill management team decided to do a "bench top" test to determine the feasibility of the product.

Method The protocol specified replicating the actual system. For the experiment, three two gallon glass containers were used. One was marked as control, second as 1:1,000, and the third as 1:10,000. Once a week for 4 weeks, EM Waste Treatment and EMZ Ceramics powder were introduced into the liquid at above dosages. To account for the evaporation, leachate was added to the liquid in appropriate amounts. After 4 weeks later, control was tested for dioxins (Table 1). Then, 1:1,000 sample was tested for dioxins (Table 2). Due to miscommunication 1:10,000 sample was not tested.

Results The test indicated a substantial reduction in dioxins; however, the County of Yolo was not satisfied with the results. They wanted complete disappearance of dioxins. For EM Technologies, Inc., it was a matter of further introduction of EM Waster Treatment and EMZ Ceramics powder to erase the dioxins. Unfortunately, the communication was terminated with the team leader at that time.

Conclusion It is difficult to convey an EM technology to many professionals. How can a simple system unravel a complex system? There are only few professionals who can see the new horizons in an EM technology. It will take time but EM will make the difference.

Reference

Lewis, Sr., Richard J., (1997). Hawley's Condensed Chemical Dictionary, Thirteenth Edition, John Wiley & Sons, Inc.

PCDD & PCDF
EPA METHOD 8290

Sample ID	: 98-13444-2	Date Received	:	11/20/98	QC Lot	:	LC1201A
Lab ID	: 5716-0001-SA	Date Extracted	:	12/1/98	Units	:	ng/L
Matrix	: Aqueous	Sample Amount	:	0.968 L	TEQ	:	0.27

Table 1. Analysis of Control Sample Bottle

Compound	Cone	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8 TCDD	ND	3.4			
Total TCDD	ND	3.4			
1,2,3,7,8-PeCDD	ND	2.5			
Total PeCDD	ND	2.5			
1,2,3,4,7,8-HxCDD	ND	4.2			
1,2,3,6,7,8 HxCDD	ND	4.5			
1,2,3,7,8,9-HxCDD	ND	4.0			
Total HxCDD	ND	4.5			
1,2,3,4,6,7,8-HpCDD	14		0.94	>10.:1	A
Total HpCDD	25		1.11	>10.:1	
OCDD	130		0.79	>10.:1	
2,3,7,8-TCDF	ND	1.2			
Total TCDF	ND	1.2			
1,2,3,7,8-PeCDF	ND	3.1			
2,3,4,7,8-PeCDF	ND	3.3			
Total PeCDF	ND	3.3			
1,2,3,4,7,8-HxCDF	ND	2.8			
1,2,3,6,7,8-HxCDF	ND	2.7			
2,3,4,6,7,8-HxCDF	ND	3.1			
1,2,3,7,8,9-HxCDF	ND	3.6			
Total HxCDF	ND	3.6			
1,2,3,4,6,7,8-HpCDF	ND	8.6			
1,2,3,4,7,8,9-HpCDF	ND	5.3			
Total HpCDF	ND	9.5			
OCDF	ND	9.8			

PCDD & PCDF
EPA METHOD 8290

Sample ID:	98-13444-3ADDN	Date Received :	12/29/98	QC Lot :	LC1231A
Lab ID	: 6093-0001-SA	Date Extracted :	12/31/98	Units :	ng/L
Matrix	: Aqueous	Sample Amount :	0.961 L	TEQ :	0.047

Table 2. **Analysis of 1:1,000 (EM Waste Treatment and EMZ Ceramics Powder) Sample Bottle**

Compound	Cone	D.L.	Ratio	S/N Ratio	Qualifier
2,3,7,8 TCDD	ND	1.3			
Total TCDD	ND	4.3			
1,2,3,7,8-PeCDD	ND	3.7			
Total PeCDD	ND	3.7			
1,2,3,4,7,8-HxCDD	ND	8.2			
1,2,3,6,7,8 HxCDD	ND	8.3			
1,2,3,7,8,9-HxCDD	ND	7.5			
Total HxCDD	ND	8.3			
1,2,3,4,6,7,8-HpCDD	ND	9.9			
Total HpCDD	ND	9.9			
OCDD	49		0.87	>10.:1	A
2,3,7,8-TCDF	ND	3.4			
Total TCDF	ND	3.4			
1,2,3,7,8-PeCDF	ND	5.8			
2,3,4,7,8-PeCDF	ND	6.1			
Total PeCDF	ND	6.1			
1,2,3,4,7,8-HxCDF	ND	2.6			
1,2,3,6,7,8-HxCDF	ND	2.4			
2,3,4,6,7,8-HxCDF	ND	2.8			
1,2,3,7,8,9-HxCDF	ND	3.1			
Total HxCDF	ND	4.3			
1,2,3,4,6,7,8-HpCDF	ND	4.0			
1,2,3,4,7,8,9-HpCDF	ND	4.7			
Total HpCDF	ND	4.7			
OCDF	ND	9.6			